PROCESSING OF PRONOUNS AND REFLEXIVES IN TURKISH-GERMAN BILINGUALS

Gloria-Mona Knospe

Submission date: 25.09.2018
Defense date: 09.05.2019

Doctoral dissertation submitted to the Faculty of Human Sciences at the University of Potsdam in fulfillment of the requirements for the degree of Doctor of Philosophy in Cognitive Science

Supervisors:
PD Dr. Claudia Felser
Prof. Dr. Harald Clahsen

Reviewers:
PD Dr. Claudia Felser
Prof. Dr. Pia Knoeferle

Published online at the
Institutional Repository of the University of Potsdam:
https://doi.org/10.25932/publishup-43644
https://nbn-resolving.org/urn:nbn:de:kobv:517-opus4-436442

Abstract

Previous studies on native language (L1) anaphor resolution have found that monolingual native speakers are sensitive to syntactic, pragmatic, and semantic constraints on pronouns and reflexive resolution. However, most studies have focused on English and other Germanic languages, and little is currently known about the online (i.e., real-time) processing of anaphors in languages with syntactically less restricted anaphors, such as Turkish. We also know relatively little about how 'non-standard' populations such as non-native (L2) speakers and heritage speakers (HSs) resolve anaphors.

This thesis investigates the interpretation and real-time processing of anaphors in German and in a typologically different and as yet understudied language, Turkish. It compares hypotheses about differences between native speakers' (L1ers) and L2 speakers' (L2ers) sentence processing, looking into differences in processing mechanisms as well as the possibility of cross-linguistic influence. To help fill the current research gap regarding HS sentence comprehension, it compares findings for this group with those for L2ers.

To investigate the representation and processing of anaphors in these three populations, I carried out a series of offline questionnaires and Visual-World eye-tracking experiments on the resolution of reflexives and pronouns in both German and Turkish. In the German experiments, native German speakers as well as L2ers of German were tested, while in the Turkish experiments, non-bilingual native Turkish speakers as well as HSs of Turkish with L2 German were tested. This allowed me to observe both cross-linguistic differences as well as population differences between monolinguals' and different types of bilinguals' resolution of anaphors.

Regarding the comprehension of Turkish anaphors by L1ers, contrary to what has been previously assumed, I found that Turkish has no reflexive that follows Condition A of Binding theory (Chomsky, 1981). Furthermore, I propose more general cross-linguistic differences between Turkish and German, in the form of

a stronger reliance on pragmatic information in anaphor resolution overall in Turkish compared to German.

As for the processing differences between L1ers and L2ers of a language, I found evidence in support of hypotheses which propose that L2ers of German rely more strongly on non-syntactic information compared to L1ers (Clahsen & Felser, 2006, 2017; Cunnings, 2016, 2017), independent of a potential influence of their L1. HSs, on the other hand, showed a tendency to overemphasize interpretational contrasts between different Turkish anaphors compared to monolingual native speakers. However, lower-proficiency HSs were likely to merge different forms for simplified representation and processing. Overall, L2ers and HSs showed differences from monolingual native speakers both in their final interpretation of anaphors and during online processing. However, these differences were not parallel between the two types of bilingual and thus do not support a unified model of L2 and HS processing (cf. Montrul, 2012).

The findings of this thesis contribute to the field of anaphor resolution by providing data from a previously unexplored language, Turkish, as well as contributing to research on native and non-native processing differences. My results also illustrate the importance of considering individual differences in the acquisition process when studying bilingual language comprehension. Factors such as age of acquisition, language proficiency and the type of input a language learner receives may influence the processing mechanisms they develop and employ, both between and within different bilingual populations.

Acknowledgements

A long time has gone by since I started my PhD project, and I would not have been able to complete this thesis without the help and feedback of others.

First of all, I am very grateful to my supervisor Claudia Felser for accepting me as her PhD student, teaching me a lot about linguistics and often giving me a valuable new perspective on my ideas. Thanks for keeping me on track and reminding me of what is important when I was getting lost in details. I also really appreciated your fast comments on the drafts that I produced throughout the years. I would also like to thank Harald Clahsen for giving me helpful feedback over the course of my studies, and for his direction of the Potsdam Research Institute for Multilingualism (PRIM), together with Claudia.

My PRIM colleagues were happy to answer linguistic, statistical, eye-tracking-related and many other questions, and for this I especially thank Sabrina, Vera, Clare, João, and Sol. I also really appreciated Michaela's excellent organizational skills and participant management when I was running experiments. To my fellow PhD students at PRIM: I have worked in three PhD student offices over the years. In all of them, being surrounded by you helped me continue when I had a bad day, whether I needed a boost in productivity, a laugh, or a different perspective. Anna Stutter Garcia - thanks for koality bear hugs, and for staying by my side throughout this journey, even after I moved to a different country.

I am very thankful to the Turkish community in Berlin for helping me find participants and their appreciation for my interest in their language and culture. I would like to specifically thank Semanur, Seçkin, Gülşah, Ayşe, Nurdan, and Bilal for their help in developing my experimental materials and/or participant recruitment.

My PhD was partly financed by a PhD scholarship from the University of Potsdam. For this, I would like to thank the university, and the Landesgraduierten-

förderung Brandenburg.

The figures used in the Visual-World experiments reported in this thesis were generously provided to our lab by Playmobil®, for which I am very grateful.

I am lucky to have friends who listened whenever I was frustrated and never complained about it. I would like to thank Steffi and Kathrin for the best listening skills and most comforting words. I also cannot forget to acknowledge the city of Lausanne for providing me with such a beautiful view when I was writing up my thesis.

I am eternally grateful for my family, especially my parents and siblings, who never doubted my ability to complete my PhD. I would not be where I am today without my mother, who taught me that I can achieve anything I want, but also to keep in mind what really matters in life. Lastly, I want to thank Hannes for his patience and understanding, his unconditional love, and for always being there for me.

Contents

List of Figures

List of Tables

Chapter 1

Introduction

1.1 Pronoun resolution in monolingual and bilingual populations

This thesis investigates the resolution of anaphors in languages and populations that have not received much attention. I compare anaphor resolution in native speakers and two types of bilingual speakers (L2 speakers and heritage speakers) in two languages: **German**, which is similar in its properties to English, the most frequently studied language in anaphor resolution; and **Turkish**, which differs in the properties of its pronouns and reflexives from both English and German.

Despite many previous studies on English and other languages, there is an ongoing debate on how the **processing of pronouns and reflexives** takes place in **adult native speakers** (L1ers). Some remaining open questions are the role of syntactic vs. non-syntactic (e.g. semantic or pragmatic) factors, the timing of these effects during processing, and how this affects the ultimate interpretation of anaphors (e.g. Clackson, Felser, & Clahsen, 2011; Dillon, Mishler, Sloggett, & Phillips, 2013). Furthermore, it is unclear how well hypotheses based on evidence on Germanic languages extend to typologically different languages such as Turkish. One goal of this thesis is to identify the constraints that guide (online) anaphor resolution in German compared to Turkish and investigate potential cross-linguistic differences by presenting evidence from L1ers of both languages in corresponding experiments.

Another question this thesis deals with is whether (and if so, how) **non-native**

speakers process syntactic dependencies differently from monolinguals. In this thesis, the labels 'non-native speakers' and 'L2ers' are used interchangeably. L2ers are usually defined as people who have started learning a language after having at least partially acquired their native language (L1). Normally, L2ers who have started learning the language after age 6 are considered *late L2 learners*, while people who have acquired a language before that age are considered *early L2 learners*. When two languages have been introduced from birth, or the second language (L2) was introduced before age 3, this population is sometimes described as *2L1ers* (because they are considered to have two L1s). Because I am interested in the impact that the age of acquiring a second language has on language processing, I will include bilinguals from all three groups in the participant sample for Turkish speakers of German, and test the influence of the age of acquisition (AoA) of German. For the sake of simplicity, I will refer to all of these bilinguals as L2ers of German, irrespective of their German AoA.

There are different perspectives on how L2ers differ from L1ers in language comprehension overall, and pronoun resolution specifically. The hypotheses range from proposing that L1-L2 differences can be reduced to proficiency and processing speed (Hopp, 2006, 2010; McDonald, 2006), to describing more fundamental differences in processing mechanisms (Cunnings, 2016) or structural representations (Clahsen & Felser, 2006, 2017) between native and non-native speakers. Ch. 3 will present these hypotheses in more detail, and provide a context for the interpretation of the results in this thesis. A central aim of this thesis is to contribute to the understanding of L2 anaphor resolution and the constraints that guide it.

A third group under investigation in this study is **heritage speakers** (HSs). In this thesis, HSs are defined as people who grew up in a country where the majority language is different from their family language. Due to different amounts of exposure and use of the heritage language (HL), HL proficiency may vary widely among HSs. While there are HSs with merely receptive abilities, in this thesis I will focus on HSs who also have productive abilities in their HL. HSs are a subgroup of L1ers, and in this thesis they will be compared with L1ers who did not grow up with a second language from early childhood, who I will refer to as monolinguals or **monolingual L1ers**.

HL research is a relatively young field, but some theories have been proposed, such as incomplete acquisition (Montrul, 2002; Polinsky, 2006) and attrition (e.g. Polinsky, 2011). Previous studies of HL pronoun resolution have found that HSs are more likely to consider syntactically illicit antecedents for pronouns (Gürel & Yilmaz, 2011; Keating, VanPatten, & Jegerski, 2011; J.-H. Kim, 2007;

J.-H. Kim, Montrul, & Yoon, 2009), while others report no or only minor differences between HSs and monolingual L1ers (Keating, Jegerski, & Vanpatten, 2016; Rinke, 2016; Schmitz, Di Venanzio, & Scherger, 2016). However, only very few studies have looked at online processing; therefore, this thesis aims to contribute to the understanding of HL processing of anaphors.

Another factor to consider is the heterogeneity of groups of bilinguals for a variety of factors. Thus, **individual differences** may play a role in both L2 and HL anaphor resolution. This thesis will focus on the role of L1 and L2 proficiency, as well as the AoA of the L2.

1.2 Research questions

Based on these considerations, this thesis will address the following research questions:

1. **How do the constraints that guide L1 anaphor resolution differ between German and Turkish?**

   This question addresses the possibility of cross-linguistic differences in anaphor resolution between typologically different languages such as German and Turkish. The theoretical literature describes differences between the German and Turkish anaphor systems both in the number of different anaphors in the language, and in the constraints on the potential antecedents of these anaphors. While there are some studies that have looked at German or Turkish, to my knowledge no study has tested the same materials in Turkish and in a Germanic language, and looked both at final interpretations of anaphors and real-time language processing.

2. **Do Turkish-speaking L2ers of German process German anaphors differently than German L1ers?**

   This question asks what characterizes L2 anaphor resolution in comparison to L1 anaphor resolution, and how L1-L2 differences can be explained. For this, it is also important to consider potential differences between offline and online performance in L2ers, which have been described in previous studies. Furthermore, the role of individual differences such as language proficiency and the AoA of the L2 will be investigated to paint a clearer picture of L2 processing of anaphors.

3. **Do German-speaking HSs of Turkish process Turkish anaphors differently than monolingual Turkish L1ers?**

Previous theories of HS language comprehension have focused mostly on how the HL is acquired, but it is still unclear how HS processing differs from processing in monolingual L1ers. Some accounts propose parallels with L2ers (e.g. Montrul, 2012). This thesis tries to explore whether the patterns that characterize L2 and HS anaphor resolution are comparable. However, as this study tests L2ers of German and HSs of Turkish, cross-linguistic differences in L1 anaphor resolution must also be considered for this. Because HSs are a very heterogeneous group, the role of individual differences in language proficiency and AoA will also be investigated for this group.

1.3 Thesis structure

Chapter 2 gives an overview of structural properties of German and Turkish, mainly focusing on the properties of reflexives and pronouns, and which types of antecedents are syntactically acceptable according to the theoretical literature.

Chapter 3 presents previous findings on anaphor resolution in monolingual and bilingual populations, and describes the models and hypotheses for anaphoric processing that are investigated in this thesis.

Chapter 4 presents four questionnaire experiments. The first two experiments investigate offline pronoun resolution in native and non-native speakers of German, and the other two present Turkish versions of the German experiments, which were tested with monolingual L1ers of Turkish as well as Turkish HSs. Unlike the other chapters presenting experiments, Ch. 4 investigates not only object anaphors, but also subject pronouns in both German and Turkish.

Chapter 5 provides a description and discussion of two eye-tracking experiments on the processing of pronouns and reflexives in German. A group of Turkish-speaking L2ers is compared to German L1ers, and individual differences in the Turkish-speaking L2 group are explored. Furthermore, a proficiency-matched subset of the Turkish-speaking group is compared to a group of Russian-speaking L2ers of German to investigate effects of L1 influence.

Chapter 6 investigates the online processing of Turkish pronouns and reflexives in two eye-tracking experiments. Turkish monolingual L1ers are compared to HSs of Turkish with L2 German. Effects of individual differences in HL proficiency are also investigated.

Chapter 7 summarizes the findings of this thesis and their implications, and

attempts to answer the general research questions described above.

Chapter 8 provides an overall conclusion, as well as some directions for future research.

Chapter 2

Linguistic background: Pronouns and reflexives in German and Turkish

2.1 Introduction

In this chapter, I will describe relevant linguistic characteristics of German and Turkish, focusing mainly on pronouns and reflexives and their structural properties. This introduction provides a description of general commonalities and differences between German and Turkish in terms of word order, morphology and syntax. After this, I will describe the anaphor system in each of the two languages in detail in separate subsections of this chapter. I will show that the German and Turkish anaphor systems differ in terms of the structural constraints that are relevant for reflexives, and pragmatic constraints for overt pronouns. I will also show that Turkish has more anaphors than German and describe their properties in detail. The two anaphors without a German counterpart that are of interest for this thesis are the null pronoun *pro* and the overt anaphor *kendisi*, of which the latter has been been categorized both as a reflexive and a pronoun.

German is a language in the Germanic branch of Indo-European languages, while Turkish belongs to the family of Turkic languages (a branch of Altaic languages). Thus, the languages are not closely related. At the same time, the two languages do share a number of properties of their respective grammars. For example, the base word order of both languages is SOV, and in both languages,

word order is also fairly flexible compared to languages like English. While Turkish is a head-final language, German is mostly head-initial, but verb-final (see (2.1)).

(2.1) Verb-final phrases in German

a. Tom bemerkt, dass der Hund weg ist.
Tom notice$_{3^{rd}Sing}$ that the$_{NomMasc}$ dog gone be$_{3^{rd}Sing}$
'Tom notices that the dog is gone.'

b. Tom geht den Hund suchen.
Tom go$_{3^{rd}Sing}$ the$_{AccMasc}$ dog search
'Tom goes to look for the dog.'

Another difference between German and Turkish in terms of word order is in wh-questions: While Turkish is wh-in-situ, German has wh-movement (see (2.2) below).

(2.2) Wh-questions

Turkish: Ali nereye gidiyor?
Ali where$_{Dat}$ go$_{3^{rd}Sing}$

German: Wohin geht Ali?
Whereto go$_{3^{rd}Sing}$ Ali

English: *'Where is Ali going?'*

In terms of morphology, both languages may be classified as 'morphologically rich', as they have extensive morphological features on both nominals and verbs. However, German and Turkish differ regarding the most common type of morphology in the language. Turkish is a strongly agglutinating language. Hence, the Turkish verbal morphology includes distinct types of affixes for tense, aspect, person, number, and negation, which are attached to the stem or to each other without changes to their form (see (2.3)).

(2.3) Yıka -n -ma -dı -n -ız.
wash Pass Neg Imperf 2nd Plur
'You(plural) did not wash yourselves.'

Furthermore, Turkish nominal morphology also includes a large number of affix types, as illustrated in (2.4) below.

(2.4)

firin	-ci	-ler	-im	-iz	-den
oven	Profession	3rdPlur	1stPoss	1st/2ndPlur	from

'from our bakers'

Unlike Turkish, German is a fusional synthetic language. While German has agglutination in nouns (e.g. *Be-urteil-ung* 'judgment'), it is fusional in most of its verbal morphology: e.g., in *du geh-st* 'you go', the *-st* suffix carries both person and number information.

A morphological feature that exists in German, but not in Turkish, is the gender marking on nouns and pronouns. As can be seen in Table 2.1, the Turkish masculine and feminine noun forms are identical, as well as the third person pronoun in its masculine, feminine and neuter form. Another interesting contrast between Turkish and German can be detected from Table 2.1 as well: Unlike German, Turkish does not have definite determiners. A noun without a determiner is definite, while an indefinite determiner (*bir* 'a/one') marks an indefinite noun.

Table 2.1 *Gender marking in Turkish, German, and English*

Language	noun_{m}	noun_{f}	$\text{pronoun}_{\text{m}}$	$\text{pronoun}_{\text{f}}$	$\text{pronoun}_{\text{n}}$
Turkish	öğretmen	öğretmen	o	o	o
German	der Lehrer	die Lehrerin	er	sie	es
English	the teacher	the teacher	he	she	it

Having given a brief overview of the grammatical systems of German and Turkish, the remaining part of this chapter will focus on one specific aspect of Turkish and German syntax, namely pronouns and reflexives. For more detailed information on each language's grammar, see Kornfilt (1997b), G. L. Lewis (1967), or Göksel and Kerslake (2005) for Turkish, and Hentschel and Weydt (2013b) or Durrell (2011) for German.

2.2 Pronominal anaphors in German

In this section, I will discuss the properties of the German anaphor system in detail, focusing on pronouns first and then on reflexives. In this thesis, the term

pronoun will only be used to refer to non-reflexive anaphors, while **reflexive** will be used for reflexive anaphors. I will use the term **anaphor** generally to refer to any expression which refers to another expression in context, which includes both reflexives and pronouns, as well as non-pronominal anaphors. This thesis focuses only on pronominal anaphors.

2.2.1 Pronouns in German

In the following, I will first describe the properties of pronouns in intrasentential contexts, and then move on to discourse pronouns. In the final part of this section, I will explain the pro-drop phenomenon, and discuss to what extent and in which form it occurs in German.

2.2.1.1 Intrasentential pronouns

German has different types of overt pronouns, with some types which have to agree with their antecedents in person, gender, and number. Condition B of Binding Theory (Chomsky, 1981) states that a pronoun must be free within its governing category. This means that the antecedent of a pronoun must come from outside the pronoun's governing category (see (2.5)).

(2.5) **Condition B**
A pronominal is free in its governing category.
(Chomsky, 1981, p. 188)

Note that Binding Theory uses the term pronominal rather than pronoun for non-reflexive anaphors. There has been some debate about what constitutes a governing category, but it is commonly understood as 'a noun phrase (NP) or sentence (S) which contains the anaphor as well as a governor (= an element such as a verb that can assign case)' (definition adapted from Patterson, 2013). In (2.6) below, the pronoun *ihm* is the object of the complement clause *dass Tom ihm einen Apfel kaufte*. Complement clauses are considered governing categories for pronouns. Because *Tom*, the subject of the complement clause, appears within the pronoun's governing category, it is described as the **local antecedent**, while *Peter* is considered **non-local**, because it is outside the pronoun's governing category. Therefore, *Tom* cannot be coindexed with the pronoun *ihm*, according to Condition B. The only sentence-internal antecedent that is available for *ihm* in (2.6) is *Peter*, because as the matrix clause subject, it is non-local.

An antecedent that is licensed by the syntactic information relevant for a constraint like Condition B (such as *Peter* in (2.6)) is referred to as the **(syntactically) accessible or licit antecedent**. **Syntactically inaccessible or illicit antecedents**, on the other hand, are potential antecedents of an anaphor which are not licensed by the syntactic information of the anaphor and its context, such as *Tom* in (2.6).

Condition B was developed as a linguistic universal, and it is widely considered a hard constraint on the resolution of third-person pronouns in German. However, its cross-linguistic validity may be questioned, as examples of local binding of a pronoun can be found in a variety of languages (Huang, 2000; Reuland, 2011).

(2.6) Peter$_{i}$ sieht, dass Tom$_{j}$ ihm$_{i/*j}$ einen Apfel kauft.
Peter$_{i}$ see$_{3^{rd}Sing}$ that Tom$_{j}$ him$_{i/*j}$ an apple buy$_{3^{rd}Sing}$
'Peter$_i$ sees, that Tom$_j$ buys him$_{i/*j}$ an apple.'

German pronouns do not require an antecedent within the same sentence, as they can also refer to antecedents from the discourse. This is described in detail in the following section, 2.2.1.2. The following parts of this subsection will focus on personal pronouns, leaving out other pronominal forms such as possessive or interrogative pronouns, which are not under investigation in this thesis.

Third person pronouns, which are the focus of this thesis, generally follow Condition B in German and thus cannot take local antecedents. This holds for main clauses and different types of subordinate clauses, such as complement clauses as well as relative clauses (see (2.7)).

(2.7) Condition B in German

a. main clauses

Walther$_{i}$ malt ihm$_{*i}$ ein Bild.
Walther draw$_{3^{rd}Sing}$ him a picture
'Walther draws him a picture.'

b. complement clauses

Thomas$_{i}$ sieht, dass Walther$_{j}$ ihm$_{i/*j}$ ein Bild malt.
Thomas see$_{3rdSing}$ that Walther him a picture draw$_{3^{rd}Sing}$
'Thomas sees that Walther draws him a picture.'

c. relative clauses

Thomas$_{i}$ sieht den Mann$_{j}$, der ihm$_{i/*j}$ ein Bild malt.
Thomas see$_{3^{rd}Sing}$ the man who him a picture draw$_{3^{rd}Sing}$

'Thomas sees the man who draws him a picture.'

There are a few exceptions in which third person pronouns are exempt from Condition B in German, e.g. in picture noun phrases (Kaiser & Runner, 2008, see (2.8)). In these cases, the pronoun is ambiguous between referring to a local, non-local or sentence-external antecedent. The types of constructions tested in this thesis (single-sentence contexts with complement clauses, and two-sentence contexts, in which the second sentence contains a temporal adverbial clause) do not fall under the structures that allow local reference for pronouns in German.

(2.8) Thomas$_{i}$ zeigt Walther$_{j}$ das Bild von ihm$_{i/j/k}$.
Thomas show$_{3^{rd}Sing}$ Walther the picture of him
'Thomas shows Walther the picture of him.'

Table 2.2 *Personal pronouns in German*

Person & Number Case \	1^{st}Sing	2^{nd}Sing	3^{rd}Sing	1^{st}Plur	2^{nd}Plur	3^{rd}Plur
Nominative	ich	du	er sie es	wir	ihr	sie
Genitive	meiner	deiner	seiner ihrer seiner	unserer	eurer	ihrer
Dative	mir	dir	ihm ihr ihm	uns	euch	ihnen
Accusative	mich	dich	ihn sie es	uns	euch	sie

Overall, German has seven different forms for personal pronouns in nominative case, some of which are ambiguous between nominative and accusative case (see Table 2.2). Furthermore, German pronouns are marked for both number and person. Within the nominative, the only form that is ambiguous in terms of number is the form *sie*, which is used for both feminine third person singular and third person plural (for all genders). Furthermore, the third person singular is the only combination of person and number that has three different forms, one for each grammatical gender: *er* (which is used in the examples above) is masculine, *sie* is feminine, and *es* is neuter. Historically, the gender distinction also existed for the third person plural, but in modern German, the original

masculine form is used for all genders (Hentschel & Weydt, 2013a).

German first- and second-person pronouns may take both local and non-local antecedents, as they may be used both as pronouns and as reflexives. For example, in (2.9)-a, *mich* can refer to the subject of the same clause, *ich*. In (2.9)-b, *dir* can only refer to the non-local antecedent *du*, but not to the local antecedent, *Walther*. However, as (2.9)-c illustrates, this is only because of the mismatch in person. While this may seem like a contradiction of Condition B, local binding of first- and second-person pronouns is common in languages that have no specific first- and second-person reflexive forms, such as German, Italian and Danish (Huang, 2000).

(2.9) First- and second-person pronouns in German

a. Ich$_{i}$ sehe mich$_{i}$ auf dem Bild.
I see$_{1^{st}\text{Sing}}$ me/myself on the picture
'I see myself on the picture.'

b. Du$_{i}$ weißt, dass Walther$_{j}$ dir$_{i/*j}$ ein Bild malt.
You know$_{2^{nd}\text{Sing}}$ that Walther you a picture draw$_{3^{rd}\text{Sing}}$
'You know that Walther draws you a picture.'

c. Ich$_{i}$ weiß, dass du$_{j}$ dich$_{*i/j}$ nicht verstecken kannst.
I know$_{1^{st}\text{Sing}}$ that you you not hide can$_{2^{nd}\text{Sing}}$
'I know that you cannot hide (yourself).'

In addition to these standard personal pronouns, German also has d-pronouns (*der*, *die*, *das*), which differ in their pragmatic function from personal pronouns (e.g. Ellert, 2013a). Though they can be used in similar positions as third-person personal pronouns (*er*, *sie*, *es*), they are considered demonstratives.[1] Note that d-pronouns are homophonous with definite determiners in German.

There is a general consensus that d-pronouns prefer different types of antecedent than personal pronouns when several potential antecedents are available from the discourse. While unmarked personal pronouns are thought to refer to the most prominent entity in the discourse, d-pronouns tend to prefer non-topics (e.g. Bosch, Katz, & Umbach, 2007; Bosch, Rozario, & Zhao, 2003; Kaiser,

[1] However, Ahrenholz (2007) points out that d-pronouns differ from another type of demonstrative pronoun (*dieser/diese/dieses* 'this one'), as d-pronouns may not refer to specific common knowledge in a conversation, but instead must have generic or unique antecedents. Thus, the term d-pronoun is often used to refer to this special type of demonstrative in German. D-pronouns are a special property of German, and corresponding forms do not exist in many other languages, e.g. English. As d-pronouns are the most common demonstratives in German and this thesis investigates the interpretation and processing of personal rather than demonstrative pronouns, I will focus my description of German demonstrative pronouns on d-pronouns only.

2011). However, several notions of topicality exist, and it has been claimed that 'aboutness' topics (Reinhart, 1981) are the only types of topic that are dispreferred by d-pronouns in German (Hinterwimmer, 2009).

It has been suggested that the relationship between d-pronouns and standard pronouns in German resembles that of overt and null pronouns in null subject languages like Turkish (see section 2.3.1.3 below). Specifically, the former pronoun type is considered marked and tends to prefer less prominent antecedents, while the latter is the unmarked form. Thus, the forms differ from each other pragmatically, rather than syntactically. While most of this thesis investigates the application of Condition B, a structure-sensitive semantic constraint, pragmatic aspects are also relevant, and will be discussed in more detail in the following subsection.

2.2.1.2 Discourse pronouns in German

Condition B specifies that a pronoun cannot refer to an entity within its governing category. Therefore, it is is a purely negative constraint, meaning it rules out a potential antecedent, which is often not enough to identify the antecedent of a third person pronoun. There may be several potential antecedents in the discourse. Sometimes, gender and number information may referentially disambiguate the pronoun. However, it is still possible that there are two potential antecedents in the discourse which match the pronoun in all of its morphological features (see (2.10) below). Several studies have claimed that in cases where disambiguating morphological information is not available, the most prominent entity in the previous discourse is chosen as the pronoun's antecedent (e.g. Ariel, 1988, 1990; Givón, 1983; Gundel, Hedberg, & Zacharski, 1993).

(2.10) Thomas arbeitete seit 40 Jahren bei VW. Er lebte mit seiner Familie in Wolfsburg. Thomas' Freund Walther wusste, dass er bald in Rente gehen würde.
'Thomas had been working for VW for 40 years. He lived in Wolfsburg with his family. Thomas' friend Walther knew that he would soon retire.'

In (2.10), most adult L1ers of German would preferably associate the pronoun *er* in the last sentence with *Thomas* rather than with the second potential antecedent in the discourse, *Thomas'* friend *Walther*. *Thomas* is the subject of the first sentence. In the second sentence, *er* is interpreted as referring to *Thomas*, as there is no other available antecedent. Therefore, *Thomas* is

rementioned twice in the second sentence, once as the personal pronoun *er* and once as the possessive pronoun *seiner*. In the third sentence, *Thomas* again appears as a modifier of the sentence subject. The friend, on the other hand, is only mentioned once. Therefore, despite the friend being the matrix subject and linearly closer to the pronoun than *Thomas*, the pronoun prefers *Thomas* as its antecedent due to its prominence.

The most prominent antecedent may differ depending on the model chosen to determine antecedent prominence. Among the factors that have been shown to affect an antecedent's structural prominence are topicality (on both sentence and discourse level), subjecthood, and first mention (Gernsbacher & Hargreaves, 1988; Gordon, Grosz, & Gilliom, 1993; Järvikivi, van Gompel, Hyönä, & Bertram, 2005). Semantic factors such as verb transitivity also affect the accessibility of antecedents and therefore also participants' antecedent choices and processing of referentially ambiguous pronouns (Pyykkönen, Matthews, & Järvikivi, 2010).

2.2.1.3 Pro-drop in German

Generally, Standard German does not license the dropping of subjects of finite clauses. Thus, German may be considered a non-pro-drop language. However, unlike in English, which is clearly non-pro-drop, some instances of pro-drop do occur even in Standard German, e.g. in constructions with *lassen* 'let' as in (2.11)-a. For this reason, some researchers (Huang, 2000) characterize German as a partial pro-drop or semi-pro-drop language.

Specifically, Huang (2000) distinguishes between three types of languages with respect to null subjects: a) full pro-drop languages, which allow any type of null subject, b) partial pro-drop languages, which allow only certain types of null subject, and c) non-pro-drop languages, which never allow null subjects. German falls into the second category, because it only allows expletive null subjects (i.e., null subjects without argumental or referential functions which contribute nothing to the meaning of the sentence), but not quasi-argumental null subjects (i.e. null subjects with an argument position, but no referential index) or referential null subjects (i.e. null subjects with both a referential index and an argument position). See (2.11) below for an illustration.

The referential null subject is the only one of these forms that could represent a counterpart to pronouns that are of interest in this thesis. Thus, in the contexts that are relevant for this thesis, no pro-drop is possible in Modern Standard German.

In contrast to German, referential subjects are frequently allowed (or even required) to be dropped in many pro-drop languages (e.g. Italian, Spanish, Korean; section 2.3.1.3 will describe the occurrence of pro-drop in Turkish).

(2.11) a. expletive null subjects

Dort lässt ∅ sich gut unterhalten.
There $\text{let}_{3^{rd}\text{Sing}}$ ∅ self good converse
'There one can have a nice conversation.'

b. quasi-argumental null subjects

* ∅ schneit.
∅ $\text{snow}_{3^{rd}\text{Sing}}$
'∅ *snows.*'

c. referential null subjects

* Peter denkt, dass ∅ zu spät kommen wird.
Peter $\text{think}_{3^{rd}\text{Sing}}$, that ∅ too late come $\text{will}_{3^{rd}\text{Sing}}$
'Peter thinks that ∅ will come too late.'

2.2.2 Reflexives in German

The following section will describe the properties of German reflexives. First, standard reflexives will be discussed, then the second subsection will deal with the use and effect of the reflexive intensifier *selbst*.

2.2.2.1 Standard reflexives in German

German has only one standard third person reflexive, *sich*. Unlike other German anaphors, *sich* is not marked for gender, number, or case. Therefore, it is used as a third person reflexive in both singular and plural, and can be used with both accusative and dative case. (Consequently, it can only appear in object position.) In this respect, German differs e.g. from English, which has gender- and number-marked third person reflexives.

Binding Theory (Chomsky, 1981) also has a syntactic constraint for the antecedents of reflexives, Condition A (see (2.12) below).

(2.12) **Condition A**
An anaphor is bound in its governing category.
(Chomsky, 1981, p. 188)

Note that the term *anaphor* is used in Binding Theory to refer to what I call reflexives in this thesis. Condition A states that the antecedent of a reflexive must appear in its governing category (i.e. an NP or sentence that contains both the reflexive and a governor, as described in section 2.2.1). The fact that the reflexive must be bound means that the antecedent must c-command the reflexive, as binding requires a c-command relationship between the binder and the bindee. An example of the Condition A constraint on reflexives in German can be found in (2.13)-a.

The governing category is the same for pronouns and reflexives, thus pronouns and reflexives have a complementary distribution according to Conditions A and B (see section 2.2.1.1). In (2.13)-a, *Walther* is the syntactically accessible antecedent for *sich*, and *Thomas* is the syntactically inaccessible antecedent. In (2.7)-b, where *sich* is replaced with *ihm*, the accessible antecedent is *Thomas*, while *Walther* is inaccessible.

Furthermore, *sich* tends to prefer subject antecedents (e.g. Hentschel & Weydt, 2013b). However, sentences in which *sich* corefers with another object are often acceptable, though dispreferred (Featherston & Sternefeld, 2003; Zifonun, 2003), and reflexives in NPs and infinitival constructions with control verbs[2] may refer to antecedents outside of their governing category (e.g. Zifonun, 2003, see (2.13)-b). In infinitival constructions, *sich* may only refer to the implicit subject of the infinitival verb. Thus, *wir* is not an acceptable antecedent for *sich* in (2.13)-c.

(2.13) a. *sich* in subordinate clauses

Thomas$_{\text{i}}$ sieht, dass Walther$_{\text{j}}$ sich$_{*\text{i/j}}$ ein Bild malt.
Thomas see$_{3^{\text{rd}}\text{Sing}}$ that Walther himself a picture draw$_{3^{\text{rd}}\text{Sing}}$
'Thomas sees that Walther draws himself a picture.'

[2]Control verbs are verbs like *decide, expect, demand*, and *promise*, which can take a subordinate (e.g. infinitival) construction as an argument. Furthermore, they semantically constrain the arguments of the verb in the subordinate construction. That is, the superordinate (control) verb defines whether the implicit subject of the subordinate verb is the subject or the object of the control verb. As an example, consider the following sentence from Polinsky (2013): *Maria$_i$ bat Peter$_j$, ___$_i$ zur Party gehen zu dürfen.* (Maria asked Peter to be allowed to go to the party.) The verb *bitten* (ask) determines that the antecedent for the implicit subject of the infinitival construction (marked as ___) has to refer to the subject of *bitten*. Replacing *bitten* with *versprechen* (promise) leads to another outcome: *Maria$_i$ verspricht Peter$_j$, ___$_j$ zur Party gehen zu dürfen.* (Maria promises Peter to be allowed to go to the party.) Here, ___ refers to the object of the control verb. Thus, the verb in the main clause controls the implicit subject argument of the subordinate verb.

b. *sich* in NPs (from Zifonun (2003))

Hans$_{i}$ empfiehlt Karl$_{j}$ größeres Vertrauen in sich$_{i/j}$.
Hans recommend$_{3^{rd}\text{Sing}}$ Karl greater trust in himself.
'Hans recommends Karl to put trust in himself.'

c. *sich* in infinitival constructions (from Zifonun (2003))

Wir$_{i}$ baten ihn$_{j}$, sich$_{*i/j}$ auf das Examen vorzubereiten.
We ask$_{1^{st}\text{PlurPast}}$ him, himself for the exam prepare$_{\text{Inf}}$
'We asked him to prepare himself for the exam.'

As mentioned above, German has no separate forms for reflexives in first or second person. Therefore, the personal pronoun forms may also refer to local antecedents. The respective first and second person reflexives are *mich*/*mir* and *dich*/*dir* for singular, and *uns* and *euch* for plural antecedents.

All of these reflexives can only appear in object position, and only in accusative or dative case. Reflexive usage in genitive case is very rare, and *sich* cannot be used in genitive. Rather, the respective personal pronoun form is used in genitive for first, second and third person reflexives, as can be seen in (2.14). Again, it is only the third person form that is marked for gender. In (2.14), the genitive reflexive is used in combination with *selbst*, as this is how it appears in natural contexts. The occurrence and function of reflexive constructions with *selbst* will be discussed in more detail in section 2.2.2.2 below.

(2.14) a. Ich gedachte meiner selbst.
I commemorate$_{1^{st}\text{SingPast}}$ myself$_{\text{Gen}}$ self.
'I commemorated myself.'

b. Du gedachtest deiner selbst.
You commemorate$_{2^{nd}\text{SingPast}}$ yourself$_{\text{Gen}}$ self.
'You commemorated yourself.'

c. Er/Sie gedachte seiner/ihrer selbst.
I commemorate$_{2^{nd}\text{SingPast}}$ himself$_{\text{Gen}}$/herself$_{\text{Gen}}$ self.
'He/She commemorated himself/herself.'

2.2.2.2 *selbst*

Aside from *sich*, there is a second, somewhat more marked, type of reflexive construction in German, namely *sich selbst*. It is formed by adding the word *selbst* after the reflexive, and has counterparts for first and second person reflexives as well (i.e. *mich selbst, dich selbst, uns selbst, euch selbst*). It can be

used in the same syntactic environments as the standard reflexive *sich*, so it also cannot appear as the subject of a sentence.

Without *sich*, the word *selbst* has been assigned different functions. The most important distinction is made between preposed *selbst* as in (2.15)-a and postposed *selbst* as in (2.15)-b (Edmondson & Plank, 1978). In (2.15)-a, the word following *selbst* is stressed and the insertion of *selbst* has both a scalar implication (i.e. Thomas not wanting to go into the house is more remarkable than all alternatives to Thomas) and a quantifying implication (i.e. the situation of not wanting to go into the house is true for more people than Thomas). In (2.15)-b, the scalar implication is the same (i.e. it was more remarkable that Thomas bought the birthday cake compared to all relevant alternatives), but there is no quantifying implication.

Selbst in cases like (2.15)-b is labeled 'intensifying selbst' and I will continue to use this label for such cases in the following. *Sich selbst* is considered an instance of intensifying *selbst* which contains a reflexive.

(2.15) a. Selbst THOMAS wollte nicht in das verlassene Haus
Even Thomas want$_{3^{rd}\text{SingPast}}$ not in the abandoned house
gehen.
go
'Even Thomas did not want to go into the abandoned house.'

b. Thomas SELBST hatte die Geburtstagstorte
Thomas himself have$_{3^{rd}\text{SingPast}}$ the birthdaycake
gekauft.
buy$_{\text{PastParticiple}}$
'Thomas himself had bought the birthday cake.'

While there are different theoretical analyses for the exact function of the *selbst* insertion in the case of the reflexive (Eckardt, 2001; Primus, 1992), in all analyses, inserting *selbst* serves to focus certain aspects of the sentence content, and therefore should make the overall content of the sentence more prominent. When treating *sich selbst* as an instance of intensifying *selbst*, it may be described as an emphatic reflexive, which means that it emphasizes the reference to its antecedent, and draws attention to a coindexation that is more remarkable than other options. For example, it may make coindexation to an unlikely antecedent more acceptable (Featherston & Sternefeld, 2003).

Kaiser and Runner (2008) did not find any difference in antecedent choices for *sich* vs. *sich selbst* in PNPs. It is important to note that PNPs have generally been considered an environment that challenges the classical binding conditions

of Binding Theory, as pronouns and reflexives do not behave in a complementary manner in these environments. Therefore, in sentences such as (2.16), pronouns and reflexives can refer to both of the referents mentioned in the sentence. In these cases, the two German reflexive forms *sich* and *sich selbst* produce the same interpretational preferences in German L1ers. To my knowledge, the interpretational preferences for *sich* vs. *sich selbst* have not been investigated in cases in which the reflexive only has one syntactically licensed potential binder.

(2.16) (taken from Kaiser & Runner, 2008)

a. Tobias$_{i}$ erzählte / hörte von Peter$_{k}$ von dem Bild von
Tobias told / heard from Peter about the picture of
ihm$_{i/k}$ / sich$_{i/k}$ / sich selbst$_{i/k}$.
him / himself / himself (emphatic).
'Tobias told/heard from Peter about the picture of him/himself.'

To summarize the most important points of this section, German has a standard third person pronoun, *er/sie/es*, and a standard reflexive, *sich*. Both forms have structural or structure-sensitive constraints on antecedents that are described in Condition A for the reflexive, and Condition B for the pronoun. German only allows the dropping of pronouns in very restricted contexts, and is thus considered a non-pro-drop, or a partial pro-drop language. Furthermore, there is a reflexive construction *sich selbst*, which combines *sich* with the focus adverb *selbst*, but it has not yet been established whether antecedent constraints differ between *sich selbst* and the standard reflexive *sich*.

2.3 Pronominal anaphors in Turkish

As previously mentioned in the introduction to this chapter (section 2.1), the Turkish and German anaphor systems differ from each other in a number of ways. In this section, I will first describe Turkish pronouns. As a part of this, I will discuss the pro-drop phenomenon in Turkish. Then I will move on to discuss reflexives. The last part of this section deals with the special form *kendisi*, which has received various classifications in the literature. Unlike German, the properties of the Turkish anaphor system have not been studied extensively, so the presentation of some anaphors in this section will describe conflicting claims and open questions.

2.3.1 Pronouns in Turkish

2.3.1.1 Intrasentential pronouns in Turkish

An overview of Turkish overt personal pronouns is given in Table 2.3. Turkish has six cases, and all Turkish overt pronouns can be inflected for case. Irregular forms only arise for two cases, namely dative and genitive. First, in the dative case, first and second person singular pronouns undergo a vowel change in the stem (from *e* to *a*). Therefore, in compliance with the vowel harmony system of Turkish,[3] they also receive a different dative suffix than would be expected from the nominative stems (*-a* instead of *-e*). Second, the genitive case suffix for nouns is *-(I)n*, but in the first person singular and plural, it is replaced with *-(I)m* (which is also the possessive suffix for first person singular).[4]

Table 2.3 *Overt personal pronouns in Turkish*

Person & Number Case \	1st Sing	2nd Sing	3rd Sing	1st Plur	2nd Plur	3rd Plur
Nominative	ben	sen	o	biz	siz	onlar
Genitive	benim	senin	onun	bizim	sizin	onların
Dative	bana	sana	ona	bize	size	onlara
Accusative	beni	seni	onu	bizi	sizi	onları
Locative	bende	sende	onda	bizde	sizde	onlarda
Ablative	benden	senden	ondan	bizden	sizden	onlardan

One more thing to note is that the second person plural form *siz* is also used as a formal pronoun to address a singular second person. Furthermore, it is possible to attach a plural suffix *-ler* to the first and second person plural forms *biz* and *siz*, resulting in the forms *bizler* and *sizler*, respectively. These are used for example when a single person was previously addressed with *siz* (in formal

[3] For a detailed description of Turkish vowel harmony, see Ch. 3 of Göksel and Kerslake (2005).

[4] The suffix *-(I)m* is used both as a genitive suffix to form possessive pronouns and as a first person possessive marker on nouns. So for example in *ben-im öğretmen-im* ('my teacher'), both words receive the same suffix. Because the possessive suffix is sufficient to identify the possessor of a noun, first and second person possessive pronouns are often dropped in unmarked contexts, as discussed in section 2.3.1.3.

contexts), and one then refers to a group to which this person belongs. Other applications include the individuation of the members of a group and referring to multiple groups (Göksel & Kerslake, 2005). It is however not possible to add a second plural suffix to the third person plural form *onlar*, e.g. to refer to multiple groups. This may be due to the fact that *onlar* is already marked for plural, and, while the doubling of suffixes or infixes does sometimes occur in Turkish, it is rare and restricted to specific constructions (e.g. the passive and the causative suffixes).

The form that is most relevant for the purpose of this thesis is the third person singular form, *o*. This form contains another irregularity: *-n-* (instead of *-y-*) is inserted between *o* and all of the case suffixes.[5] *O* also functions as a demonstrative pronoun.[6] Furthermore, *o* can appear as a resumptive pronoun (i.e. a pronoun that restates its antecedent within the same sentence) after *ki* (see (2.17)).

(2.17)

Serpil$_i$	teyzem	ki	o$_i$	başarılı	bir	kadın,	...
Serpil	aunt$_{1^{st}\text{SingPoss}}$	who	(s)he	successful	one	woman,	...

'My aunt Serpil$_i$, who (she$_i$) is a successful woman, ...'

Being a third person pronoun, *o* is always potentially ambiguous with regards to its antecedent. It is generally assumed that, in line with Condition B, *o* cannot take local antecedents (Kornfilt, 1997a; Meral, 2013). For example, in (2.18) *o* cannot refer to the subject of the subordinate clause (*Onur*), but only to the matrix subject (*Serpil*) or to an antecedent from a previous sentence. Note that the subordinate clause in (2.18) is nominalized, which is the most common form of subordination in Turkish. Therefore, the literal translation of (2.18) would be *Serpil remembers Onur's embarrassing her/him in the office yesterday*, where *Onur's embarrassing her/him in the office yesterday* represents the embedded clause.

(2.18)

Serpil$_i$	Onur'un$_j$	onu$_{i/*j/k}$	dün	ofiste	utandırdığını	
Serpil	Onur$_{\text{Gen}}$	(s)he$_{\text{Acc}}$	yesterday	office$_{\text{Loc}}$	embarrass-that$_{3^{rd}\text{Sing}}$	
hatırlıyor.						

[5] For other nouns that end in a vowel, *-n-* is also inserted before the genitive suffix, but *-y-* is inserted before the accusative and dative suffixes, and no consonant is inserted before the locative and ablative suffixes (because these suffixes start with a consonant).

[6] Turkish has three demonstrative pronouns: *bu*, *şu*, and *o*. The three forms express differences in proximity (similar to Spanish *éste*, *ése*, and *aquel*). Furthermore, they provide the basis for the locative and directional pronoun stems *bura-*, *şura-*, and *ora-*.

remember$_{3^{rd}\text{Sing}}$
'Serpil$_i$ remembers that Onur$_j$ embarrassed her/him$_{i/*j/k}$ in the office yesterday.'

An observation made by Gürel (2002) and Kornfilt (1997a) is that, when appearing as the subject of such an embedded clause, *o* cannot refer to the subject of the matrix clause (see (2.19)). Gürel (2002) concludes that *o* in embedded subject positions cannot take an antecedent from inside its sentence, irrespective of whether the antecedent is in the same clause as the pronoun or not. Based on this, Gürel (2002) claims that the governing category for an embedded subject is the matrix clause rather than the nominalized subordinate clause (because the nominalized verb is a governor for an embedded object, but not for an embedded subject).[7]

(2.19) Serpil$_i$ onun$_{*i/j}$ sınafta kötü bir not aldığını biliyor.
Serpil (s)he$_{Gen}$ exam$_{Loc}$ bad a grade take-that$_{3^{rd}\text{Sing}}$ know$_{3^{rd}\text{Sing}}$
'Serpil$_i$ knows that (s)he$_{*i/j}$ got a bad grade in the exam.'

However, Dinçtopal-Deniz (2009) has shown that an embedded subject can refer to an antecedent inside the same sentence, e.g. to the object of the matrix clause, as illustrated in (2.20) below (adapted from Dinçtopal-Deniz (2009), p. 25). While the embedded subject *o* cannot refer to the matrix subject *Ali* in (2.20), as correctly predicted by Gürel (2002), it may refer to the matrix object, *Ayşe*. Thus, sentence-internal reference is possible for *o* irrespective of whether it is an object or a subject. The fact that an embedded *o* cannot refer to an antecedent within the same nominalized clause, but can refer to an antecedent outside of the clause suggests that nominalized subordinate clauses do in fact serve as the governing category for *o*.

(2.20) Ali$_i$ Ayşe'ye$_k$ [o-nun$_{*i/k}$ gel-me-sin]-i söyledi.
Ali Ayşe$_{Dat}$ (s)he$_{Gen}$ come$_{Nom\text{-}3^{rd}\text{SingPoss}}$ say$_{Past}$
'Ali told Ayşe that (s)he should come.'

Assuming that subordinate clauses are the governing category for embedded

[7] Gürel (2002) explains that while nominalized clauses are the most common form of subordination in Turkish, they behave like NPs syntactically (which was also claimed in George & Kornfilt, 1981), e.g., by receiving case endings. Thus, their structural properties might not be sufficient to serve as governing categories, unlike e.g. German or English subordinate clauses, which are considered full clauses rather than NPs.

pronouns in Turkish, the binding behavior of *o* can be almost completely predicted from Condition B. That is, *o* must be free in its governing category, but can freely refer to an antecedent outside of this domain. However, one exception to this rule persists: The fact that *o* in embedded subject position cannot refer to the matrix subject. Note that this observation does not conflict with Binding Theory, as Condition B simply states that a pronoun must be free within its governing category (i.e. the subordinate clause in this case).

It seems that factors beyond syntax and semantics also play a role in determining acceptable antecedents for *o*. Based on the topic shift function assigned to *o* (described below in section 2.3.1.3), it is possible that the matrix subject is excluded as an antecedent for *o* on purely pragmatic grounds. That is, if *o* signals a topic shift, *o* in an embedded subject position cannot refer to the current topic, but instead refers to an antecedent previously mentioned in the discourse. Since a new topic is usually introduced only by subjects, *o* in an embedded *object* position may still refer to the matrix subject (= the current topic) under this proposal (as in (2.18)).

Another explanation for the observed effect may be found in Kornfilt (1987). She asserts that an adaptation and refinement of Chomsky's Avoid Pronoun Principle (Chomsky, 1981) applies to Turkish, such that in contexts where *pro* is licensed in Turkish, an overt pronoun may not be used to refer to the same antecedent as the null pronoun. This is illustrated in (2.21) (taken from Kornfilt (1987), pp. 113-114, Exs. (19) and (20)): While the null pronoun can refer to the matrix subject *askerler* 'soldiers', the use of the overt pronoun *onlar* 'they' is only grammatical when it is disjoint from the matrix subject, and refers to a sentence-external antecedent.

(2.21) a. Askerler$_{i}$ [onlar-in$_{*i/j}$ cephe-ye gönderilmelerin]-e karşi.
Soldiers they$_{Gen}$ front$_{Dat}$ send$_{PassInf3^{rd}PlurDat}$ against
'The soldiers are against their being sent to the front.'

b. Askerler$_{i}$ [*pro$_{i}$* cephe-ye gönderilmelerin]-e karşi.
Soldiers pro front$_{Dat}$ send$_{PassInf3^{rd}SingDat}$ against
'The soldiers are against their being sent to the front.'

2.3.1.2 Discourse pronouns in Turkish

In line with the Givenness hierarchy (Gundel et al., 1993), it is assumed that a null pronoun typically refers to the most prominent antecedent in the discourse, while an overt pronoun signals topic shift (Dinçtopal-Deniz, 2009; Enç, 1986; Kornfilt, 1997a). As mentioned before, null pronouns are often considered to be

the unmarked pronominal form or a form that signals topic maintenance (Carminati, 2002; Kornfilt, 1997a; Prentza, 2014; Tsimpli, Sorace, Heycock, & Filiaci, 2004). As the discourse topic is the most prominent entity in the discourse, it is the typical antecedent of a null pronoun.

According to the Givenness hierarchy (Gundel et al., 1993), the most prominent antecedent is referred to by the most reduced pronominal form in each language. In non-null-subject languages, the most reduced form is an unstressed personal pronoun (e.g. *er* in German), and therefore these types of overt pronoun tend to refer to the most prominent antecedent. In null-subject-languages such as Turkish, however, the most reduced form is the null pronoun. Hence, the use of an overt pronoun indicates reference to a less prominent antecedent, and marks topic shift in these languages.

An example of the division of labor among null and overt subject pronouns in null-subject languages as well as of the parallels between unstressed overt pronouns in non-null-subject languages and null pronouns in null-subject languages can be found in Roberts, Gullberg, and Indefrey (2008) (see (2.22)). As can be seen in (2.22)-a, the unstressed pronoun in the non-null-subject language Dutch takes a prominent, sentence-internal antecedent. The same goes for the null pronoun in Turkish in (2.22)-b. The overt pronoun *o*, however, cannot refer to a sentence-internal antecedent, as illustrated in (2.22)-c.

(2.22) *'Peter and Hans are in the office. While Peter is working, he is eating a sandwich.'*

a. Dutch: Unstressed pronoun
Peter en Hans zitten in her kantoor. Terwijl Peter_{i} aan het werk is, eet hij_{i} een boterham.

b. Turkish: Zero pronoun
Peter_{i} ve Hans_{j} ofiste oturuyorlar. Peter_{i} çalışırken, $\text{pro}_{i/*j}$ sandeviç yiyor.

c. Turkish: Overt pronoun
Peter_{i} ve Hans_{j} ofiste oturuyorlar. Peter_{i} çalışırken, $\text{o}_{*i/j}$ sandeviç yiyor.

(example taken from Roberts et al. (2008))

Roberts et al. (2008) claim that coindexing a null pronoun with a sentence-external antecedent or the overt pronoun *o* with a sentence-internal antecedent is ungrammatical. Dinçtopal-Deniz (2009) also claims that ungrammaticality follows when a pronoun is used with the dispreferred antecedent. However, it

is also possible that the distinction between null and overt pronouns is not as categorical as described by Roberts et al. (2008) and others. For example, note that Roberts et al. (2008) do not indicate whether it is ungrammatical for the Dutch unstressed pronoun to refer to the sentence-external antecedent.

For Dutch, it is generally assumed that both antecedents are grammatical for unstressed pronouns, but the sentence-internal antecedent is highly preferred. It is difficult to determine whether an analysis is highly dispreferred or is ungrammatical based solely on the judgments of a small number of people. The availability of sentence-external antecedents for Turkish null pronouns may be tested by investigating L1ers' interpretation of these pronouns on a larger scale, which to my knowledge has not yet been done.

2.3.1.3 Pro-drop in Turkish

Unlike German, Turkish is a full pro-drop language, meaning it allows null pronouns to be not only expletive, but also quasi-argumental and referential. Based on Huang's (2000) typology of null-subject languages (cf. section 2.2.1.3), this qualifies Turkish as a full null-subject language. As well as allowing for referential null subjects, Turkish null referents can also be objects or possessive pronouns (e.g. Pfaff, 1991). Examples of null pronoun constructions in Turkish can be found in (2.23).

(2.23) a. null subjects

Pro okula gidiyor.
Pro school$_{\text{Dat}}$ go$_{3^{\text{rd}}\text{Sing}}$
'He/she is going to school.'

b. null objects

A: Serpil hep meşgul. Ona uzun zamandan beri görmedim.
Serpil always busy (s)he$_{\text{Dat}}$ long time$_{\text{Abl}}$ since see$_{\text{Neg}1^{\text{st}}\text{Sing}}$
'Serpil is always busy. I haven't seen her in a long time.'

Sen de mi?
you also quest.part.
'What about you?'

B: Ben *pro* bugün gördüm.
I *pro*$_{\text{Acc}}$ today see$_{\text{Past}1^{\text{st}}\text{Sing}}$.

'I saw her today'.

c. null possessors

Pro kitabı
Pro_{Gen} $\text{book}_{\text{Poss3}^{\text{rd}}\text{Sing}}$
'his/her book'

Thus, Turkish has extensive pro-drop, similar to e.g. Italian or Spanish. It has been assumed that across languages rich inflection is correlated with the possibility of dropping pronouns (Jaeggli, 1982; Taraldsen, 1978). However, it is often not necessary for pro-drop that the identity of the null pronoun can be detected from verbal inflection. Otherwise, languages without verbal inflection such as Chinese could not allow for pro-drop at all. The opposite is the case: Chinese actually allows extensive pro-drop and is generally considered a full pro-drop language, despite lacking subject-verb agreement (e.g. Huang, 2000).

Another example in which identifiability through verbal agreement is not necessary for pro-drop is the fact that Turkish allows for object-drop, despite its lack of object-verb agreement. Objects may be dropped when the identity of the referent has been disambiguated through the (linguistic or non-linguistic) context. A common context in which object-drop occurs is during conversation, when an object was established as a topic by one speaker, and the next speaker comments on that topic without mentioning it overtly (see (2.23)-b).

While verbal agreement is not necessary for pro-drop, it is also not sufficient for pro-drop in Turkish. That is, despite its rich verbal inflection, e.g. subject-verb agreement, Turkish has overt pronouns, which are commonly used in certain contexts. In the following, I will discuss the frequency of Turkish null and overt pronouns in different syntactic environments.

The distribution of null and overt pronouns in Turkish For subjects in finite clauses, which are in a sententially prominent position and whose referent can often be identified through the inflection on the predicate, pro-drop is very common.

In non-finite clauses such as nominalized subordinate clauses, the inflection on the predicate is sufficient to determine person and number of the subject in most cases (see (2.24)-a), and the subject is also frequently dropped. However, even in non-finite structures without person marking on the verb (e.g. in temporal

adverbial clauses with *-ken*, see (2.24)-b), subject drop is not uncommon and sometimes even required.[8]

(2.24) a. pro-drop in a nominalized subordinate clause

Ali$_i$ *pro$_i$* geç kaldığını biliyordu.
Ali *pro* late stay-that$_{3^{rd}\text{SingAcc}}$ know$_{3^{rd}\text{SingPast}}$
'Ali knew that he arrived late.'

b. pro-drop in a temporal adverbial clause

Pro$_i$ evine gelirken, Semra$_i$ şaşırdı.
pro house$_{3^{rd}\text{PossDat}}$ come-when, Semra be-surprised$_{3^{rd}\text{SingPast}}$
'When pro came home, Semra was surprised.'

It has been argued (e.g. by Kornfilt, 1997a) that null pronouns are the unmarked pronominal form in Turkish. If this is the case, what are the environments in which *pro* tends to be replaced with an overt pronoun?

Göksel and Kerslake (2005) give an extensive list of environments in which pronouns are overtly realized. To summarize, they claim first that an overt pronoun is used when there is a contrast between the current subject and the previously mentioned subject, or the subject of the matrix clause (for subjects of non-finite subordinate clauses). Second, they claim that focused subject entities must be realized overtly. Third, overt pronouns are also used when there is a shift in topic (e.g. from a specific statement to a generalization). Lastly, they claim that pronouns are normally realized overtly at the beginning of a conversation or when introducing a new conversation topic. This pattern found in descriptive data has led several researchers to conclude that overt pronouns in Turkish signal topic shift (e.g. Dinçtopal-Deniz, 2009; Enç, 1986).

Potential antecedents for null pronouns in Turkish Another question concerns the interpretation of null pronouns. It is generally assumed that a null subject can freely refer to an antecedent from both inside and outside its own sentence. For example, the embedded null subject in (2.25), *pro*, may refer to either the object of the matrix clause, to the subject of the matrix clause, or to a sentence-external antecedent, such as the subject of the previous sentence. Thus, there seem to be no syntactic restrictions on the antecedents of null subjects.

However, it also seems that not all potential antecedents of a null pronoun are

[8] For an overview of different types of subordinate structures in Turkish, see Göksel and Kerslake (2005), sections 8.5 (pp.84-89) and 12.3 (pp. 122-124), and for a more detailed discussion of these structures see chapters 24 - 27 (pp. 351-437) of the same book.

considered to the same extent. Since the null pronoun is considered to be the unmarked form in Turkish, it has been claimed that it prefers the most prominent entity in the sentence or discourse as its antecedent. Thus, it is assumed that the null pronoun signals topic maintenance, similar to null subjects in other pro-drop languages (Carminati, 2002; Tsimpli et al., 2004). Furthermore, Carminati (2002) and Tsimpli et al. (2004) also claim that null subjects prefer subject antecedents over object antecedents.

(2.25) Ali$_i$ Selma$_j$'ya [*pro*$_{i/j/k}$ geç kalacağan]ı söyledi.
Ali Selma$_{Dat}$ *pro* late stay-that$_{3^{rd}SingFutAcc}$ say$_{3^{rd}SingPast}$
'Ali told Selma that pro would be late.'

Regarding the potential antecedents for null *objects*, different accounts have been put forward. Most researchers (Dinçtopal-Deniz, 2009; Kornfilt, 2001; Rudnev, 2011) argue that, in direct object position, the null pronoun *pro* resembles the overt pronoun *o* in that it may only refer to non-local antecedents. Gürel (2002), on the other hand, claims that null pronouns in direct object positions are ambiguous between a local and a non-local interpretation.[9] An informal survey I conducted among L1ers of Turkish (n=5) confirms the view that local antecedents are not accepted for null objects.

It is possible that non-local antecedents are strongly preferred for null objects, but local antecedents are not ruled out completely. This pattern may still be in line with Gürel's (2002) account. Therefore, it would be interesting to conduct an experimental investigation to disentangle the two positions. At present, given the number of studies that rule out local binding for null objects, I will accept the view that *pro* in object position can only take non-local antecedents.

2.3.2 Reflexives in Turkish

2.3.2.1 Standard reflexives in Turkish

The standard third person singular reflexive in Turkish is *kendi*. It is identical to the Turkish reflexive stem, which is inflected for person and number, as can be seen in Table 2.4. *Kendi* also receives an inflection for case that is fully regular. Therefore, Table 2.4 only contains the nominative forms of *kendi-*. (The case suffixes are attached behind the possessive person suffixes, in a similar fashion

[9] Different judgments for the potential antecedents of *pro* in essentially parallel sentences (including main clauses and embedded clauses) can be found on p. 27 of Gürel (2002) and p. 22 of Dinçtopal-Deniz (2009).

to other nouns.) Table 2.4 also shows another third person singular form for the reflexive: *kendi-si*, which consists of the stem *kendi* and the standard possessive third person singular suffix *-sI*. This form and its properties will be discussed in detail in the following subsection of this chapter, 2.3.2.2.

Table 2.4 *Reflexives in Turkish*

Person \Number	Singular	Plural
1st	kendi-m	kendi-miz
2nd	kendi-n	kendi-niz
3rd	kendi / kendi-si	kendi-leri

Kendi can be used as an emphatic anaphor in Turkish (see (2.26)). This property is different from the German reflexive *sich*, which can only be used as a reflexive, and which is replaced by the word *selbst* in emphatic contexts (see section 2.2.2.2 above).

(2.26) Ben$_i$ kendim$_i$ gittim.
I myself go$_{1^{st}SingPast}$
'I myself went.' / 'I went myself.'

Another use of *kendi* that is related to its reflexive usage is its adjectival function. As illustrated in 2.27, *kendi* can also be a 'reflexival adjective' which may be translated as *own* in English. In this usage, *kendi* is not inflected for gender or number. Furthermore, it is potentially referentially ambiguous, but prefers a subject as its antecedent. Thus, while it is possible for *kendi* in (2.27) to refer to the object antecedent *Ali*, *Ahmet* is clearly preferred as an antecedent (Göksel & Kerslake, 2005).

(2.27) Ahmet$_i$ Ali$_j$'ye kendi$_{i(/j)}$ arabasını gösteriyor.
Ahmet Ali$_{Dat}$ own car$_{Acc}$ show$_{3^{rd}Sing}$
'Ahmet shows Ali his own car.'

Generally, Turkish reflexives are thought to conform to Condition A, i.e. they must be bound by a local c-commanding antecedent. Therefore, a sentence like (2.28) is regarded as ungrammatical if *kendi* is coindexed with the non-local antecedent, *Ali* (Dinçtopal-Deniz, 2009; Enç, 1989; George & Kornfilt, 1981;

Gürel, 2002; Kornfilt, 1997a; Meral, 2013; Rudnev, 2008, 2011; Underhill, 1976).

(2.28) Ali_{i} [Can'ın_{j} $\text{kendinden}_{*i/j}$ korktğu]-nu zannediyor.
Ali Can_{Gen} $\text{himself}_{\text{Abl}}$ $\text{be-scared-that}_{3^{rd}\text{Sing}}$ $\text{think}_{3^{rd}\text{Sing}}$.
'Ali thinks that Can is scared of him/himself.'

Kornfilt (2001) claims that for most L1ers of Turkish, *kendi* cannot refer to a non-local antecedent except when it is used in 'narrative style'. In some idiolects, this usage is also found in regular colloquial discourse. Nonetheless, *kendi* is unambiguously considered a reflexive in Kornfilt (2001). Support for this position can also be found in Göksel and Kerslake (2005, p. 236), where, in an example similar to (2.28), it is claimed that *kendi* is much more likely to refer to the local antecedent than to the non-local antecedent.

Given these judgments, the question still remains whether the preference for local antecedents in *kendi* is categorical, or whether *kendi* can sometimes override Condition A and also take non-local antecedents in Modern Standard Turkish. If *kendi* can in fact take non-local antecedents, it may be interesting to compare it to long-distance reflexives in other languages like *zibun* in Japanese, and *caki* and *casin* in Korean. **Long-distance reflexives** are reflexives that require a c-commanding antecedent but need not be bound in their governing category, contrary to Condition A. Note however that most long-distance reflexives tend to prefer a non-local antecedent over a local antecedent (Huang, 2000), while the opposite is the case for *kendi*.

Sezer (1979) claims that the antecedents for reflexives in Turkish are not fully determined through syntax, but that semantic factors play a larger role than syntactic constraints in the antecedent preferences for *kendi*. That is, *kendi* may refer to non-local and even non-c-commanding antecedents, if these antecedents are preferred for extra-syntactic reasons. According to Sezer (1979), the most important factors in such cases are 'Empathy' and 'Direct discourse'. If a speaker is fully empathetic with a given character in a discourse, this character may bind *kendi* even when it is outside of its governing category. To give an example (from Sezer, 1979, p. 751), in a sentence like (2.28), *kendi* may refer to *Ali* if it has become clear from the discourse that the speaker is reporting and empathizing with *Ali*'s feelings.

Referring back to an antecedent whose perspective (speech, feelings or thoughts) is described in the context in which the anaphor appears is called **logophoric binding**. According to Sezer (1979), in these cases the use of *kendi* is preferred over *kendisi*, which may also be used logophorically, but signals 'psychologi-

cal distance' between the speaker and the described person. Other reports of logophoric binding of *kendi* can be found in Meral (2010), Yakut (2015) and Gračanin-Yüksek, Lago, Şafak, Demir, and Kırkıcı (2017).

Furthermore, morphology and world knowledge or semantic plausibility may override the preference for local c-commanding antecedents in *kendi*. Thus, in (2.29) (taken from Sezer, 1979, p. 758), the knowledge that a salary must be sufficient for a human being rather than for itself allows the reader to coindex *kendi* and *Hasan*.

(2.29) Hasan'ın$_{i}$ maaşı kendine$_{i}$ yetiyor.
Hasan$_{\text{Gen}}$ salary$_{\text{Poss}}$ self$_{\text{Dat}}$ be-sufficient$_{3^{\text{rd}}\text{Sing}}$
'Hasan's salary is sufficient for him.'

While it is possible that the judgments in Sezer (1979) were made by people who are part of the minority of Turkish L1ers mentioned in Kornfilt (2001) who accept non-local binding of *kendi*, it is evident that non-local binding is much more common for *kendi* than it is for the German reflexive *sich*. At the same time, the only non-local antecedents that have been reported to be (potentially) grammatical for *kendi* c-command the anaphor, suggesting that *kendi* does not behave like a pronoun when referring to a non-local antecedent. This is also supported by the observation that *kendi* cannot take a sentence-external antecedent. Based on these restrictions for potential antecedents, I conclude that *kendi* must be categorized as a reflexive.

In the following section (2.3.2.2), I will provide a detailed description of *kendisi*, a form that, while strongly resembling *kendi* in its surface form, is much less restrictive in its antecedent choice and therefore has sometimes been categorized as a pronoun.

Note that, while there are two distinct forms of third person singular reflexives, there is only one third person **plural** reflexive, *kendileri*. The internal structure of *kendi-ler-i* can be broken down into the reflexive stem *kendi*, the plural marker *-ler*, and the possessive suffix *-i*. Thus, unlike *kendi* and like *kendisi*, *kendileri* is inflected for possessive case. It also aligns with *kendisi* rather than *kendi* in terms of the antecedents it can take (Dinçtopal-Deniz, 2009; Göksel & Kerslake, 2005), i.e. it does not require a local c-commanding antecedent, and it may even refer to an antecedent from a previous sentence (e.g., see (2.30-c)). Thus, the properties of *kendisi* described below in section 2.3.2.2 are thought to apply to *kendileri*, as well.

2.3.2.2 The special case of *kendisi*

As mentioned above, *kendisi* has the surface form of a third person singular possessive-marked *kendi*. The fact that two third person singular reflexives exist raises the question whether the two forms serve different functions. It has in fact been claimed (e.g. in Göksel & Kerslake, 2005; Kornfilt, 2001; Sezer, 1979) that *kendi* and *kendisi* differ from each other in their respective antecedent preferences.

Kendisi can take antecedents both from within and from outside its governing category (Dinçtopal-Deniz, 2009; Enç, 1989; Gürel, 2002, 2004, 2006; Kornfilt, 1997a; Sezer, 1979). Furthermore, a c-command relation is not necessary to establish a coreference relation between *kendisi* and an antecedent (Rudnev, 2011). *Kendisi* can also take antecedents that are outside its sentence, and even from a different turn in conversation (see examples from the literature in (2.30) below.)

Kendisi has sometimes been likened to forms such as *zibun* (Schlyter, 1978; Enç, 1989), a Japanese long-distance reflexive which also has remarkably few restrictions on its antecedent options. *Zibun* does however have to be bound within the same sentence (e.g. Enç, 1989; Rudnev, 2011). Thus, *kendisi* is even less restricted than *zibun* in this respect.

(2.30) a. non-c-commanding antecedent (Rudnev, 2011; p. 11)

Bir çiftçi bir eşeği (eğer) kendisininse döver.
one farmer one $\text{donkey}_{\text{Poss}}$ if $\text{self}_{3^{\text{rd}}\text{SingGenCond}}$ $\text{beat}_{3^{\text{rd}}\text{Sing}}$

'A farmer beats a donkey if he owns it.'

b. sentence-external antecedent (Göksel & Kerslake, 2005; p. 237)

Ahmet hala uyuyor. Kendisi bu günlerde çok yorgun.
Ahmet still $\text{sleep}_{3^{\text{rd}}\text{SingProg}}$. (S)He these days_{Loc} very tired

'Ahmet is still asleep. He is very tired at the moment.'

c. turns in conversation (Göksel & Kerslake, 2005; p. 237)

A: Kulüpteki arkadaşların nasıl?
$\text{club}_{\text{Loc-ki}}$ friends how?

'How are your friends at the club?'

B: Bilmem, kendi-lerin-i çoktandır görmedim.
$\text{know}_{1^{\text{st}}\text{SingNeg}}$, $\text{s/he}_{3^{\text{rd}}\text{PlurPossAcc}}$ long-since $\text{see}_{1^{\text{st}}\text{SingNegPast}}$

'I don't know. I haven't seen them for a long time.'

The observed pattern has led researchers to categorize *kendisi* in various ways. For example, some claim that *kendisi* can serve both as a reflexive and as a pronoun (Göksel & Kerslake, 2005). In this analysis, the identity and function of *kendisi* changes depending on the context that it is in.[10] A criticism of this approach is that it has little explanatory power, despite its descriptive accuracy.

Gürel (2002) has put forward a different account. She claims that *kendisi* is the overt counterpart of the null pronoun *pro*. As described above, *pro* is less restricted than *o* in terms of binding and coreference, and *kendisi* resembles *pro* in that it can refer to both c-commanding and non-c-commanding antecedents sentence-internally, as well as antecedents from outside the sentence that the anaphor is in.

Other researchers (Dinçtopal-Deniz, 2009; Kornfilt, 2001) have claimed that the observed pattern is not due to *kendisi* being the overt counterpart of *pro*. Instead, they propose that *kendisi* is in fact phrasal, i.e. it is an agreement phrase (AgrP) that is headed by a null pronoun. The proposed structure of this phrase according to Kornfilt (2001) is displayed in (2.31). The possessive-marked reflexive *kendi* is bound by *pro*. Similar agreement phrases can be formed with a noun as the possessee, e.g. *Cem'in kedi-si* (Cem's cat) or pro_{Gen} *kedi-si* (his/her cat). Because the head of the agreement phrase with *kendi-si* is the null pronoun, the binding properties of *pro kendi-si* are determined through the binding properties of *pro* rather than *kendi*. Furthermore, the agreement phrase is considered the governing category for *pro*, so because *pro* is subject to Condition B, it can refer to any antecedent outside of this agreement phrase.

(2.31) a. pro_i kendi_i-si
pro $\text{self}_{\text{Poss}}$
'pro's self'

b. $[_{\text{AgrP}}$ *pro* $[_{\text{AgrP}'}$ -si $[_{\text{NP}}$ kendi-$]]]$

While it may seem that Gürel's (2002) and Kornfilt's (2001) accounts make the same predictions for the binding and coreference behavior of *kendisi*, Dinçtopal-Deniz (2009) shows that this is not the case. There are several syntactic environments in which *kendisi* can appear, but in which replacing *kendisi* with *pro* would lead to ungrammaticality. An example for this can be found in (2.32) (taken from Dinçtopal-Deniz (2009), p. 10). These cases are not in line with Gürel's (2002) proposal, as she claims that *kendisi* and *pro* are essentially par-

[10] This is in line with Cole's and Hermon's (1998) analysis of *dirinya*, a Malay anaphor that is very similar to *kendisi* in its binding properties.

allel in terms of binding and coreference.

(2.32) a. Ali Kerem$_{i}$'in kendisini$_{i}$ seviyor.
Ali Kerem$_{Gen}$ self$_{3SingPoss\text{-}Acc}$ like$_{3^{rd}Sing}$
'Ali likes Kerem's self.'

b. *Ali Kerem$_{i}$'in *pro* seviyor.
Ali Kerem$_{Gen}$ *pro* like$_{3^{rd}Sing}$
'Ali likes Kerem's pro.'

Due to the existence of examples like (2.32), Dinçtopal-Deniz (2009) concludes that *kendisi* cannot be the overt counterpart of the null pronoun as proposed by Gürel (2002). Rather, the binding behavior of *kendisi* can be explained by analyzing it as a phrasal construct which consists of *kendi* and the null pronoun *pro*. According to Dinçtopal-Deniz (2009), *kendi* behaves like a noun in a possessive phrase, so there is no difference between *pro kedi-si* (his/her cat) and *pro kendi-si* (his/her self). Kornfilt (2001), on the other hand, categorizes *kendi* as a reflexive.

Irrespective of their classification of *kendi*, both Kornfilt (2001) and Dinçtopal-Deniz (2009) claim that *pro* can refer to any antecedent in the discourse that is outside of the agreement phrase with *kendi*, which explains why *kendisi* can take antecedents in a wide range of syntactic positions. This account can also explain the different antecedent options for *pro* and *kendisi* when in object position:

(2.33) a. Ali$_{i}$ *pro*$_{i/j}$ kendi$_{i/j}$-si-ni seviyor.
Ali *pro* self$_{3SingPoss\text{-}Acc}$ like$_{3^{rd}Sing}$
'Ali likes himself/him/her/it.'

b. Ali$_{i}$ *pro*$_{*i/j}$ seviyor.
Ali *pro*$_{Acc}$ like$_{3^{rd}Sing}$
'Ali likes him/her/it.'

Kendisi in object position can refer to both local and non-local antecedents. This is illustrated in (2.33)-a, where *kendisi* can refer to *Ali*, because the reflexive *kendi* is bound by *pro*, which in turn is bound by *Ali*. The antecedent relation between *pro* and *Ali* is possible because *Ali* is outside the governing category for *pro*. As can be seen in (2.33)-b, when there is no agreement phrase, *pro* cannot refer to *Ali*, because *Ali* is within the same domain as *pro*. Thus, *pro* can only refer to an antecedent outside the sentence in this example.[11]

[11] (2.33)-b is adapted from Dinçtopal-Deniz (2009), p. 22. As described in section 2.24, Gürel (2002) claims that *pro* in object position can refer to an antecedent within the same clause. However, several other researchers (Dinçtopal-Deniz, 2009; Kornfilt, 2001; Rudnev,

Another analysis of *kendisi* was put forth by Rudnev (2011). Rudnev (2011) claims that the binding behavior of *kendisi* resembles that of a pronoun rather than the binding of a reflexive. Furthermore, Rudnev (2011) shows that *kendisi* cannot be compared to other cross-linguistic examples of long-distance reflexives, an analysis that was initially preferred for *kendisi* due to its surface form suggesting that it is a reflexive, and the observation that it can take long-distance antecedents. Nonetheless, Rudnev's (2011) analysis fails to provide explanations for cases like (2.32) and (2.33), in which *kendisi* would violate Condition B if it were a true pronoun.

Note that most recent analyses of *kendisi* do not propose that *kendisi* is a true reflexive. While some propose that *kendisi* can be both a reflexive and a pronoun, Kornfilt (2001), Gürel (2002), Dinçtopal-Deniz (2009), and Rudnev (2011) claim that most antecedent options of *kendisi* are either determined by a pronoun (*pro* in the agreement phrase), or are equivalent to those of a pronoun. The non-reflexive nature of *kendisi* is further exemplified by the fact that *kendisi* can also hold the subject position of matrix clauses (see (2.34)).

(2.34) Esra çok yorgun. Kendisi bugün uzun süredir calışıyordu.
Esra very tired. (S)He today long time-since work$_{3^{rd}\text{SingContPast}}$
'Esra is very tired. She has been working for a long time today.'

Based on the review above, for the following parts of this thesis I will adopt the phrasal analysis of *kendisi* put forth by Kornfilt (2001) and supported by Dinçtopal-Deniz (2009). The experiments in this thesis were not designed to distinguish between all the different analyses of *kendisi* described above, but some of the experimental results are relevant for the question of whether *kendisi* may be classified as a reflexive or as a pronoun.

Another question addressed in the experiments of this thesis asks whether some antecedents are preferred over others for *kendisi*. Göksel and Kerslake (2005) suggest that there is no clear bias in sentences in which *kendisi* is an embedded object that is ambiguous between referring to the embedded subject and the matrix subject, as illustrated in (2.35). As mentioned above, in the same sentence with *kendi* as an embedded object (2.28), *kendi* strongly prefers the embedded subject as an antecedent.

However, in simple sentences without subordinate clauses, *kendi* may be pre-

2011) have reported that this is ungrammatical, and this was confirmed to me in an informal survey, so I will adopt the view that null objects cannot refer to an antecedent within the same clause.

ferred over *kendisi* when referring to a local subject, suggesting that *kendisi* may prefer antecedents that are more distant syntactically (Kornfilt, 2001). Furthermore, Rudnev (2011) and Kornfilt (2001) showed that unlike many long-distance reflexives, *kendisi* does not have a preference for subject antecedents, but can readily be bound by syntactic objects. In a discourse, *kendisi* tends to prefer prominent antecedents and antecedents whose point of view is taken in an utterance (Schlyter, 1978; Sezer, 1979).

(2.35) Ahmet$_{i}$ [Ali$_{j}$'nin kendisine$_{i/j}$ baktığı]-nı gördü.
Ahmet Ali$_{Gen}$ himself$_{Dat}$ look-that$_{3^{rd}Sing}$ see$_{3^{rd}SingPast}$
'Ahmet saw that Ali looked at himself.'

2.4 Summary and conclusion

This chapter aimed to provide the linguistic background for the phenomena under investigation in this thesis. For this, I first provided an overview of the German anaphor system, discussing the existence of pro-drop, and the properties of different types of German anaphors. It has become clear that German reflexives and pronouns generally align with Conditions A and B of Binding Theory. Furthermore, I described how *selbst* may be used as an intensifier in reflexive contexts.

This chapter also showed that for Turkish, some aspects of the anaphor system are still under debate. In some respects, the Turkish anaphor system may be considered more complex than the German anaphor system. Turkish has extensive pro-drop, and while the use and the properties of null subjects aligns with most other pro-drop languages, null objects have been assigned different antecedent options by different researchers. Turkish furthermore has a special characteristic in its reflexive system, as there are two forms which are classified as a third person singular reflexive. In section 2.3.2.2, I have shown that one of these two, the inflected reflexive *kendisi*, does not in fact behave like a reflexive. In my opinion, the most convincing analysis of *kendisi* is Kornfilt's (2001), who characterizes it as a phrasal constituent.

Table 2.5 provides an overview of the anaphors that are relevant for this study, and shows the contrasts between pronouns and reflexives in German and Turkish.

This chapter provides a basis for the linguistic questions asked in my experiments. Section 2.2 is relevant to understanding the motivation behind and the

Table 2.5 *Different anaphors of German and Turkish and their characteristics according to the literature*

Language	**German**		**Turkish**			
Anaphor	**er**	**sich**	**pro**	**o**	**kendisi**	**kendi**
pronoun/ reflexive	pron.	refl.	pron.	pron.	?	refl.
overt / null	overt	overt	null	overt	overt	overt
local ants. allowed	no	yes	no	no	yes	yes
non-local ants. allowed	yes	no	yes	yes	yes	?
non-c-commanding ants. allowed	yes	no	yes	yes	yes	no

Note. A cell with a question mark indicates that there is no consensus in the literature about that specific combination of anaphor and characteristic.

design of experiments in Chapters 4 and 5, which deal with the interpretation and the online processing of German pronouns and reflexives in different populations. Section 2.3 is relevant for experiments in Chapters 4 and 6 which deal with the processing of Turkish pronouns and reflexives.

Because some aspects of the Turkish anaphor system are not fully understood (e.g., the acceptability of non-local antecedents for *kendi*, and the classification of *kendisi*), I investigate and discuss the anaphor resolution in monolingual L1ers before focusing on HS processing and whether and how it may differ from that of monolingual L1ers. For German, there are more existing studies on the online processing of pronouns and reflexives in L1ers, but also open questions about how anaphoric processing takes place in L1ers. Therefore, the experiments with German will also first describe L1ers' results, before comparing L1 and L2 interpretation and processing. To understand why these potential population differences are worth investigating, it is necessary to first get an overview of the existing literature on the processing of pronouns and reflexives and overall language processing in these populations, which is provided in the following chapter.

Chapter 3

Processing of pronouns and reflexives in monolingual and bilingual populations

3.1 Introduction

Ch. 2 described in detail the linguistic phenomena that are of interest for this thesis, and illustrated differences in the properties of pronouns and reflexives between Turkish and German. Ch. 3 will discuss the processing of pronouns and reflexives in different populations. Three populations (L1ers, L2ers, HSs) are of particular interest and constitute the participant groups in the experiments of Chapters 4-6.

The different subsections will first give a brief description of the population in question and discuss more general findings before turning to studies on the processing of anaphors. First, I will focus on L1ers, then L2ers, followed by HSs. For the two bilingual populations, I will also discuss the role of individual differences in each population. Compared to the processing of L1ers and L2ers, there are fewer studies that have dealt with HS processing. This thesis aims to add to existing research on all three of these populations.

3.2 Processing of pronouns and reflexives in L1ers

Generally, native language processing is thought to adhere to the grammatical constraints of the respective language, and healthy adult L1ers are often used as controls in studies on language acquisition, multilingualism, and language attrition. In terms of the offline interpretation of syntactic structures, L1ers do mostly align with what is characterized as grammatical by linguists, and empirical studies on adult L1ers can give insight into language characteristics beyond linguists' grammaticality judgments, for example by informing about interpretational biases for referentially ambiguous forms such as many long-distance reflexives.

However, it is important to consider that during online processing even L1ers may sometimes compute only a shallow syntactic analysis of the linguistic input (e.g. the 'good enough approach to language comprehension' of Ferreira & Patson, 2007). Several studies have shown that L1ers do not always compute full syntactic structures when comprehending language in real time, and may wrongly interpret structurally complex sentences, e.g. when they are semantically implausible (Van Herten, Kolk, & Chwilla, 2005). Even when L1ers do compute full syntactic analyses during language processing, the input they receive also contains semantic, pragmatic, and other types of information. For this reason, many theories of L1 processing deal with the question of when and how adult L1ers consider different types of information.

Constraint-based models of sentence processing (e.g. MacDonald, Pearlmutter, & Seidenberg, 1994; Mayberry, Crocker, & Knoeferle, 2009; McRae, Spivey-Knowlton, & Tanenhaus, 1998) claim that both syntactic and non-syntactic (including semantic, pragmatic, and non-linguistic) information becomes immediately available when a syntactic ambiguity is resolved. The different types of information may be weighted, and an analysis is selected from all possible analyses of a sentence as a result of combining these weighted constraints every time new information is presented over the course of processing.

A subgroup of constraint-based models that is relevant for this thesis are cue-based retrieval models (e.g. Foraker & McElree, 2011; R. L. Lewis & Vasishth, 2005; R. L. Lewis, Vasishth, & Van Dyke, 2006; Van Dyke & McElree, 2011). These models claim that dependencies in sentence processing are resolved through a cue-based memory retrieval mechanism. For example, encountering an anaphor should initiate a search for an antecedent in memory which matches the retrieval cues of the anaphor. For a reflexive, these cues may include syntactic cues

such as c-command or subjecthood, semantic cues such as gender, and other types of cues. While it has been claimed that syntactic cues are weighted more strongly than non-syntactic cues during cue-based retrieval (Patterson, 2013; Sturt, 2003; Van Dyke & McElree, 2011), other models assume equal weights of cues (R. L. Lewis & Vasishth, 2005).

Regarding the processing of anaphors, many studies have investigated interference effects, a key prediction of cue-based retrieval models. I will use the term **interference** to describe a situation in which an inaccessible antecedent is considered during the resolution of an anaphor despite the presence of a feature-matching syntactically accessible antecedent. Early studies found no evidence for interference in the processing of pronouns (Clifton, Kennison, & Albrecht, 1997; Nicol & Swinney, 1989) and reflexives (Clifton, Frazier, & Deevy, 1999; Nicol & Swinney, 1989), and suggested that binding constraints are not violated during anaphoric processing.

Sturt (2003) investigated the online processing of reflexives in English. The materials from one condition of Exp. 1 in Sturt (2003) are displayed in (3.1). Participants read a three-sentence text while their eye movements were recorded. In experimental items, the second sentence always contained a reflexive and two potential antecedents. Two constraints on anaphor resolution were investigated in this study:

- Constraint 1 (Cond. A of Binding Theory): Only a local c-commanding antecedent is syntactically accessible for the reflexive (so only *the surgeon* for *himself* in (3.1)).
- Constraint 2: A gender-marked reflexive like *himself* must agree in gender with its antecedent.

Constraint 2 is a semantic constraint on anaphor resolution which is independent of the anaphor's syntactic environment. In (3.1), both potential antecedents matched the reflexive in gender. In order to examine whether the gender of potential antecedents affected the processing of the reflexive, the gender of the accessible antecedent (*surgeon*) and inaccessible antecedent (*He/Jonathan*) were manipulated while the gender of the reflexive was always masculine, resulting in four different conditions.[12] If syntactic information is weighted more strongly than non-syntactic information during anaphor resolution, the gender of the syntactically inaccessible antecedent should not affect the interpretation and processing of *himself* in (3.1).

[12]The only difference between conditions was the gender of the two potential antecedents.

(3.1) Accessible-match / inaccessible-match
Jonathan was pretty worried at the City Hospital. He remembered that the surgeon had pricked himself with a used syringe needle. There should be an investigation soon.

The eye-movement data revealed that the gender of the accessible antecedent influenced the processing of the reflexive from the earliest stages of processing. This suggests that participants correctly considered the accessible antecedent (based on constraint 1), and were sensitive to constraint 2 when constraint 1 was met. No such effects were found for the inaccessible antecedent. This suggests that as constraint 1 was not met, the inaccessible antecedent was not considered, and constraint 2 became irrelevant. During later stages of processing, however, both the accessible and the inaccessible antecedent's gender had an effect on eye movements. Sturt concluded that antecedents that are not licensed by Condition A can still be considered for reflexives if they are in a discourse-prominent position (such as *Jonathan/He* in (3.1)). Nonetheless, these effects appeared only after the accessible antecedent was considered.

In the comprehension question data from a second, very similar experiment in Sturt (2003), participants' antecedent choices were affected by the gender of both the accessible and the inaccessible antecedent: each antecedent was chosen more frequently when it matched the reflexive in gender. A third experiment reversed the order of the accessible and inaccessible antecedents in the second sentence such that the inaccessible antecedent appeared in a relative clause and thus was in a less prominent position (e.g. *The surgeon who treated Jonathan had pricked himself with a used syringe needle.*). Again, participants' eye movements were affected by the gender of the accessible antecedent from the early stages of processing, but this time there was no evidence that the inaccessible antecedent was ever considered during the processing of the reflexive.

Sturt's (2003) results suggest that reflexives may be processed and sometimes interpreted as logophors. As described in section 2.3.2, a logophor is an anaphor that refers to an antecedent whose perspective (speech, feelings or thoughts) is described (such as *Jonathan* in (3.1)). Some studies report that it is only in logophoric contexts that non-local antecedents are considered during reflexive processing (e.g. Sloggett & Dillon, 2015). This hypothesis can explain the lack of inaccessible antecedent effects when the inaccessible antecedent was not the center of perspective in Exp. 3 of Sturt (2003). Similarly, in other experiments that used an inaccessible antecedent that was not the center of perspective (Cunnings & Felser, 2011; Dillon, 2011; Dillon et al., 2013; Xiang, Dillon, &

Phillips, 2009), no interference effects were found.[13]

However, logophoric antecedents are often also highly prominent in the discourse, and other studies have argued that an inaccessible antecedent's prominence may determine whether or not it is considered during reflexive processing (Badecker & Straub, 2002; Clackson & Heyer, 2014; Cunnings & Felser, 2011). Furthermore, a c-commanding inaccessible antecedent may be more likely to be considered during processing than a non-c-commanding antecedent, as c-command is a requirement for binding. However, these factors are difficult to disentangle, and existing studies have not provided a clear image of the relative importance of c-command, logophoricity, discourse prominence, and other factors in the resolution of reflexives.

Several of the studies that found no interference from inaccessible antecedents for reflexives (Clifton et al., 1999; Nicol & Swinney, 1989; Xiang et al., 2009) used experimental designs that could not investigate the full time-course of reflexive processing. Thus, it is possible that interference took place at time points that were not measured in these studies. While Sturt (2003) proposed that inaccessible antecedents are only considered at later stages of reflexive processing, most following online studies which report inaccessible antecedent effects for reflexives found them from the earliest stages of processing onward (Clackson et al., 2011; Clackson & Heyer, 2014; Cunnings & Felser, 2011; Runner & Head, 2014).

Unlike reflexives, **pronouns** can have several syntactically accessible antecedents, as long as these do not c-command the pronoun in its governing category, (Condition B, see section 2.2.1.1). In a discourse that stretches over more than one sentence, a pronoun must often be disambiguated between two or more potential antecedents. Hence, while Condition B is sensitive to structural information, factors beyond syntax may play a larger role in pronoun resolution compared to the resolution of reflexives, even in intrasentential contexts.

Evidence for this was found in Clackson et al. (2011), where syntactically inaccessible antecedents for pronouns were not fully ruled out during processing in L1ers of English. The materials for the 'double-match' condition (i.e. both potential antecedents matched the anaphor in gender) are presented in (3.2). The experiment was a Visual-World eye-tracking experiment, which means that these materials were auditorily presented in combination with a visual display of four pictures, including pictures of the two potential antecedents (*Peter* and

[13] Note that this finding does not apply to individuals with a low working memory capacity, as interference effects were found for this population in Cunnings and Felser (2011).

Mr. Jones in (3.2)).[14]

(3.2) Double-match
Peter was waiting outside the corner shop. He watched as Mr. Jones bought a huge box of popcorn for him over the counter.

Clackson et al. (2011) found that adult L1ers of English were less likely to look at the accessible antecedent for *him* (*He/Peter*) after hearing the pronoun in (3.2), compared to a condition in which *Mr. Jones* was replaced by *Mrs. Jones*. Thus, the gender of the syntactically inaccessible antecedent affected the processing of the pronoun *him*. This suggests that non-syntactic information is considered and syntactically illicit antecedents are not immediately ruled out during online processing of pronouns. Clackson et al. (2011) tested the same materials with the reflexive *himself* replacing *him*, but they found no effect of the inaccessible antecedent in adult L1 processing.

Similar interference effects for pronouns have been described in other online processing studies (Badecker & Straub, 2002). Other studies reported that the parser is faithful to binding constraints even for pronouns (Chow, Lewis, & Phillips, 2014; Clifton et al., 1997; Nicol & Swinney, 1989; Patterson, 2013). Nonetheless, the processing of pronouns involves information beyond Condition B, such as order of mention (Cunnings, Patterson, & Felser, 2014; Patterson, 2013).

In the studies outlined above, even when interference from syntactically inaccessible antecedents was observed, this did not override the preference for the accessible antecedent, both during processing and in final interpretations. These results seem to support the claim that syntactic cues, such as c-command and local position to the anaphor, are weighted more strongly than non-syntactic cues during cue-based retrieval in anaphor resolution (Patterson, 2013; Sturt, 2003; Van Dyke & McElree, 2011).

A remaining open question is whether different types of anaphor, such as pronouns and reflexives, differ in their sensitivity to interference from inaccessible antecedents. Clackson et al. (2011) reported interference effects for pronouns but not for reflexives in one study, but for both types of anaphor several studies have found that adults L1ers may consider syntactically inaccessible antecedents during processing.

[14] As this thesis will also use the Visual-World methodology, it will be explained in detail in section 5.2.1.

Like the majority of studies on the processing of pronouns and reflexives in L1ers, the studies discussed above focused on L1 English. An exception to this pattern is a recent study on the online processing of the Turkish anaphors *o, kendisi* and *kendi* (Gračanin-Yüksek et al., 2017). Using self-paced reading and comprehension questions, Gračanin-Yüksek et al. (2017) had Turkish L1ers read sentences with classical Condition A and B constructions, and afterwards choose an antecedent for the anaphor. Participants showed a dispreference for the local c-commanding antecedent for *o* in interpretation, in line with Condition B, and showed increased reading times when the sentential context implied that *o* should refer to the local antecedent.

Regarding *kendi*, recall that previous studies have not established whether its antecedent options are fully determined by Condition A. Gračanin-Yüksek et al. (2017) found a clear preference for the local c-commanding antecedent for *kendi* in Turkish L1ers, in line with Condition A. At the same time, participants readily accepted a non-local c-commanding antecedent for *kendi* as well, and were only marginally slower to read sentences in which the context was biased towards interpreting *kendi* as referring to the non-local antecedent.

Kendisi was the third anaphor under investigation in Gračanin-Yüksek et al. (2017). Previous descriptive studies claimed that *kendisi* can refer to any antecedent in the discourse, and the reading time data from Gračanin-Yüksek et al. (2017) support this hypothesis, as L1ers' reading times were the same for contexts that biased towards the local, non-local, or even a sentence-external antecedent. However, the sentence-external antecedent was dispreferred in antecedent choices. Gračanin-Yüksek et al. (2017) interpreted this result as support for Sezer's (1979) hypothesis that *kendisi* prefers discourse antecedents with a psychological distance from the speaker (see section 2.3.2).

Overall, the results from Gračanin-Yüksek et al. (2017) illustrate that non-syntactic factors (in the form of contextual biases) can influence anaphor resolution in Turkish, both during online processing and in final interpretations. The results further suggest that the role of contextual information in anaphor resolution in Condition A and B constructions may be larger in Turkish compared to English. However, this is hard to determine without having comparable experiments in both languages.

One goal of the experiments in this thesis was to test whether L1ers of German and Turkish behave similarly to the English L1ers in Clackson et al. (2011), and whether German and Turkish L1ers show similar processing patterns for anaphors. As shown in Ch. 2, German and English have the same antecedent constraints for both reflexives and pronouns, while Turkish differs from the other

two languages. To address these questions, I carried out corresponding Visual-World experiments in German and Turkish, with materials similar to Clackson et al. (2011); these will be discussed in Chapters 5 and 6, respectively.

3.3 Processing of pronouns and reflexives in L2ers

Many different theories and hypotheses have been put forward to describe language processing and specifically grammatical processing in L2ers. For example, the 'shallow structure hypothesis' (SSH) by Clahsen and Felser (2006, 2017) proposes that language processing in non-native speakers differs from L1ers in that the former may rely less on syntactic information when interpreting grammatically complex structures. Instead, they focus more on semantic and contextual information. A study that found evidence for this hypothesis regarding anaphor resolution in L2ers was Felser and Cunnings (2012). Felser and Cunnings (2012) found a stronger reliance on contextual information for the resolution of reflexives in L2ers' eye movements during reading, which was independent of the L2ers' native language: Processing of English reflexives was influenced by contextual information more strongly than in L1ers in both German and Japanese L2ers of English, of which the latter were tested in a previous study (Felser, Sato, & Bertenshaw, 2009).

The 'Interface Hypothesis' (Sorace, 2011; Sorace & Filiaci, 2006) proposes that L2ers have more trouble integrating syntactic information with pragmatic or semantic information, and that this difficulty persists even in near-native L2ers. A prediction based on this hypothesis is that anaphors which can be resolved purely through syntax, such as object reflexives, which are subject to Condition A, will be easier to resolve for L2ers than object pronouns in Condition B environments and subject pronouns, whose antecedent search requires an integration of syntactic and non-syntactic information. These pronouns are described as sitting at the 'syntax-pragmatics interface' or the 'syntax-semantics interface'.

Evidence in support of the interface hypothesis is described in Wilson (2009), who found in a series of Visual-World experiments that English L2ers of German were less native-like in the processing of d-pronouns than of personal pronouns. The explanation proposed by Wilson (2009) for this effect was that the resolution of d-pronouns relies more heavily on discourse information than does the resolution of personal pronouns. Similar results were found in Ellert (2013b) for German L2ers of Dutch and their processing of intersentential pronoun resolu-

tion.

In a recent paper, Cunnings (2016) proposes that differences between L1 and L2 sentence processing are best explained by differences in memory retrieval mechanisms between the two populations. Cunnings (2016) bases his account on cue-based retrieval models, and claims that L2ers are more susceptible to interference during the retrieval of entities from memory (such as potential antecedents for anaphors), because they weight discourse-based cues more strongly than L1ers. For L2 anaphor resolution, this means L2ers assign more weight to discourse-based cues than to syntactic cues relevant for Conditions A and B, such as c-command and local position to the anaphor. Therefore, they are more likely to show interference effects from syntactically inaccessible antecedents compared to L1ers. Note that the L2 processing pattern in Cunnings (2016) does not describe a reduced ability to process syntactic dependencies, but rather a different mechanism. However, because of this mechanism, L2ers are more likely to consider a syntactically inaccessible antecedent if it is favored by discourse constraints. In the following, I will refer to Cunnings' (2016) proposal as the 'memory interference hypothesis'.

Depending on the phenomenon, the three accounts of L2 sentence processing described above often make similar predictions and are thus difficult to test against each other. I will use these hypotheses to make predictions for the experiments in this thesis, but my experiments were not designed to specifically test any of them. The three accounts do however differ from capacity-based approaches to L2 processing, which claim that working-memory limitations and/or a slower processing speed can explain L1-L2 differences (e.g. Hopp, 2006, 2010; McDonald, 2006).

Furthermore, all three accounts propose that L2 processing differs from L1 processing in ways that go beyond an influence of the native language. L1 influence and L1 transfer (the direct application of properties from the L1 to L2 comprehension or production) have been reported many times in the L2 literature, and it is of course always possible that bilinguals' L1 has an influence on processing in their L2. However, given the many studies that have described effects which cannot be explained by differences in the bilinguals' L1 and L2 (e.g. Ellert, 2013b; Wilson, 2009), L1-independent factors must also be considered when characterizing the L2 processing of anaphors.

Roberts et al. (2008) reported both L1-specific and L1-independent effects for subject pronoun resolution in L2 Dutch. The study tested L1ers of Dutch as well as two groups of L2ers in an acceptability judgment task, an interpretation task, and an eye-tracking during reading experiment. For all three experiments, ma-

terials of the type presented in (3.3) were used. The offline interpretation data showed that Dutch L1ers clearly prefer a feature-matching sentence-internal referent over a feature-matching sentence-external referent for the pronoun *hij* in (3.3), as they chose the sentence-internal antecedent in 100% of the cases when both antecedents matched the pronoun in gender and number.

(3.3) Peter en Hans zitten in het kantoor. Terwijl Peter aan het werk is, eet hij een boterham. Het is een rustige dag.
'Peter and Hans are in the office. While Peter is working, he is eating a sandwich. It is a quiet day.'
(optional resolution condition, taken from Roberts et al., 2008)

Roberts et al. (2008) also investigated a group of German-speaking L2ers of Dutch and a group of Turkish-speaking L2ers of Dutch. German *er* and Dutch *hij* are both assumed to clearly prefer a sentence-internal referent, whereas the Turkish overt pronoun *o* prefers a sentence-external antecedent. As described in Ch. 2, Turkish is a null-subject language in which null pronouns are normally used to refer back to the most prominent entity in the discourse, while overt pronouns tend to refer to less prominent antecedents. If Turkish-speaking L2ers of Dutch are influenced by the properties of Turkish overt pronouns when interpreting Dutch pronouns, they should consider a sentence-external antecedent more often compared to L1ers of both Dutch and German, as these two non-null-subject languages pattern alike in their interpretation of subject pronouns. This is exactly the pattern that was found in the offline interpretation task. When both antecedents matched the features of the pronoun, both the native Dutch and the German-speaking group overwhelmingly chose the sentence-internal referent, while the Turkish-speaking group only chose the sentence-internal referent in 55% of the trials. Roberts et al. (2008) interpreted these results as evidence for an influence of the L1 in the interpretation of subject pronouns.

In the online processing data for the same sentences, there was no evidence for an influence of the native language; rather, a general L2 effect was observed: Both German-speaking and Turkish-speaking participants were more confused by and thus slower in processing sentences with referentially ambiguous pronouns than Dutch L1ers. Roberts et al. (2008) interpreted the online results as in line with the SSH (Clahsen & Felser, 2006, 2017).

It is not uncommon to find differences between L2ers' performance in offline interpretation tasks and in online processing experiments (Roberts & Siyanova-Chanturia, 2013). The vast majority of previous studies has employed offline methods to investigate L2 language comprehension. In order to get the full

picture, it is necessary to investigate both offline interpretation and real-time language processing. Ch. 4 of this thesis presents results from two experiments on the interpretation of reflexives and subject pronouns in L1ers and L2ers of German. Ch. 5 adds to the growing number of online studies on L2 processing of pronouns and reflexives. The experiments in Ch. 5 also investigate the role of L1 background in online processing.

A more recent study that investigated L2 online processing of reflexives and pronouns in classical Condition A and B contexts is E. Kim, Montrul, and Yoon (2015). They tested English L1ers and Korean L2ers of English with a fairly high L2 proficiency in sentences like (3.4), using a Visual World eye-tracking paradigm: Participants listened to one of three versions of a sentence like the one in (3.4) while viewing a corresponding visual display that contained the three cartoon characters mentioned in the sentence as well as three sets of framed pictures of the characters (see Fig. 3.1). As participants listened to the instructions and carried out the task by moving the respective character with a mouse, their eye movements and mouse actions were recorded. The eye-movement data was used to detect processing over the time-course of anaphor resolution, while the mouse action indicated the final interpretation of the respective anaphor.

English L1ers performed as expected, considering almost exclusively the sentence-internal antecedent for the reflexive *himself*, and the sentence-external antecedent for the pronoun *him*, both in eye movements and in final interpretations. L2ers also made this distinction in antecedent preferences between reflexives and pronouns, with a preference for *Mickey* for reflexives and for *Goofy* for pronouns in (3.4). However, they were much more likely than L1ers to consider the sentence-internal antecedent *Mickey* for the pronoun, both in eye movements and final interpretations. At the same time, they did not differ from L1ers in their processing or interpretation of the reflexive in the same context, except for slowed-down processing in lower-proficiency L2ers.

(3.4) Look at Goofy$_{i}$. Have Mickey$_{j}$ touch himself$_{*i/j/*k}$/him$_{i/*j/k}$/Donald$_{k}$.

E. Kim et al. (2015) interpreted these results as evidence that L2ers are less native-like in the processing of pronouns than of reflexives, perhaps due to the need to integrate syntactic and discourse information for pronoun resolution, while reflexives can be resolved based on syntactic information alone. This explanation supports the interface hypothesis (Sorace, 2011; Sorace & Filiaci, 2006).

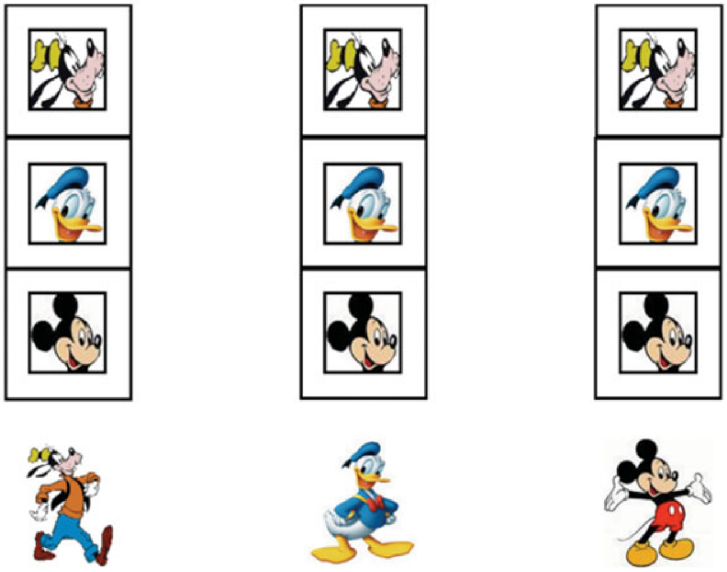

Figure 3.1. Example display from Kim et al. (2015, p. 1332).

However, it also possible to explain L2ers' greater difficulty with pronouns than with reflexives as the result of a stronger consideration of the most prominent or most recently mentioned antecedent, since the correct antecedent for reflexives was always the more prominent and more recent antecedent, whereas the only syntactically accessible antecedent for the pronoun was the less prominent and less recent one. Thus, while providing interesting information on the online processing of binding conditions in L2ers, the data in E. Kim et al. (2015) cannot determine what causes L1-L2 differences in anaphor resolution. Ch. 5 aims to address this open question by manipulating the relative prominence and linear order of the potential antecedents for reflexives and pronouns.

Individual differences have also played an important role in L2 research. The role of individual differences in the interpretation and processing of anaphors will be investigated in Chapters 4 and 5. Therefore, the following subsection discusses existing research on this topic, focusing on two variables: L2 proficiency and the AoA of the L2.

3.3.1 The role of proficiency in L2 anaphor resolution

It is difficult to assess the role of general proficiency in an L2 in the processing of a specific phenomenon, such as pronoun resolution. First, the concept of proficiency is not clearly defined, and there is a wide variety of proficiency tests

with very different content structures. If the concept is so vague, why should one consider it at all in the study of L2 language processing? Individual differences in communicative abilities are so common among L2ers that it seems wrong to assume that for example participants with little more than receptive abilities will behave no different from individuals who are fully fluent in their L2.

Ullman (2001) has found that as language proficiency reaches a native-like level in L2ers, they may start using different memory resources than in the initial stages of L2 acquisition. Specifically, he claims that higher-proficiency L2ers employ procedural processing, while lower-proficiency L2ers rely more strongly on declarative memory resources. If this is the case, it is easy to imagine that this would affect how L2ers treat specific phenomena, such as anaphor resolution.

For pronoun resolution, effects of proficiency on L2 online processing and final interpretation of d-pronouns and pronouns at the syntax-discourse interface were found in Ellert (2013) and Wilson (2009), where a higher L2 proficiency correlated with more native-like processing. Furthermore, in Patterson, Trompelt, and Felser (2014), German L2ers of English with higher proficiency scores were less likely to show a non-native-like bias in the interpretation of referentially ambiguous pronouns. For reflexives, Köylü (2010) found an effect of proficiency on the interpretation of English reflexives by L1ers of Turkish, and E. Kim et al. (2015) (described above) found effects of proficiency on the online processing of both reflexives and pronouns.

On the other hand, several studies have found differences between L1ers and L2ers in their processing and/or interpretation of pronouns (Roberts et al., 2008; Sorace & Filiaci, 2006) and reflexives (Felser & Cunnings, 2012; Felser et al., 2009), even at very high proficiency levels. While many previous studies have tested anaphor resolution at different proficiency levels, a thorough investigation of the role of proficiency in L2 anaphor resolution requires including a broader range of proficiency levels in the participant sample, and testing proficiency as a continuous predictor variable. This was done in Ch. 4 for the offline interpretation of pronouns and reflexives, and in Ch. 5 for the online and offline application of Conditions A and B.

3.3.2 The role of AoA in L2 anaphor resolution

The question of whether the AoA of an L2 affects the language representations and processing of L2ers has been addressed in a large number of studies. The 'critical period hypothesis' states that there is an age after which it is very hard to begin learning a language and reach native-like competence (e.g. Hawkins

& Chan, 1997; Hensch, 2004; Johnson & Newport, 1989). Regarding syntax, DeKeyser, Alfi-Shabtay, and Ravid (2010) found a steep decline in grammatical aptitude with increasing AoA before age 18, and no difference in grammatical aptitude between AoAs of 18 to 40. Thus, according to DeKeyser et al. (2010), AoA only plays a role in L2 grammatical processing when comparing AoAs below 18.

An interesting point was raised by DeKeyser (2003) and Paradis (2004): AoA seems to affect implicit but not explicit language knowledge of the L2. Thus, critical period effects are not expected for tasks that only tap into explicit knowledge. These results support the 'Fundamental Difference Hypothesis' (Bley-Vroman, 1989, 2009), which proposes that late L2 learners fundamentally differ from early bilinguals because children have better procedural memory capabilities. Therefore, older learners must use more explicit strategies for language learning and will not become native-like in areas that require fast, automatic, implicit processing. Based on this, one would expect to find native-like offline interpretation in late L2 learners, but L1-L2 differences in online processing. This pattern was reported for reflexives in Felser and Cunnings (2012).

On the other hand, many researchers have argued against the notion of a critical period. One group of researchers claims that there are no fundamental differences in the acquisition process between L1 and L2. Rather, differences between bilinguals and monolinguals arise because for bilinguals two language systems are activated at the same time, and the challenge of activating and inhibiting the languages during communication is what causes non-native behavior (Frenck-Mestre, Foucart, Carrasco-Ortiz, & Herschensohn, 2009; Prévost & White, 2000). Because of this, some researchers have moved from comparing L2ers to monolinguals to comparing different types of bilinguals, such as L2ers, early bilinguals, HSs, and L1ers who are (proficient) late L2ers of another language (Slabakova, 2013).

Most studies investigating AoA effects in anaphor resolution have used this approach and compared late L2ers with HSs of the same language. As the following section deals with anaphor resolution in HSs, I will postpone the discussion of these studies to section 3.5. I am not aware of any studies of L2 anaphor resolution which directly compared late L2ers to early L2ers who could not be categorized as HSs, or studies which included AoA as a continuous predictor of L2 processing of anaphors.

An open question in L2 processing is the relative influence of proficiency and AoA on how native-like L2 processing is (Herschensohn, 2009; Perani et al., 1998; Wartenburger et al., 2003). In Chapters 4 and 5, I investigate this question

by testing for both proficiency and AoA effects in the L2 processing of German pronouns and reflexives. For all experiments in this thesis, AoA was investigated as a continuous variable. This made it possible to test participants with various AoA levels, rather than comparing two very distinct groups. However, AoA may still correlate with other factors such as type of exposure to L2 and overall proficiency. The potential implications of this will be discussed in the respective chapters.

3.4 Processing of pronouns and reflexives in HSs

HSs have increasingly become a topic of research over the past few decades. Due to global migration, many people grow up in a country which has a majority language that is different from their family language. While this has been the case for a long time, it is only recently that there has been a growing interest in studying the characteristics of HS language processing. Most studies of HL processing have been carried out in the USA, possibly due to its high percentage of residents with a migrant background, resulting in sizable HS populations of Spanish, Russian, Korean, German and Turkish, among others. The majority language of all of these groups is English. Only in recent years has there been an increase in HS studies with other majority languages, e.g. Swedish, Italian, and German.

HSs may often perform like monolingual L1ers in some aspects (e.g. phonology), but in other areas (e.g. syntax), their comprehension and production may differ substantially from that of L1ers. Some researchers have likened HSs to other bilingual groups such as late L2ers (Bustin, 2016; Montrul, 2010; Sorace, 2011) or bilinguals whose L1 changes in adulthood (e.g., Kaltsa, Tsimpli, & Rothman, 2015), while others suggest that HS processing is a unique outcome of early but reduced or discontinued exposure to a language (e.g., Gürel & Yilmaz, 2011; J.-H. Kim et al., 2009). It is generally assumed that differences between HSs and monolingual L1ers emerge due to reduced input from the HL, and considerably more exposure to the majority language. As a result, language dominance shifts at an early age. Recent studies have shown that strongly increased input from an L2 may affect syntactic processing in the L1 even for late bilinguals (Dussias, 2016). However, the exact processes that underlie and determine the characteristics of HS grammars remain under debate.

The most prominent theories for the development of non-monolingual-like patterns in HSs are incomplete acquisition and attrition. For **incomplete acquisition** (Montrul, 2002; Polinsky, 2006), it is assumed that a strong shift in

bilingual children's language dominance takes place before the acquisition of a specific feature has been completed and the interpretation and processing of this phenomenon has stabilized. Thus, incomplete acquisition is feature-specific and dependent on the individual interplay of a child's developmental trajectory and the timing of the dominance shift. **Attrition**, on the other hand, is a process that takes place after a child has fully acquired a feature in the same way as a monolingual child. If monolingual-like mastery of a linguistic phenomenon has been obtained in early childhood, but was subsequently lost due to reduced input from and use of the L1, this phenomenon has undergone attrition. While the term attrition is often used to describe changes in adult language following a drastic reduction of L1 input (e.g. in first-generation adult immigrants), it has been used for HSs as well, and effects of attrition have been reported for HSs, e.g. in the domain of object relative clauses (Polinsky, 2011).[15]

Testing attrition requires either a longitudinal study design, in which the processing pattern of bilingual children is compared across a span of several years, or a cross-sectional approach, in which comparable groups of HS children and adult HSs are tested (Polinsky, 2011). A common way to test incomplete acquisition in HSs is to test for AoA effects. Montrul (2002) claims that a negative correlation between age of L2 acquisition and L1 performance in HSs indicates that an early onset of L2 acquisition may prevent children from fully acquiring certain aspects of their L1. Furthermore, Montrul (2002) suggests that the negative effect of majority language exposure on the acquisition of the home language is maximized in bilinguals who have acquired both languages from birth (= simultaneous bilinguals). Thus, according to Montrul (2002), simultaneous bilinguals are expected to perform worse than successive bilinguals (= bilinguals who have learned their L2 at a later age than their L1) in their HL. The role of AoA in HL processing will be discussed in more detail in section 3.4.2.

Anaphor resolution is usually acquired in early childhood in L1ers, around the time that language dominance shifts in HS children. Therefore, it is interesting to investigate whether the reduced exposure to the HL in HSs leads to a non-monolingual-like processing or interpretation of anaphors in the HL. Previous studies of HS anaphor resolution have used offline methods. For example, J.-H. Kim (2007) investigated the interpretation of reflexives in Korean, and found that HSs preferred local antecedents for long-distance reflexives more strongly than monolinguals, irrespective of whether the majority language they were exposed to only allowed for local binding of reflexives (English) or allowed both local and long-distance binding (Mandarin Chinese).

[15] For an in-depth overview of HL acquisition, see Montrul (2016).

Similar results were presented in J.-H. Kim et al. (2009). Korean HSs with English as a majority language were tested in a truth value judgment task, i.e. participants were presented with a picture as well as a sentence containing an anaphor, and were asked to indicate whether the sentence correctly described the picture. Three anaphors were tested: *caki*, *caki-casin*, and *casin*. An example sentence with *caki* is given in (3.5). Korean monolinguals showed different antecedent preferences for all three forms: a preference for the local antecedent (*Minswu*) for *caki-casin*, a preference for the long-distance antecedent (*Cheli*) for *caki*, and no clear preference for either antecedent for *casin*. Compared to monolinguals, Korean HSs showed less clear differences in antecedent preferences between the three anaphors. On an individual level, the percentage of participants who had different preferences for all three forms was much lower in the HS group (3%) compared to the monolingual group (41%). Overall, HSs preferred local antecedents more strongly than monolinguals. This effect was strongest for the most referentially ambiguous form, *casin*.

(3.5) Cheli$_{i}$-nun [Minswuj-ka caki$_{i=j}$-ul kuli-ess-ta-ko] malhay-ss-ta.
Cheli$_{\text{Topic}}$ Minswu$_{\text{Nom}}$ self$_{\text{Acc}}$ draw$_{\text{PastDeclComp}}$ said
'Cheli said that Minswu drew him(self).'

(taken from J.-H. Kim et al., 2009)

Most studies of pronoun resolution in HSs have focused on referentially ambiguous subject pronouns. Many of these studies report a non-monolingual-like production or interpretation of overt pronouns in a null-subject language for HSs with a non-null-subject majority language (Kaltsa et al., 2015; Keating et al., 2011; Polinsky, 2006; Sorace & Filiaci, 2006). This effect has often been interpreted as resulting from cross-linguistic influence. However, similar effects have been found for HSs with a null-subject majority language (Rinke, 2016; Sorace, Serratrice, Filiaci, & Baldo, 2009), suggesting that other factors may be at play. Note, however, that the properties of overt pronouns may differ even among null subject languages (Filiaci, 2010; Filiaci, Sorace, & Carreiras, 2014).

In Gürel and Yilmaz (2011), Turkish HSs (with Dutch as their L2) were compared to monolingual Turkish controls in their interpretation of subject pronouns in intra-sentential contexts. Three anaphors were investigated: *o*, *kendisi*, and the null pronoun *pro*. An example of their materials from the *o* condition is given in (3.6). As can be seen in the example, *o* cannot corefer with the matrix subject when in an embedded subject position. Therefore, the correct answer

in (3.6) is (b), and monolingual L1ers chose the correct response option 94% of the time. HSs only had an accuracy of 78% in the same condition, and were significantly more likely to choose response option (a), the illicit antecedent for *o*. The other two anaphors, *kendisi* and *pro*, were ambiguous between referring to the matrix subject or an unmentioned sentence-external antecedent. Therefore, the most frequent response given by monolinguals was (c) in both conditions (64% for *kendisi* and 84% for *pro* respectively). Turkish HSs were much less likely to choose the ambiguous response option (c) (12% and 20% for *kendisi* and *pro*, respectively), and instead chose the matrix subject antecedent more often than monolinguals.

(3.6) **Burak$_{\mathbf{i}}$ [o-nun$_{*\mathbf{i/k}}$ sinema-ya gid-eceğ-i]-ni söyle-di.**
Burak s/he$_{\text{Gen}}$ cinema$_{\text{Dat}}$ go$_{\text{Nom3}^{\text{rd}}\text{SingPossAcc}}$ say$_{\text{Past}}$
'Burak said (that) s/he would go to the movies.'
Soru : Sizce bu cümleye göre kim sinemaya gidecek olabilir?
(*'Question: According to this sentence, who could be the person that would go to the movies?'*)
(a) Burak
(b) Başka bir kişi (*'some other person'*)
(c) Hem (a) hem (b) (*'Both (a) and (b)'*)

(taken from Gürel & Yilmaz, 2011)

As in the results on reflexive interpretation from J.-H. Kim et al. (2009), two main differences between HSs and monolinguals were found in Gürel and Yilmaz (2011). First, HSs had a tendency to interpret ambiguous anaphors as being less ambiguous than monolinguals perceived them to be. According to Gürel and Yilmaz (2011), HSs may not recognize that a form is ambiguous, which leads to non-monolingual-like biases in interpretation. Other studies (Orfitelli & Polinsky, 2017; Polinsky, 2016) also report that HSs have trouble with linguistic tasks that require them to choose between different options. As a result, HSs may may turn biases into hard constraints during interpretation. Evidence for this pattern can be found in studies which showed that HSs have a tendency to eliminate ambiguity (Benmamoun, Montrul, & Polinsky, 2013; Kondo-Brown, 2005; Polinsky, 2016; Scontras, Fuchs, & Polinsky, 2015).

The second difference between HSs and monolinguals observed in both J.-H. Kim et al. (2009) and Gürel and Yilmaz (2011) was that HSs had a stronger preference than monolinguals for antecedents that were linearly closer to the anaphor

(i.e., a stronger preference for local over non-local antecedents for reflexives, and a stronger preference for a sentence-internal over an unmentioned sentence-external antecedent for pronouns). Similarly, J.-H. Kim (2007) reported that HSs were more likely to lose long-distance binding options for Korean long-distance reflexives. Thus, it is possible that HSs have a general preference for linearly closer antecedents in anaphor resolution. It remains unclear whether the observed preference for closer antecedents can be explained by a less memory-intensive processing mechanism that HSs adopt due to their reduced proficiency, or whether these effects are due to an influence of the HSs' dominant L2.

Another interesting result from J.-H. Kim et al. (2009) is the observation that HSs may simplify the grammatical system of their HL by 'merging' linguistic categories in interpretation and/or processing. Similar effects were found in Keating et al. (2011) for overt vs. null subject pronouns in American Spanish, and for linguistic phenomena other than anaphor resolution (e.g., Polinsky (1997) for case in American Russian; Polinsky (2008) for gender in American Russian).

All of the above-mentioned studies reporting merging of linguistic categories in HSs used offline methods. In an online extension of Keating et al. (2011), Keating et al. (2016) found distinct eye-movement patterns for overt and null subject pronouns in contrast to the merging of overt and null subject pronouns in offline interpretation reported in Keating et al. (2011). Keating et al. (2016) concluded that the loss of distinctions or merging of categories may be limited to HSs' offline interpretation, and not present in their online processing.

I am not aware of any studies which have investigated HSs' offline or online processing of Condition B. Furthermore, Keating et al. (2016) is the only published study that investigated the question of simplification in HSs' online anaphor resolution. Thus, more online studies are necessary to identify what determines whether merging occurs in HS language processing, and what is the source of the observed effects.

The following two sections will discuss evidence on the role of individual variables in HS processing, specifically AoA of the majority language and HL proficiency.

3.4.1 The role of proficiency in HL anaphor resolution

The language processing performance of HSs for a specific phenomenon may be influenced by their HL proficiency. Proficiency effects have been reported for

language control (Schwieter, 2008), Arabic root and pattern morphology (Benmamoun, Albirini, Montrul, & Saadah, 2014), subject-verb agreement (Foote, 2009), clitics and direct object marking (Montrul, 2010), and across a wide range of other syntactic structures (Polinsky, 1997, 2006; Polinsky & Kagan, 2007).

Keating et al. (2011) investigated pronoun processing, testing whether the interpretation of overt vs. null subject pronouns in HSs of Spanish was correlated with scores on a proficiency test, but found no significant effects. However, the participant sample only included very high-proficiency speakers, as the study was not designed to test proficiency effects.

Recent studies have revealed that HSs living in the USA and HSs living in Europe often show contrasting results for similar phenomena. For example, while many studies carried out in the USA found strong differences between HSs and monolinguals in the production of overt vs. null pronouns (see above), Schmitz et al. (2016) showed that Italian and Spanish HSs in Germany do not differ from L1ers and attriters in null and overt pronoun production. According to Flores (2015), among other factors, proficiency might explain the differences between these two groups of HSs.

Kupisch (2013) suggests that high-proficiency and low-proficiency HSs might show non-monolingual-like patterns in different linguistic domains, referring to results which show that accent is the most difficult aspect for high-proficiency HSs (Kupisch, Barton, et al., 2014; Kupisch, Lein, et al., 2014), while Benmamoun et al. (2013) claim that phonology is usually the best-preserved area of HSs' linguistic abilities, based on data from HSs living in North America. Kupisch (2013) points out that most of the HSs discussed in Benmamoun et al. (2013) have a relatively low HL proficiency, while her own studies investigated high-proficiency HSs.

The HSs in the experiments reported in this thesis were first- or second-generation Turkish immigrants who grew up and lived in Germany. Therefore, in order to get a clearer picture of the language processing of Turkish HSs living in Germany, it is important to consider the results of HS studies from Germany (Flores, 2015; Kupisch, 2013) as well as the predominance of evidence from the USA. Furthermore, I included a broader range of proficiency in my experiments on HSs, in order to statistically test the role of proficiency in HS anaphor resolution.

3.4.2 The role of AoA in HL anaphor resolution

As mentioned above, Montrul (2002) proposed that the AoA of the majority language is an important factor in determining HSs' success in acquiring their HL. The reasoning behind this is that the introduction of an L2 in combination with a strongly reduced exposure to the L1 may result in an interruption of the normal language acquisition process in bilingual children that monolingual children do not experience. As a result, these children may never acquire certain properties of their L1/HL, or may acquire them differently due to the reduced exposure compared to monolinguals.

Evidence for Montrul's (2002) hypothesis was found in Montrul, Foote, and Perpiñán (2008), where AoA influenced the knowledge of gender agreement in HSs of Spanish. In Montrul (2008), a critical period for grammatical acquisition is considered to end around age 9, in the sense that children who switch in language dominance before this age will diverge more strongly from adult monolinguals in this area. Furthermore, in a review of the role of AoA in L1 attrition, Schmid (2016) showed that there seems to be a period around the age of 10-12 after which the native language is more immune to bilingualism-related attrition.

A study which investigated whether the AoA of a majority language had an impact on pronoun processing in the HL was Kaltsa et al. (2015). Kaltsa et al. (2015) compared HSs and L1 attriters (individuals who were immersed in a second language at an adult age) of the same language combination (Greek-Swedish) to a matched group of Greek monolinguals. Because the attriters were older than the HSs on average, they were compared to an older group of monolinguals in order to match the ages between the bilingual and monolingual groups. The materials for the overt pronoun condition in Kaltsa et al. (2015) are displayed in (3.7).

Kaltsa et al. (2015) found that both HSs and attriters differed from monolinguals in the same way when processing overt subject pronouns in Greek, and concluded that these results do not support the incomplete acquisition hypothesis. At the same time, only HSs differentiated less between antecedents than monolinguals in their age group, while attriters did not differ from age-matched monolinguals. However, this result may be due to a 'floor effect', as the monolingual control group for the attriters also did not differentiate between antecedents.

(3.7) a. I γiaγia xeretise tin kopela otan afti
the$_{F}$ old-lady$_{F}$ greeted$_{3^{rd}Sing}$ the$_{F}$ girl$_{F}$ when she
pernuse to δromo.
cross$_{Past3^{rd}Sing}$ the street
'The old-lady greeted the girl when she crossed the street.'

Based on these results, Kaltsa et al. (2015) concluded that differential processing of null pronouns may be an effect of bilingualism as well as of age, suggesting that limited processing resources in older people and bilinguals lead to less pronounced preferences in interpretation. As this study focused on null and overt subject pronouns, the results are of direct relevance for Exp. 4 (see section 4.5), in which I investigate the resolution of subject pronouns in Turkish HSs, albeit with a smaller AoA range than in Kaltsa et al. (2015). It is not clear whether the observed lack of an AoA effect for subject pronouns is an indication for the role of AoA in the HS processing of object anaphors, a question which will be addressed in Ch. 6 of this thesis.

Gürel and Yilmaz (2011), J.-H. Kim (2007) and J.-H. Kim et al. (2009) also tested both HSs and attriters within the same experiments. In some cases, differences from monolinguals were more pronounced in HSs compared to attriters in these studies. However, based on the descriptions of the participant samples, the HSs in Kaltsa et al. (2015) appear to have been more proficient in their HL than the HS participants in the other studies.

To my knowledge, there is only one study of online processing of Turkish HSs (Arslan, Bastiaanse, & Felser, 2015), which did not investigate anaphor resolution, but instead the processing of Turkish evidentials, a morphological feature. They found similar patterns of simplification in both HSs (AoA < 5) and attriters (AoA > 12) compared to monolingual L1ers of Turkish.

Overall, only very few studies have investigated the role of AoA on pronoun and reflexive processing in HSs. In this thesis, I aim to extend the number of studies that have considered this variable, and to test the hypothesis put forth by Montrul (2002) that AoA is an important predictor of HL processing.

3.5 Investigating AoA in bilingual sentence processing by comparing HSs and L2ers

As mentioned above, several studies have investigated the effect of AoA on sentence processing in bilinguals by directly comparing HSs and L2ers of the

same language (e.g. Montrul, 2009, 2011; Montrul et al., 2008). In most cases, HSs have acquired their HL from birth, so at an AoA of 0. The L2er groups in these studies often consisted of late L2 learners, with an AoA of 6 or above.

The studies cited above tested both production and comprehension and found that both groups differed from monolingual L1ers in Spanish morphological processing. However, HSs outperformed L2ers in oral production tasks, which are thought to require fast-paced, automatic processing. At the same time, L2ers outperformed HSs in written interpretation tasks involving the same phenomena, suggesting that their explicit knowledge is intact. This seems to suggest that there are indeed fundamental differences between early and late acquisition.

However, it is possible that other factors resulted in the observed group differences. It should be obvious that HSs and L2 learners have very different language learning experiences: while the former have often received no schooling in their HL and have mainly acquired it in a naturalistic oral setting in a family environment, the latter have typically acquired the L2 in a classroom setting, with explicit instruction. This makes it very hard to determine whether differences between HSs and L2ers are due to an effect of AoA (and the different types of memory resources involved at different ages) or to a different language learning experience (a different acquisition environment).

To my knowledge, there is only one study that has compared HSs and late L2ers in anaphoric online processing, namely J.-H. Kim (2007). This doctoral thesis focused on the processing of two Korean anaphors in Korean-English bilinguals. Overall, HSs were more similar to monolingual L1ers in the interpretation of Korean anaphors than were adult L2ers. As mentioned above, HSs and L2ers differ from each other on a number of variables, including AoA, but also language dominance, naturalistic vs. classroom exposure to the L2, and others. Therefore, it is not clear whether differences between these two groups reflect an effect of AoA, or of another factor.

3.6 Conclusion

This chapter provided an overview of findings on syntactic processing in different populations, and specifically the processing of pronouns and reflexives. To summarize, adult monolingual anaphoric processing generally aligns with Conditions A and B, although evidence for the consideration of illicit antecedents has been found both for pronouns and reflexives. Furthermore, there seems to be cross-linguistic variation: In a recent study, contextual biases influenced

Turkish anaphor resolution in Condition A and B environments beyond what has been observed for English or German.

Several studies have reported that L2ers are less faithful to binding constraints during anaphor processing than monolinguals. Furthermore, the question of whether there are differences between the initial and ultimate interpretation of anaphors in L2ers was discussed. Some studies have proposed that L2ers may perform native-like in offline interpretation tasks but differ from L1ers in online processing. Several studies have shown that proficiency may influence both offline and online interpretation of pronouns in L2ers. Furthermore, the AoA of the L2 has been found to play a role in the online processing of grammatical structures.

Fewer studies have investigated the processing of anaphors in HSs. Most of these studies report some type of loss of grammatical distinctions, e.g. between overt and null pronouns, or between different types of anaphors. Furthermore, HSs seem to be less monolingual-like for referentially ambiguous forms, and show a preference for antecedents that are linearly closer to the anaphor. The concept of incomplete acquisition suggests that age of L2 acquisition plays an important role in HSs' processing, but only few studies have investigated the role of AoA as a continuous variable. Finally, proficiency has been discussed as a variable to explain contrasting findings within and between different HS populations.

Chapters 2 and 3 provided the background for the experiments described in this thesis. While Ch. 2 provided an overview of the German and Turkish anaphors that will be under investigation in this study, Ch. 3 described previous findings on anaphoric resolution in the groups that were tested. Furthermore, Ch. 3 also described the role of individual differences in the literature on bilingual language processing. Based on these two chapters, Table 3.1 gives an overview of the anaphors and populations that were tested in this thesis, ordered by chapter and language, and further shows whether individual differences (AoA and proficiency) were also investigated.

Table 3.1 *Overview of all analyses in this thesis, categorized by chapter, language and anaphor type*

Chapter	**Ch. 4**						**Ch. 5**		**Ch. 6**		
Language	**German**		**Turkish**				**German**		**Turkish**		
Anaphor	er	sich	pro	o	kendisi	kendi	er	sich	o	kendisi	kendi
L1	x	x	x	x	x	x	x	x	x	x	x
L2	x	x	-	-	-	-	x	x	-	-	-
HS	-	-	x	x	x	x	-	-	x	x	x
AoA	x	x	x	x	x	x	x	x	-	-	-
Proficiency	x	x	x	x	x	x	x	x	x	x	x

Note. An 'x' indicates that an analysis took place.

Chapter 4

Anaphor interpretation in German and Turkish - evidence from monolinguals and bilinguals

4.1 Introduction

As described in Ch. 3, differences in the interpretation of pronouns between HSs and monolingual L1ers are often considered to stem from incomplete acquisition, an interruption of the L1 acquisition process due to the introduction of a second language at an early age. Sentence processing in L2ers, on the other hand, has been assumed to differ from L1ers due to a variety of factors, such as limited processing resources in their L2, L1 influence, or more general differences in processing mechanisms between mono- and bilinguals.

In this chapter, I present four web-based questionnaire experiments which examined anaphor resolution in Turkish-German bilinguals in both of their languages. When investigating German, this population is often considered L2ers, despite the fact that most of these bilinguals started learning German from an early age and were schooled in German. As a result, their German proficiency is usually very high, and they may be considered 'end-state' L2 learners due to their extensive exposure to German. In many cases, German is the dominant language for this type of bilingual. For this reason, the same group is labeled HSs of

Turkish, in contrast to Turkish L1ers who did not learn an L2 from early childhood. The extensive exposure to German in combination with reduced exposure to Turkish compared to people who grew up in a monolingual Turkish-speaking environment may lead to differences in the interpretation of anaphors between the Turkish-German bilinguals and Turkish monolinguals.

This questionnaire study aimed to investigate how Turkish-German bilinguals interpret pronouns and reflexives in both German and Turkish. Two experiments were carried out in each language, one focusing on reflexive interpretation, and the other on referentially ambiguous subject pronouns. The German and Turkish materials were constructed to be parallel in order to keep the variation between the experiments in the two languages at a minimum. In both languages, a group of monolingual L1ers were tested as well, to provide a baseline for the bilinguals' judgments and so as to be able to identify potential causes of differences between mono- and bilinguals.

A second aim of this study (specifically, Exps. 3 and 4) was to explore the antecedent options of Turkish anaphors. As described in Ch. 2, there are two Turkish anaphors which can be used as reflexives (*kendi* and *kendisi*), and they may be ambiguous between referring to a local and a non-local antecedent to different extents. Similarly, Turkish has three types of subject pronoun, which may be used in different pragmatic contexts. In addition to HS anaphor resolution, this chapter therefore also aimed to investigate whether and how Turkish anaphors receive distinct interpretations in two syntactic contexts.

The chapter is structured as follows: The next two sections will each present an experiment on the interpretation of German anaphors, followed by two sections that describe experiments on Turkish anaphor resolution. The first experiment for each language (Exp. 1 for German, and Exp. 3 for Turkish) investigated the interpretation of object anaphors, and their ability to be bound as reflexives. The second experiment for each language (Exp. 2 for German, Exp. 4 for Turkish) investigated the availability of intra- and intersentential antecedents for subject pronouns. In all experiments, a group of Turkish-German bilinguals was compared to a group of monolingual L1ers of the respective language (German for Exps. 1 and 2, Turkish for Exps. 3 and 4).

4.2 Experiment 1: L1 and L2 resolution of German reflexives

The goal of Exp. 1 was to test the L1 and L2 interpretation of German reflexives. Furthermore, I aimed to assess whether the insertion of *selbst* ('self') results in an increased tendency to assign the German reflexive *sich* to the correct, local antecedent, given *selbst*'s function as an intensifier (see section 2.2.2.2).

As described in Ch. 2, German reflexives are subject to Condition A, which states that reflexives must be bound by a c-commanding local antecedent. Ch. 3 showed that L1ers usually have no trouble correctly applying Condition A in offline comprehension, even when processing data show temporary consideration of illicit antecedents (Clackson & Heyer, 2014; Runner & Head, 2014). However, in Sturt (2003), even offline antecedent choices could violate Condition A at considerable rates for L1ers when the inaccessible antecedent was a potential logophoric binder.

Studies of L2 online reflexive resolution suggest that L2ers rely more strongly on discourse information than structural information in their initial antecedent search (e.g. Felser & Cunnings, 2012; Felser et al., 2009), in line with the SSH (Clahsen & Felser, 2006) and memory interference hypothesis (Cunnings, 2016). In L2ers' offline interpretation of anaphors, L2ers have sometimes shown an influence of their L1 (Roberts et al., 2008), while other studies report native-like responses irrespective of L1 background (Felser & Cunnings, 2012; Felser et al., 2009).

As discussed in section 2.3.2, Turkish allows for long-distance binding of (some) reflexives, violating Condition A. If Turkish-German bilinguals are influenced by their L1 Turkish when interpreting German reflexives, which have to be bound locally, they might show a stronger consideration of non-local antecedents compared to L1ers. This type of effect has been found for English reflexives in Turkish-speaking L2ers of English (Demirci, 2000; Köylü, 2010); however, it is unclear what causes these L1-L2 differences.

The bilingual group tested in the present study includes both early and late learners of German. Many of the participants could be considered HSs of Turkish, i.e., they learned Turkish from birth, but at a relatively early age German became their dominant language, and they received schooling in German, but not Turkish. Hence, the L2 group in this study shows a large variance in German AoA, Turkish proficiency, and German proficiency, in order to investigate the role of individual differences in L2 anaphor resolution.

In the present experiment, the interpretation of the standard German reflexive *sich* is compared to the interpretation of the emphatic reflexive construction *sich selbst*. In the materials used in the present experiment, the accessible antecedents are identical for the two constructions, according to Condition A. As described in section 2.2.2.2, a previous study (Kaiser & Runner, 2008) found no difference in the interpretation of *sich* and *sich selbst* in L1ers in environments that are exempt from Condition A. Therefore, no differences in antecedent choices between *sich* and *sich selbst* are expected for L1ers.

If L2ers rely less on syntactic information, and more on discourse-based and semantic information during sentence comprehension than L1ers (Clahsen & Felser, 2006, 2017; Cunnings, 2016, 2017), it is possible that they choose the inaccessible but prominent non-local antecedent for the reflexive more often than L1ers. Furthermore, the semantic distinction between *sich* and *sich selbst* may influence L2ers' antecedent choice. Featherston and Sternefeld (2003) described the function of *selbst* in *sich selbst* as emphasizing the reference to its antecedent. This emphasis may make the interpretation of *sich selbst* easier than the interpretation of *sich* for L2ers, and lead to more correct antecedent choices for *sich selbst* than for *sich*.

4.2.1 Method

4.2.1.1 Participants

Table 4.1 *Participant information for the L2 group in Exps. 1 and 2*

Variable	mean	range	sd
Age	25.74	17-46	5.79
German proficiency (%)	88.00	56.67-100.00	9.13
Turkish proficiency (%)	72.91	13.64-100.00	22.98
German AoA	4.77	0-30	6.70
Length of exposure to German (years)	21.04	4-38	6.19

54 German monolinguals and 54 Turkish-German bilinguals participated in the questionnaire. Participants were recruited through personal contacts and social media. All participants in the monolingual group reported German as their L1, and had not learned any other language before the age of six. The average age in the monolingual group was 30.21 (range = 16-75, sd = 12.07).

The Turkish-German bilingual group (see Table 4.1) consisted of self-reported L1ers of Turkish who had started learning German between the age of 0 and 30. Their exposure to German in years varied between 4 and 38 years, with a mean of 21.04. Hence, the group included simultaneous bilinguals (i.e. with German AoA = 0, n = 20), early L2 learners with German AoA of 1 to 5 (n = 20) and late L2 learners of German, who started learning German at age 6 or later (n = 14). The average age in the bilingual group was 25.74.

In addition to the questionnaire experiments, the Turkish-speaking participants also filled out a German placement test (Goethe test, Goethe Institut, 2010), as well as a Turkish placement test (TELC C1 test, telc GmbH, 2012). For the Goethe test, participants could score between 0 and 30 points. The mean score for the bilingual group was 26.40 (88.00%), which corresponds to the C1 ('advanced') level in the CEFR framework, with the cutoff for the highest level (C2, 'proficient') being 27. The range for the German proficiency scores was 17 to 30 (56.67-100%), with the lowest-scoring participants reaching a B2 level ('upper intermediate'). Thus, despite having a considerable range, the bilinguals' German proficiency was considered sufficient for them to participate in Exp. 1.

The Turkish placement test TELC C1 was designed to test whether a participant had achieved the C1 level in the CEFR framework. Thus, it could not test whether a participant had reached the higher-level proficiency, which is C2. The C1 test was chosen for practical reasons due to its availability and brevity. Furthermore, ceiling effects were not expected, as the test uses university-level written Turkish, which many of the Turkish-German bilinguals who were not schooled in Turkish are not very familiar with. This was also observed in participants' test results: While the TELC test had a maximum score of 22, the bilinguals scored 16.04 (72.91%) points correct on average, with a range of 3 to 22 (13.61-100%). Despite some scores indicating low proficiency, none of the participants were excluded based on their TELC Score, as all of them reported being fluent in Turkish and using it on a regular basis. The TELC C1 consisted of a cloze test aimed at estimating participants' grammatical and morphological knowledge, thus it is possible for a participant to receive low TELC Scores while being a fluent speaker of Turkish.

4.2.1.2 Materials

The materials consisted of 24 experimental sentences and 24 filler items. Each experimental sentence was constructed in two different versions. The differ-

ence between the two conditions was the type of reflexive construction used (see (4.1)). In one condition, *sich* was used (4.1)-a, while the other condition additionally contained the intensifier *selbst* (4.1)-b. Experimental sentences always contained a matrix clause and a subordinate clause. The reflexive and its potential antecedent were contained in the subordinate clause, and the inaccessible antecedent was always the main clause subject. The reflexive was either the direct or the indirect object of the verb in the subordinate clause. The sentences were created such that the antecedent of the reflexive could not be inferred from the context. A list of all experimental sentences can be found in Appendix A.1.1.

(4.1) a. Christina$_{i}$ sah, dass Miriam$_{j}$ **sich$_{*i/j}$** heimlich Frühstück machte.
Christina see$_{3^{rd}\text{SingPast}}$ that Miriam herself secretly breakfast make$_{3^{rd}\text{SingPast}}$.
'Christina saw that Miriam secretly made herself breakfast.'

b. Christina$_{i}$ sah, dass Miriam$_{j}$ **sich selbst$_{*i/j}$** heimlich Frühstück machte.
Christina see$_{3^{rd}\text{SingPast}}$ that Miriam herself (self) secretly breakfast make$_{3^{rd}\text{SingPast}}$.
'Christina saw that Miriam secretly made herself breakfast.'

(4.2) a. Wem machte Miriam heimlich Frühstück?
Whom made Miriam secretly breakfast
'For whom did Miriam secretly make breakfast?'

b. response options:
definitiv Christina - eher Christina - unklar (Christina oder Miriam) - eher Miriam - definitiv Miriam
'definitely Christina - probably Christina - unclear (Christina or Miriam) - probably Miriam - definitely Miriam'

Each experimental sentence was followed by a question which probed the interpretation of the reflexive (see (4.2)). Participants were asked to respond to the question by selecting one out of five response options on a Likert scale. The options were coded on an ordinal scale from the local to the non-local potential antecedent. The presentation of the response options was randomized such that both the local and the non-local antecedents appeared on each extreme of the scale (left or right) at comparable rates. To test for the effect of the independent variable Reflexive Type (*sich* vs. *sich selbst*), materials were presented in a Latin Square design such that each participant only saw each experimental item in one of the two conditions. Furthermore, the presentation order was

pseudo-randomized so that an experimental item could not be followed by another experimental item.

The 24 filler items (see Appendix A.1.3) were also followed by a comprehension question which probed participants' interpretation of an anaphor. 12 of the fillers were experimental items in Exp. 2 (see below), which consisted of two sentences, with the second sentence containing a referentially ambiguous subject pronoun. The 12 remaining filler sentences contained either reflexives or pronouns in single-sentence contexts. The contextual information of these fillers were constructed to bias the interpretation of the anaphor to some degree. The purpose of this was to take participants' attention away from the absence of biasing context information in the experimental items.

4.2.1.3 Procedure

The experiment was carried out using SurveyGizmo (www.surveygizmo.com), an internet-based tool for conducting surveys. Participants either personally received a link to the questionnaire or were made aware of the survey through posts on social networks or word of mouth. After clicking on the link, written instructions appeared, which asked participants to fill out the questionnaire only on a laptop or desktop computer (no tablets or smartphones), and to make sure to take at least 15 minutes of their time in which they could fill out the survey without being interrupted. Most participants filled out the questionnaire from their personal computers, while some participants in the bilingual group were recruited and filled out the questionnaire in a university library in the presence of an experimenter. Nonetheless, they were instructed to fill out the questionnaire independently and could only ask questions to the experimenter after completing the session.

All participants were instructed to read each sentence and the corresponding question carefully, and to then answer the question by selecting the most appropriate response option. They were also given two example sentences, together with a comprehension question with asked for the antecedent of the anaphor, as well as response options that matched the way response options were presented in the questionnaire. However, none of the options was displayed as correct or incorrect in the examples, in order not to bias participants' behavior in the questionnaire.

Additionally, participants in the bilingual group filled out the two language placement tests (Goethe placement test for German and TELC C1 test for Turkish). Participants could fill out the test either in a lab at the Potsdam Re-

search Institute for Multilingualism (PRIM) during a later session for a different experiment, in a library immediately after filling out the online questionnaire, or from their homes. The placement tests were always filled out after the questionnaire was completed.

The research in this and all other experiments in this thesis was approved by the ethics committee of the University of Potsdam (application number 37/2011).

4.2.1.4 Analysis

As with all other experiments in this thesis, I used R (R Core Team, 2017) for data analysis.

Response options were organized on a five-point Likert scale to capture the relative strength of participants' interpretation preferences as well as potential referential ambiguity. The most local answer option (*definitiv Miriam* in (4.2)), was always coded as five, the next one (*eher Miriam*) was coded as four, etc. for each level up to *definitiv Christina* (the most non-local option), which was coded as one. The dependent variable was the tendency to assign the pronoun to the local antecedent. Responses were analyzed using cumulative link models (Agresti, 2002), which allow for a fine-grained analysis of ordinal categorical data.

An analysis of the entire data set was conducted with two predictor variables, Group (L1ers vs. L2ers) and the type of reflexive construction used, i.e. Reflexive Type (*sich* vs. *sich selbst*). A second analysis was carried out for the L2 group only, to assess whether language proficiency (in both German and Turkish) or German AoA played a role in how participants resolved the reflexives. The influence of the three variables (Goethe test score, TELC test score, German AoA), was analyzed in a joint analysis. The models tested for an effect of Reflexive Type, the individual difference variables, and interactions between the Reflexive Type and the individual differences variables. The appropriate random effects structure was determined through model comparison (e.g. Baayen, Davidson, & Bates, 2008).

4.2.1.5 Predictions

The following predictions were made:

1. German reflexives are interpreted as referring to the local antecedent, following Condition A.

2. For German L1ers, there is no difference in the tendency to assign the reflexive to the local antecedent between the bare reflexive *sich*, and the more emphatic *sich selbst*.

3. If Turkish-speaking L2ers of German rely more strongly on non-syntactic information than syntactic information compared to German L1ers, I expect a stronger consideration of the prominent non-local antecedent in L2ers than in L1ers. This effect may further be modulated by the semantic distinction between *sich* and *sich selbst*.

4.2.2 Results

The results for Exp. 1 are plotted in Fig. 4.1. In the German-speaking group, the two conditions received very similar interpretations: *sich* had a mean response of 4.96 (98.30% clicks on 5, which corresponds to 'definitely local', the correct response option), while *sich selbst* had a mean response of 4.97 (with 97.84% of clicks going on 5). In the Turkish-speaking group, the mean response for the *sich* condition was 4.86 (with 90.26% of clicks on 5) and therefore somewhat lower than in the L1 group, and in the *sich selbst* condition, the mean response was 4.96 (with 96.76% of clicks going on 5).

The cumulative link model analysis (see Table 4.2) found no evidence for a difference in preference for a local vs. non-local referent between the two reflexive constructions (*sich* vs. *sich selbst*) in the L1ers ($p>0.1$). Furthermore, the preference for a local antecedent was weaker for the L2 group than for the L1ers: *sich* was interpreted as more local by L1ers compared to L2ers ($p<0.001$). The analysis further revealed a significant interaction of Group and Reflexive Type ($p<0.001$). Based on this interaction, the data was analyzed separately for the two reflexive constructions, to determine whether a group difference would be observed for *sich selbst* as well. In the separate analysis of *sich* (see Table 4.3), L2ers again had a weaker local preference than L1ers ($p<0.05$). For *sich selbst* (see Table 4.4), L2ers had a native-like local antecedent preference ($p>0.1$).

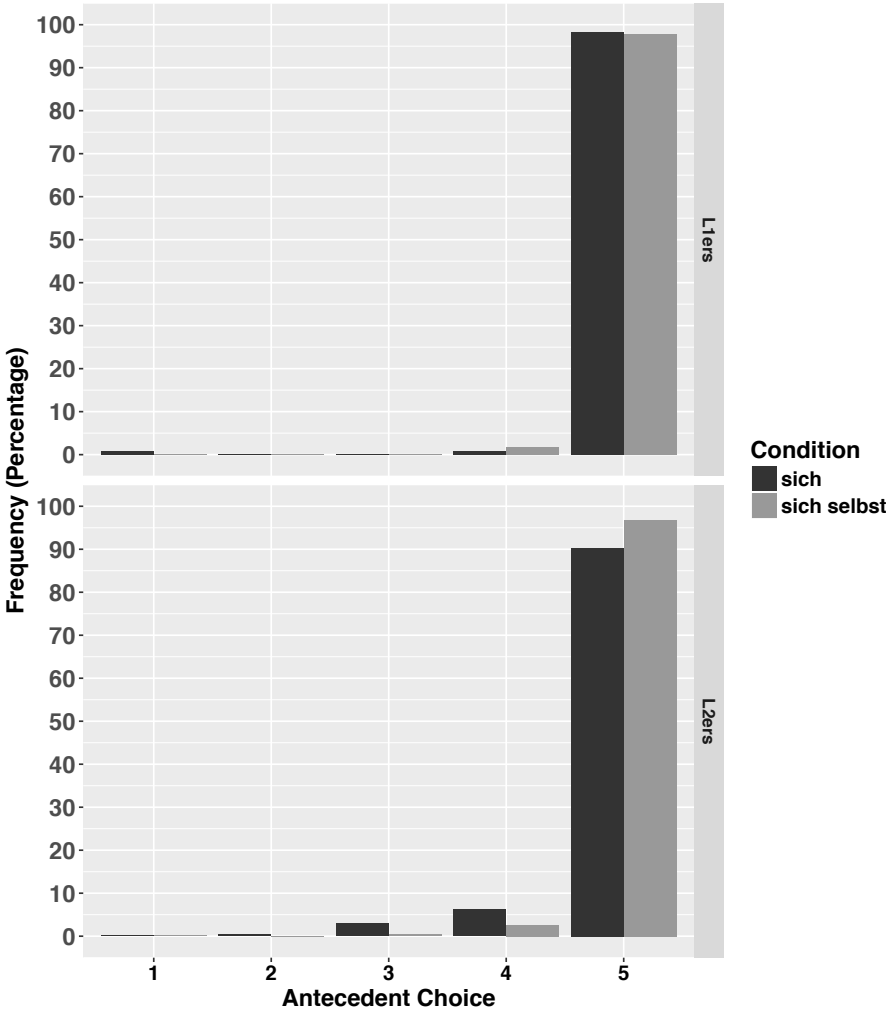

Figure 4.1. Response pattern for Exp. 1, separately for groups and conditions. Codes for Antecedent Choice were 1='definitely non-local', 2='rather non-local', 3='local or non-local', 4='rather local', 5='definitely local'.

Table 4.2 *Results of cumulative link analysis for Exp. 1*

Fixed Effect	Estimate (SE)	z-value
$\text{ReflexiveType}_{sich\ selbst}$	-0.33 (0.46)	-0.73
$\text{Group}_{\text{L2ers}}$	-2.36 (0.68)	**-3.46**
$\text{Group}_{\text{L2ers}}$ * $\text{ReflexiveType}_{sich\ selbst}$	1.89 (0.54)	**3.48**

Note. Treatment contrasts, baseline was the *sich* condition in the L1 group. Marginal or significant effects are boldfaced.

Table 4.3 *Results of cumulative link analysis for the* sich *condition in Exp. 1*

Fixed Effect	Estimate (SE)	z-value
$\text{Group}_{\text{L2ers}}$	-1.87(0.76)	**-2.47**

Note. Treatment contrasts, baseline was the L1 group. Marginal or significant effects are boldfaced.

Table 4.4 *Results of cumulative link analysis for the* sich selbst *condition in Exp. 1*

Fixed Effect	Estimate (SE)	z-value
$\text{Group}_{\text{L2ers}}$	-0.75(1.16)	-0.64

Note. Treatment contrasts, baseline was the L1 group. Marginal or significant effects are boldfaced.

4.2.2.1 Effects of proficiency and age of acquisition

The influence of the individual differences variables German AoA, Goethe Score, and TELC Score are plotted in Figs. 4.2, 4.3, and 4.4, respectively. The graphs reveal individual differences only for *sich*: participants with a higher German AoA, and participants with a lower Goethe Score were less likely to choose the local antecedent for *sich*, while the local antecedent for *sich selbst* was strongly preferred in all participants.

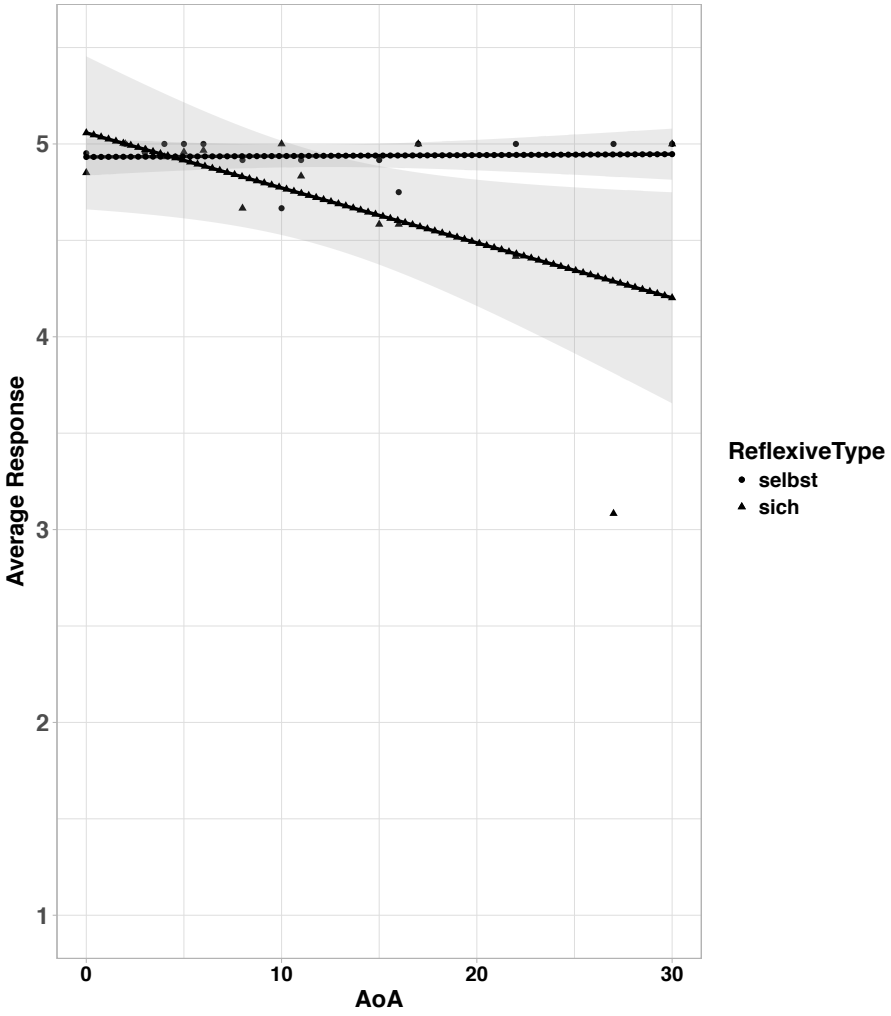

Figure 4.2. Response pattern for Exp. 1 by German AoA for the two ReflexiveType conditions.
Codes for Average Response were 1='definitely non-local', 2='rather non-local', 3='local or non-local', 4='rather local', 5='definitely local'.

The results of the statistical analysis are listed in Table 4.5. In the baseline con-

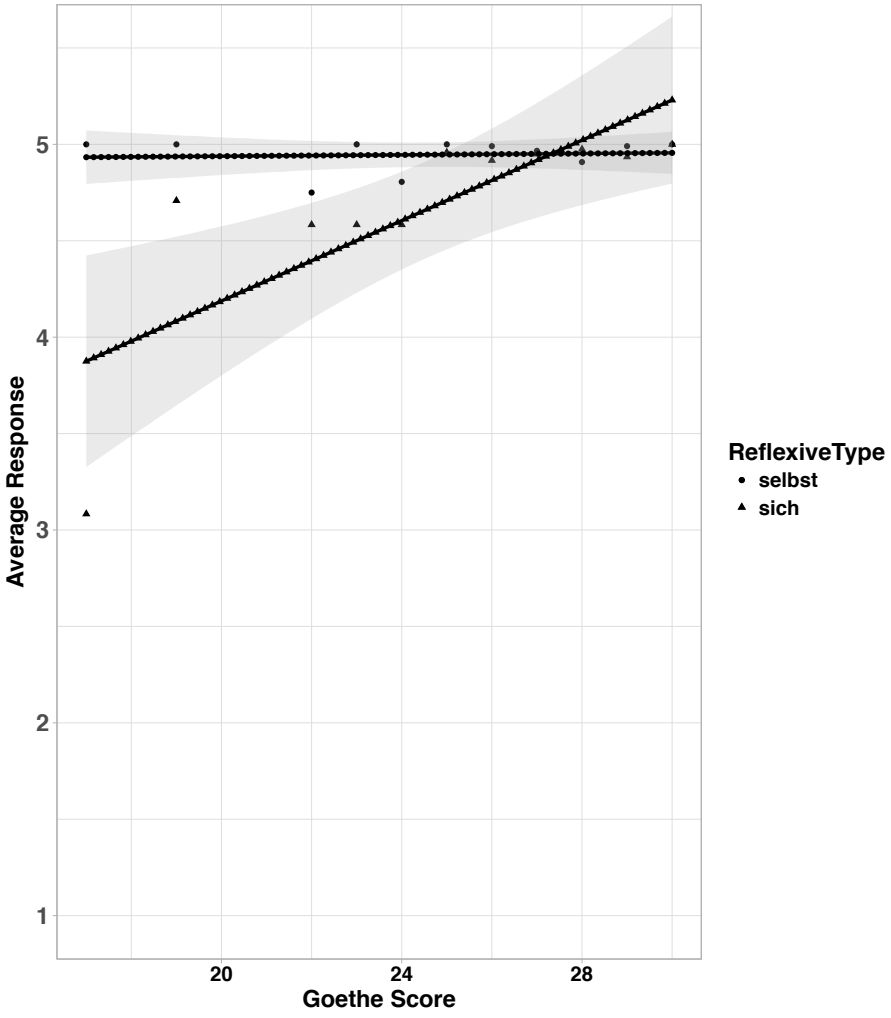

Figure 4.3. Response pattern for Exp. 1 by Goethe Score for the two ReflexiveType conditions.
Codes for Average Response were 1='definitely non-local', 2='rather non-local', 3='local or non-local', 4='rather local', 5='definitely local'.

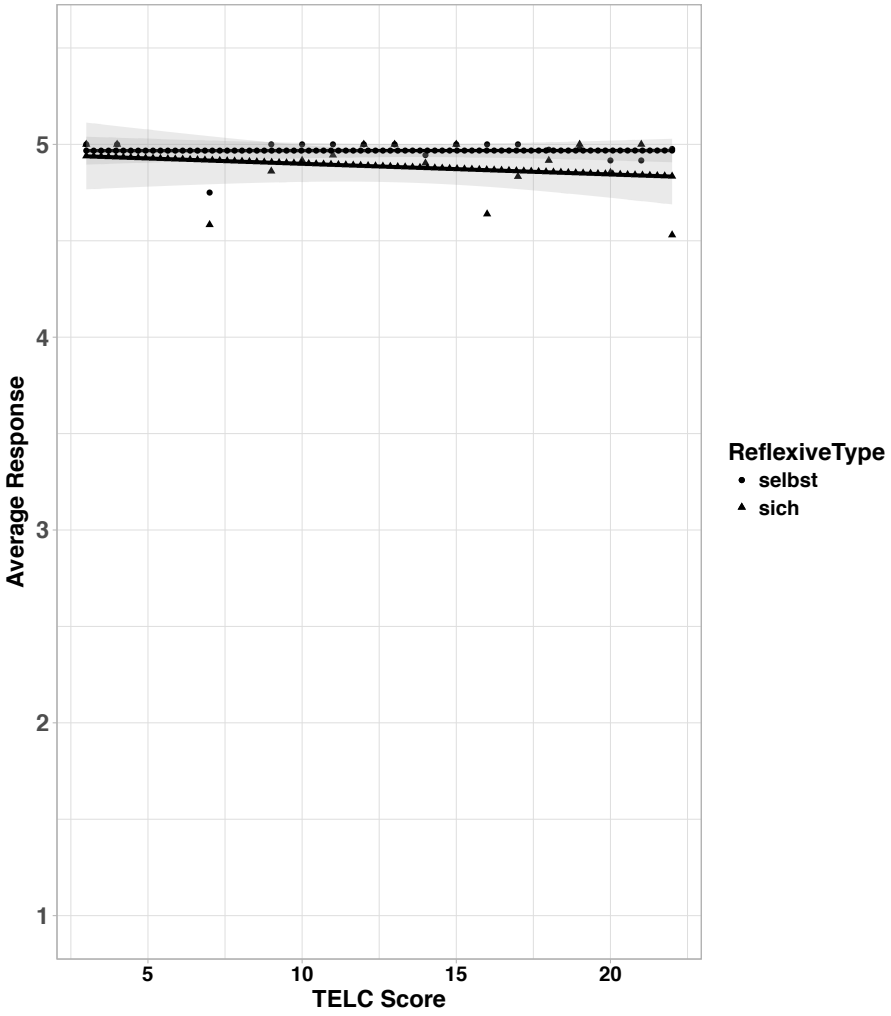

Figure 4.4. Response pattern for Exp. 1 by TELC Score for the two ReflexiveType conditions.
Codes for Average Response were 1='definitely non-local', 2='rather non-local', 3='local or non-local', 4='rather local', 5='definitely local'.

dition *sich*, the only significant predictor of participants' responses was Goethe score ($p<0.001$). Furthermore, there was a significant interaction of Goethe Score and Reflexive Type in participants' preference for a local vs. non-local antecedent for the reflexives ($p<0.01$), indicating that the influence of Goethe Score on participants' responses was stronger for *sich* than for *sich selbst*.

Table 4.5 *Effects of individual differences in the L2 group of Exp. 1*

Fixed Effect	Estimate (SE)	z-value
ReflexiveType$_{sich\ selbst}$	1.16(0.35)	**3.36**
AoA	-0.28(0.48)	-0.59
GoetheScore	1.39(0.41)	**3.37**
TELCScore	0.27(0.44)	0.61
ReflexiveType$_{sich\ selbst}$ * AoA	0.11(0.50)	0.23
ReflexiveType$_{sich\ selbst}$ * GoetheScore	-1.02(0.39)	**-2.59**
ReflexiveType$_{sich\ selbst}$ * TELCScore	-0.16(0.43)	-0.36

Note. Treatment contrasts, baseline was the *sich* Condition. Marginal or significant effects are boldfaced.

4.2.3 Discussion

To summarize the results of Exp. 1, both L1ers and L2ers of German overwhelmingly preferred a local and grammatically licensed antecedent over a non-local, grammatically illicit antecedent. At the same time, participants in the Turkish-speaking group showed a significantly weaker preference for the local antecedent for *sich* compared to German L1ers, while showing a native-like very strong preference for the local antecedent for *sich selbst*. Within the L2 group, there was considerable variance in the interpretation of *sich*, caused by lower-proficiency L2ers who considered the non-local antecedent for *sich* more strongly than higher-proficiency L2ers and L1ers.

The results for the group of German L1ers confirmed the predictions. L1ers had no trouble finding the correct antecedent for a reflexive, and this did not differ between *sich* and *sich selbst* constructions.

Similar to what has been found in previous studies of L2 reflexive interpretation (e.g. Demirci, 2000), the results showed that the Turkish-speaking participants

had more trouble identifying the correct antecedent for the reflexive in their L2 German than L1ers. The analysis of the German proficiency scores suggests that bilingual participants with native-like levels of proficiency also had native-like preferences in the interpretation of both *sich* and *sich selbst*. Participants with a somewhat lower proficiency in German also did not differ from German L1ers in their interpretation of *sich selbst*, but allowed more non-local interpretation of the standard German reflexive *sich*.

When looking at the individual differences variables separately in the graphs, both Goethe Score and German AoA showed a correlation with participants' responses for *sich*. By including all three individual differences predictors in one model, it was revealed that German proficiency was the strongest predictor of HSs' local vs. non-local preference for *sich*, as the observed correlation for German AoA proved non-significant when controlling for the effect of Goethe Score. These findings support the claim that proficiency has a larger influence on L2 language processing than L2 AoA (e.g. Herschensohn, 2009).

The differences found between the L1ers and L2ers raise the question of whether these differences can be explained by cross-linguistic influence from the bilinguals' L1, Turkish. As described in Ch. 2, Turkish allows for long-distance binding of (some) reflexives. If the bilingual participants were influenced by the properties of Turkish when interpreting German reflexives, they might consider or even prefer a long-distance (i.e. non-local) antecedent for *sich*. Within the current experiment, L1 influence cannot be ruled out due to the absence of a second L2 group whose L1 aligns with German in the resolution of reflexives.

The results for L2ers are also in line with the hypothesis that L2ers rely more strongly on non-syntactic information during language processing than L1ers (Clahsen & Felser, 2006, 2017; Cunnings, 2016, 2017). A stronger reliance on pragmatic information such as discourse prominence would result in a stronger preference for the prominent non-local antecedent, despite it being syntactically inaccessible for the reflexive. This effect was observed only for *sich*. *Sich selbst* has a stronger semantic bias for the local antecedent, because the intensifier *selbst* emphasizes the reflexivity of *sich*. Thus, if L2ers further take into account this semantic property of *selbst*, they may consider the non-local antecedent more strongly for *sich* compared to *sich selbst*. This is the observed pattern of L2ers' antecedent choice. In contrast, L1ers were more faithful to the syntactic constraint of Condition A.

The results of Exp. 1 and the underlying nature of the observed L1–L2 differences will be further discussed in the General Discussion of this chapter (section 4.6). I now turn to Exp. 2, which was carried out in the same experimental

session as Exp. 1.

4.3 Experiment 2: L1 and L2 resolution of the German subject pronoun *er*

As discussed in Ch. 2, pronouns cannot refer to an entity inside their governing category according to Condition B (Chomsky, 1981). Therefore, they need to take an antecedent from outside this domain, either from within the same sentence as the pronoun, or from a previous sentence. In a given discourse, pronouns are therefore often ambiguous between two or more potential antecedents which match the morphosyntactic features of the pronoun.

The present experiment builds on the design of Roberts et al. (2008) (described in section 3.3) by testing similar materials in German. I aimed to investigate whether the preference for the sentence-internal referent found for Dutch is also observed in German, as was assumed in Roberts et al. (2008). Roberts et al. (2008) claimed that Dutch and German subject pronouns strongly prefer a prominent sentence-internal antecedent over a sentence-external antecedent, based on the absolute preference they observed for sentence-internal antecedents in Dutch L1ers and German L2ers of Dutch. They further claimed that the strongly reduced preference for sentence-internal antecedents in a group of Turkish-speaking L2ers was due to an influence of Turkish, where the overt pronoun *o* signals reference to a less prominent antecedent.

Unlike Roberts et al. (2008), this experiment provided participants with the possibility to give graded judgments, which allows us to test for ambiguity in participants' antecedent preferences for the respective pronoun. In addition, I want to examine the interpretation of these referentially ambiguous pronouns by Turkish-speaking L2ers of German, and investigate whether non-native-like interpretation is due to an influence of their L1 or more general L1-L2 differences.

To summarize, the goal of Exp. 2 was to determine whether the German pronoun *er* will be preferentially assigned to a sentence-internal rather than a sentence-external antecedent. The main purpose of this experiment was to examine whether Turkish-German bilinguals differed from German monolinguals in the resolution of referentially ambiguous subject pronouns in their L2. Therefore, I tested a group of German L1ers and a group of Turkish-speaking L2ers of German.

4.3.1 Method

4.3.1.1 Participants

The same 54 German monolinguals and 54 Turkish-German bilinguals as in Exp. 1 participated in Exp. 2.

4.3.1.2 Materials

The materials consisted of 12 experimental items and 36 filler items. Appendices A.1.2 and A.1.3 provide full lists of experimental items and fillers, respectively. An example experimental item can be found in (4.3) below.

(4.3) Klaus$_{i}$ und Ralf$_{j}$ arbeiteten bei der Post. Als Ralf$_{j}$ aus dem Urlaub zurückkam, hatte **er$_{i/j}$** viel zugenommen.
Klaus and Ralf work$_{3^{rd}PlurPast}$ at the post-office. When Ralf from the vacation return$_{3^{rd}SingPast}$, have$_{3^{rd}SingPast}$ he much gain$_{PartPast}$.
'Klaus and Ralf worked at the post office. When Ralf came back from vacation, he had gained a lot of weight.'

(4.4) a. Wer hatte viel zugenommen?
Who has much gained?
'Who had gained a lot of weight?'

b. response options:
definitiv Ralf – eher Ralf – unklar (Ralf oder Klaus) – eher Klaus – definitiv Klaus
'definitely Ralf – probably Ralf – unclear (Ralf or Klaus) – probably Klaus – definitely Klaus'

Experimental items always consisted of two sentences, with the second sentence containing the pronoun *er* ('he'). Furthermore, the second sentence also contained a potential antecedent of the pronoun. In the first sentence, this potential antecedent was introduced together with another potential antecedent, which appeared only once in the first sentence of the experimental item. To introduce the antecedents, a coordinated subject was used (*Klaus und Ralf* 'Klaus and Ralf' in (4.3)). The order of the pronoun's potential antecedents within the coordinated subject was balanced between items, as previous research has found

that antecedent order may influence pronoun resolution (e.g. Gernsbacher & Hargreaves, 1988; Järvikivi et al., 2005).

The second sentence always began with a temporal subordinate clause, using one of the three connectors *als* ('as'), *nachdem* ('after'), and *während* ('while'). No difference between these constructions was expected; rather, this manipulation was created to make the experiment less monotonous for the participants. Therefore, Connector was a between-item variable.

The 24 experimental sentences of Exp. 1 served as fillers for Exp. 2. The remaining 12 fillers were the same as in Exp. 1 (see section 4.2.1.2). As in Exp. 1, each experimental item was followed by a comprehension question which probed the antecedent of the pronoun. An example for a comprehension question and the corresponding response options is given in (4.4).

4.3.1.3 Procedure

The procedure of Exp. 2 was identical to Exp. 1 (see section 4.2.1.3).

4.3.1.4 Analysis

As in Exp. 1, cumulative link models (Agresti, 2002) were used. The dependent variable was the tendency to assign the pronoun to the sentence-internal antecedent. The only predictor variable was Group (L1ers vs. L2ers). The appropriate random effects structure was determined through model comparison.

Some studies report that the connector between a matrix clause and a subordinate clause may influence intra-sentential pronoun interpretation (de la Fuente & Hemforth, 2014; Schlenter, 2013). Therefore, a second analysis was conducted in order to test whether the connectors used in the beginning of the second sentence of each item had an impact on participants' interpretation. For this, an interaction with Connector was added to the Group predictor, and the random effects structure was again determined through model comparison.

4.3.1.5 Predictions

The following predictions were made:

1. German pronouns will be preferentially interpreted as referring to the discourse-prominent sentence-internal antecedent by German L1ers, in line with Roberts et al. (2008).

2. If Turkish-speaking L2ers of German rely more strongly on discourse-based information during anaphor resolution than German L1ers (Clahsen & Felser, 2006, 2017; Cunnings, 2016), they should also show a preference for the sentence-internal antecedent, given its discourse prominence. Therefore, I expect no difference between L1ers and L2ers.

4.3.2 Results

The descriptive results for Exp. 2 can be found in Fig. 4.5. The L1 group had a mean response of 4.52 (with 67.03% of clicks going on 5, the definite choice of the sentence-internal antecedent). In the bilingual group, the mean response was 4.20 (with 58.18% of clicks going on 5).

The results of the cumulative link analysis are listed in Table 4.6. The analysis revealed a significant effect of Group ($p<0.05$), indicating that L2ers had a weaker sentence-internal preference than L1ers.

Table 4.6 *Results of the cumulative link analysis for Exp. 2*

Fixed Effect	Estimate (SE)	z-value
$\text{Group}_{\text{L2ers}}$	-1.17(0.49)	**-2.38**

Note. Treatment contrasts, baseline was the L1 group. Marginal or significant effects are boldfaced.

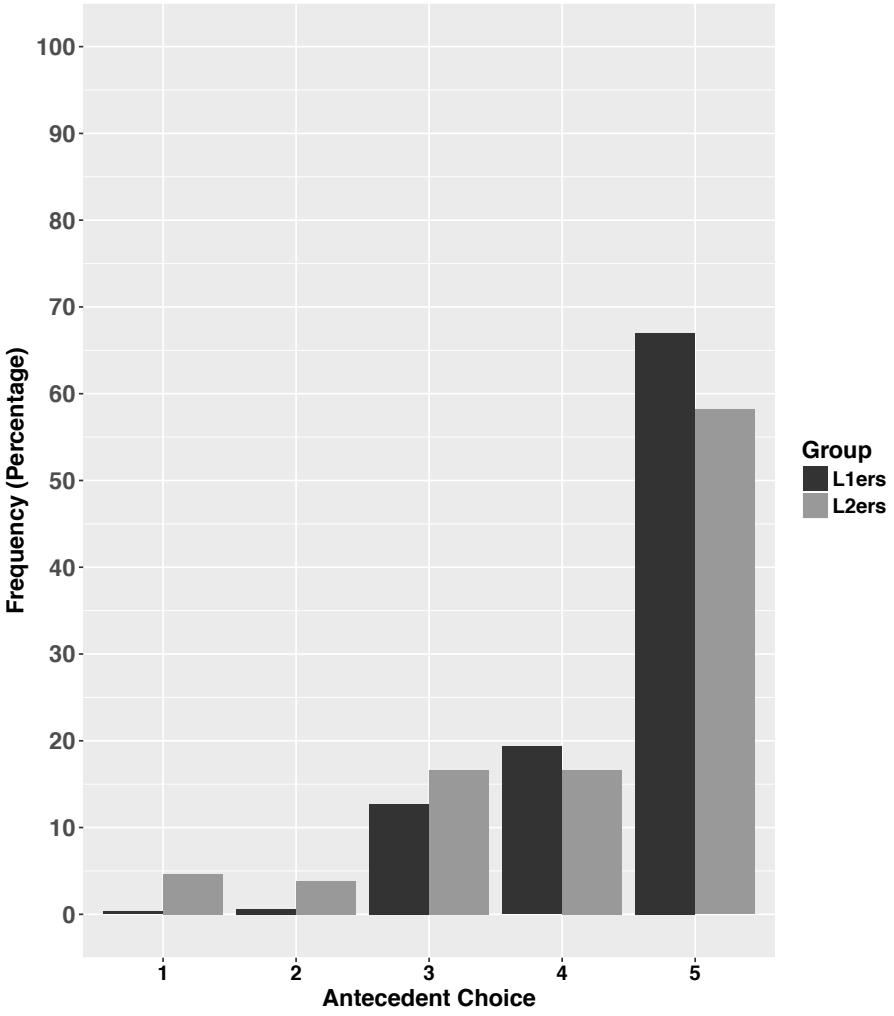

Figure 4.5. Response pattern for the two groups in Exp. 2.
Codes for Antecedent Choice were 1='definitely sentence-external', 2='rather sentence-external', 3='sentence-internal or sentence-external', 4='rather sentence-internal', 5='definitely sentence-internal'.

4.3.2.1 Effects of proficiency and age of acquisition

The influence of the individual differences variables German AoA, Goethe Score, and TELC Score are plotted in Figs. 4.6, 4.7, and 4.8, respectively. Individual differences were observed for Goethe Score and AoA. Higher-proficiency L2ers were more likely to choose the sentence-internal antecedent for *er* than lower-proficiency L2ers. Similarly, L2ers with an earlier German AoA were more likely to choose the sentence-internal antecedent than later-AoA L2ers. The correlation appeared to be slightly stronger for Goethe Score than for German AoA.

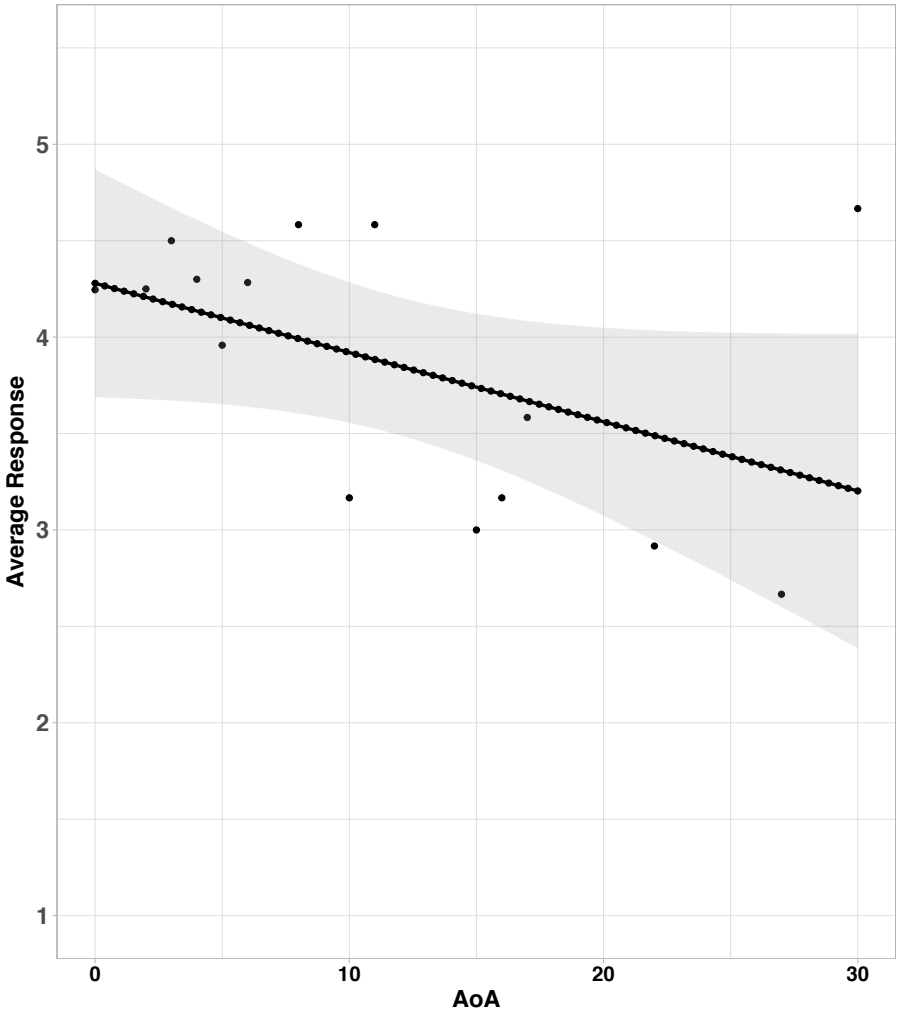

Figure 4.6. Response pattern for Exp. 2 by German AoA.
Codes for Average Response were 1='definitely sentence-external', 2='rather sentence-external', 3='sentence-internal or sentence-external', 4='rather sentence-internal', 5='definitely sentence-internal'.

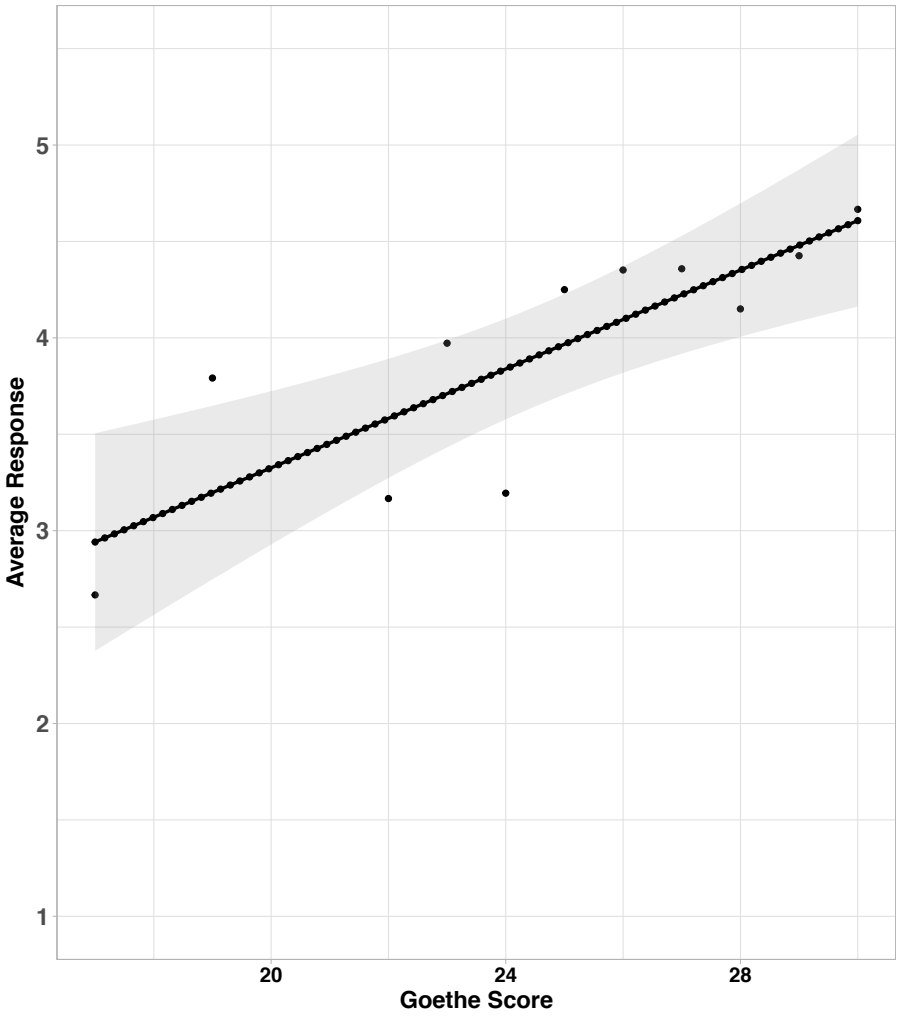

Figure 4.7. Response pattern for Exp. 2 by Goethe Score.
Codes for Average Response were 1='definitely sentence-external', 2='rather sentence-external', 3='sentence-internal or sentence-external', 4='rather sentence-internal', 5='definitely sentence-internal'.

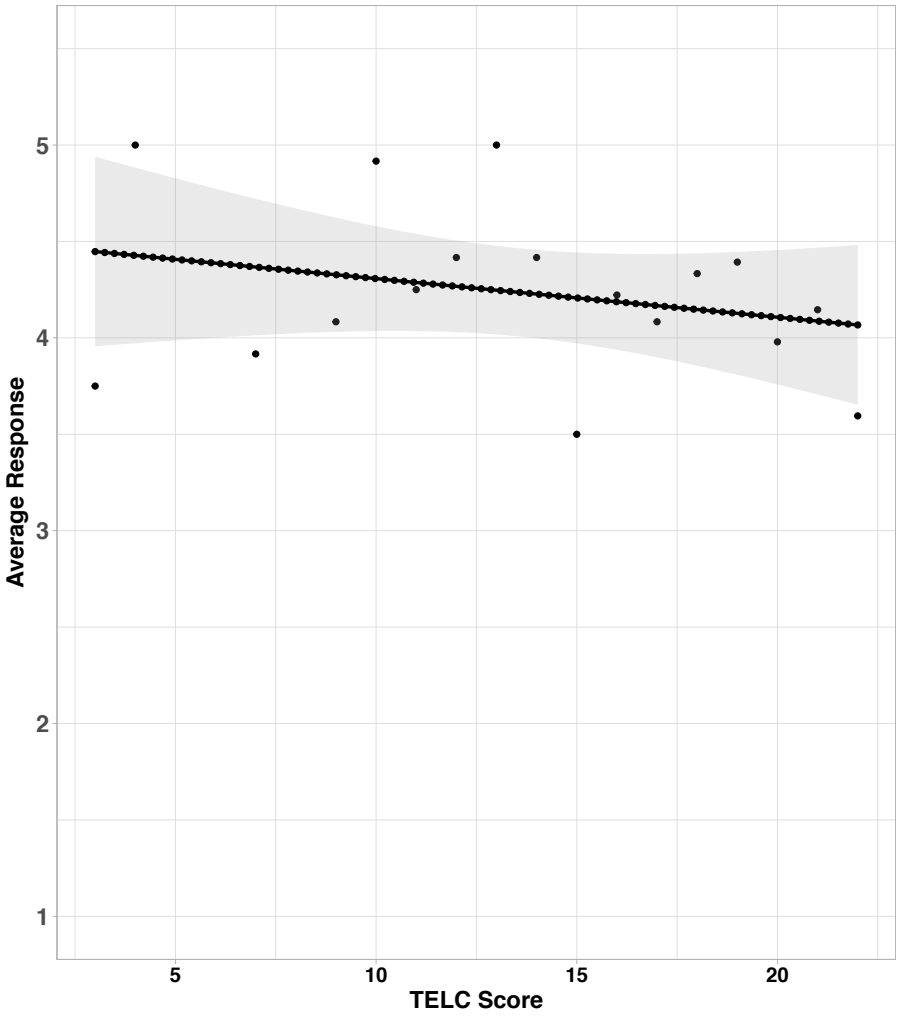

Figure 4.8. Response pattern for Exp. 2 by TELC Score.
Codes for Average Response were 1='definitely sentence-external', 2='rather sentence-external', 3='sentence-internal or sentence-external', 4='rather sentence-internal', 5='definitely sentence-internal'.

The results of the cumulative link analysis for the individual differences variables can be found in Tables 4.7. The only effect which reached marginal or full significance was of Goethe Score: Participants with a higher Goethe Score had a marginally stronger preference for the sentence-internal antecedent for *er* ($p<0.1$).

Table 4.7 *Results of cumulative link analysis with individual differences variables for the bilingual group, Exp. 2*

Fixed Effect	Estimate (SE)	z-value
AoA	-0.22(0.32)	-0.72
GoetheScore	0.50(0.27)	**1.83**
TELCScore	-0.11(0.28)	-0.38

Note. Marginal or significant effects are boldfaced.

4.3.2.2 Effects of Connector

Participants' responses are plotted separately for the two groups and the three connectors in Figure 4.9. Overall, the different connectors received very similar interpretations in the L1 group, and all had a strong preference for the sentence-internal antecedent. In the L2 group, participants' preference for the sentence-internal antecedent was strongest for *nachdem* ('after'), followed by *als* ('as'), and then *während* ('while'). Overall, the differences between connectors appear larger in L2ers than in L1ers.

The results from the winning model of the connector analysis can be found in Table 4.8. There were no effects of connector in the baseline group, L1ers. An effect of Group was found for the *während* ('while') condition ($p<0.01$), suggesting that L2ers had a weaker overall preference for the sentence-internal antecedent compared to L1ers. Furthermore, a Group by Connector interaction was found for the contrast *während-nachdem* ($p<0.001$), and a marginal interaction was found for *während-als* ($p=0.06$).

To explore these interactions, I ran separate analyses for each connector, to determine whether L1-L2 differences appeared for the other two connectors as well. For *als* ('when', see Table 4.9), L2ers interpreted the pronoun marginally more sentence-external than L1ers ($p<0.1$). For *während* ('when', see Table 4.10), this group difference was significant ($p<0.001$). For *nachdem* ('after', see Table 4.11), no group difference appeared.

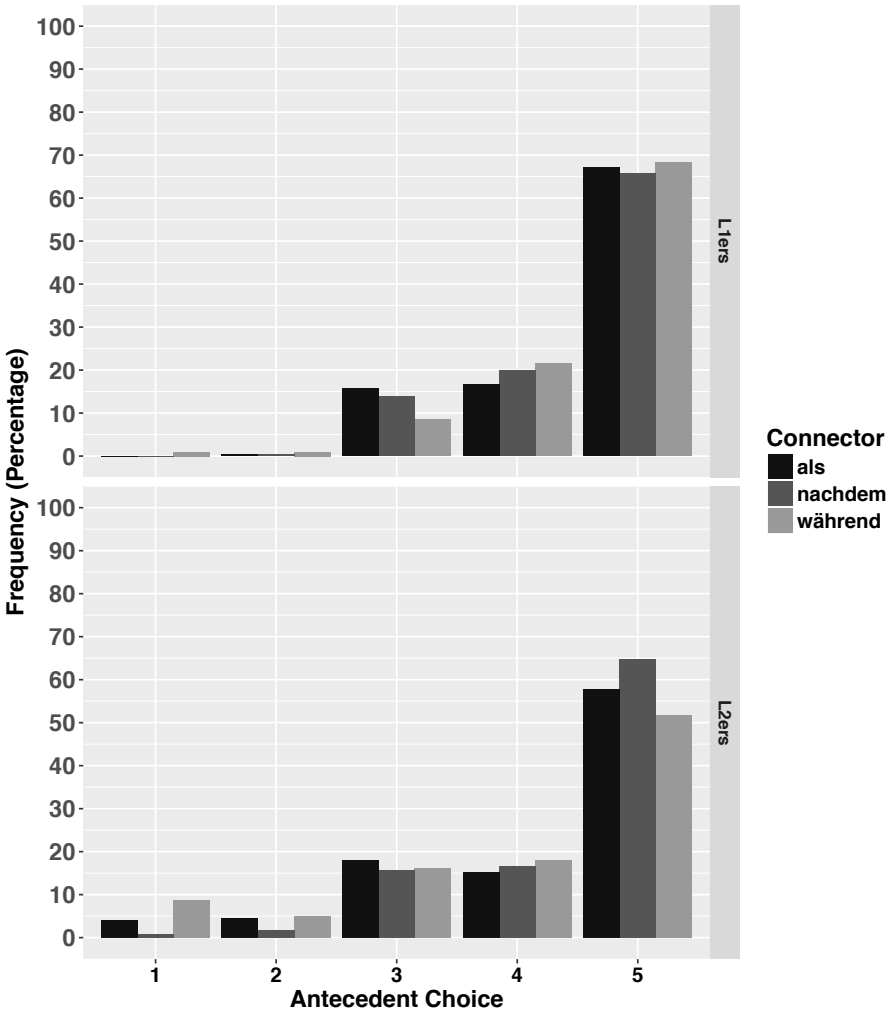

Figure 4.9. Response pattern for Exp. 2, separately for Groups and Connector types (*als* 'when', *nachdem* 'after', and *während* 'while').
Codes for Antecedent Choice were 1='definitely sentence-external', 2='rather sentence-external', 3='sentence-internal or sentence-external', 4='rather sentence-internal', 5='definitely sentence-internal'.

Table 4.8 *Results of the cumulative link analysis with connector for Exp. 2*

Fixed Effect	Estimate (SE)	z-value
$\text{Connector}_{nachdem}$	-0.25(0.41)	-0.61
Connector_{als}	-0.20 (0.41)	-0.49
$\text{Group}_{\text{L2ers}}$	-1.87 (0.53)	**-3.56**
$\text{Group}_{\text{L2ers}}$ * $\text{Connector}_{nachdem}$	1.21 (0.33)	**3.63**
$\text{Group}_{\text{L2ers}}$ * Connector_{als}	0.63 (0.33)	**1.91**

Note. Treatment contrasts, baseline was the *während* condition in the L1 group. Marginal or significant effects are boldfaced.

Table 4.9 *Results of the cumulative link analysis with connector for* als *in Exp. 2*

Fixed Effect	Estimate (SE)	z-value
$\text{Group}_{\text{L2ers}}$	-1.03(0.54)	**-1.91**

Note. Treatment contrasts, baseline was the L1 group. Marginal or significant effects are boldfaced.

Table 4.10 *Results of the cumulative link analysis with connector for* während *in Exp. 2*

Fixed Effect	Estimate (SE)	z-value
$\text{Group}_{\text{L2ers}}$	-1.55(0.44)	**-3.55**

Note. Treatment contrasts, baseline was the L1 group. Marginal or significant effects are boldfaced.

Table 4.11 *Results of the cumulative link analysis with connector for* nachdem *in Exp. 2*

Fixed Effect	Estimate (SE)	z-value
$\text{Group}_{\text{L2ers}}$	-0.34(0.61)	-0.55

Note. Treatment contrasts, baseline was the L1 group. Marginal or significant effects are boldfaced.

4.3.3 Discussion

Exp. 2 tested the interpretation of the German subject pronoun *er* in L1ers and L2ers of German. The aim was to test whether, in the contexts provided, *er* would prefer a sentence-internal antecedent, as is the case for the corresponding Dutch pronoun *hij* in Roberts et al. (2008). This hypothesis was confirmed by the judgments of the German L1 group who showed a preference for the sentence-internal antecedent in approximately 86% of trials.

At the same time, this finding goes beyond Roberts et al.'s (2008) results, as it indicates that German L1ers still considered this pronoun referentially ambiguous. In Roberts et al. (2008), participants were asked to write down the pronouns' antecedent, and in 100% of their responses they wrote down the sentence-internal antecedent. (They still regarded the sentence as highly acceptable when the pronoun could only refer to the sentence-external antecedent based on number agreement.) In the present experiment, the Likert scale allowed participants to make a graded judgment. While the L1ers almost never (in less than 1% of trials) chose a response option that preferred the sentence-external antecedent (i.e. either *'probably Klaus'* or *'definitely Klaus'*), they did choose the ambiguous option (*'unclear (Ralf or Klaus)'*) 12.69% of the time.

Based on this finding, one might assume that in Dutch, the pronoun is referentially unambiguous, while it is ambiguous in German. However, it is difficult to conclude this because of the different nature of the response variable in the two experiments. L1ers in this experiment almost never showed a preference for the sentence-external antecedent in their responses, which is the same result as in Roberts et al. (2008). When given only two response options (sentence-internal vs. sentence-external), the German-speaking participants may produce a pattern very similar to the Dutch participants in Roberts et al. (2008). Therefore, it would be wrong to conclude that there are cross-linguistic differences for the relevant pronoun resolution paradigm based on the comparison between this study and Roberts et al. (2008).

The present experiment shows that the German subject pronoun *er* is ambiguous with a strong sentence-internal bias. The experiment also illustrates the value of the chosen experimental setup: Giving participants the opportunity to make graded judgments provides the researcher with more fine-grained information and allows us to recognize the referential ambiguity of a pronoun.

Turning to the results of the L2 group, L2 participants showed a significantly weaker preference for the sentence-internal antecedent compared to L1ers. Nonetheless, L2ers still clearly preferred the sentence-internal over the sentence-external

antecedent in approximately 75% of their responses. In this respect, the present results contrast with Roberts et al.'s (2008) findings, because the Turkish-speaking group in Roberts et al. (2008) chose the two potential antecedents at comparable rates.

It is not clear what is the cause of the contrasting findings between Roberts et al. (2008) and the present experiment. Both Turkish-speaking groups were proficient speakers of their respective L2 (Roberts et al., 2008: mean score of 51.4/60 (85.67%) in a Dutch placement test; here: mean score of 26.4/30 (88.00%) in a German placement test). While Roberts et al. (2008) did not specify whether their Turkish-speaking L2 group consisted of both early and late bilinguals, the mean length of exposure to Dutch/German was similar in the two groups (Roberts et al. (2008): 19.9 years; here: 21.04 years).

To further understand the nature of the results found in the bilingual group, their German and Turkish proficiency and German AoA were tested for their predictive power in this experiment. While German proficiency and German AoA both showed a correlation with participants' responses in the graphs, German proficiency was the only significant predictor of sentence-internal vs. sentence-external antecedent preference in a joint analysis of the three variables. This result is in line with Exp. 1 and the claim that L2 proficiency is a more important determinant of L2 processing than L2 AoA (Herschensohn, 2009).

A third analysis I conducted produced somewhat surprising results. While the type of connector did not produce any differences in sentence-internal vs. sentence-external preference in L1ers, L2ers interpreted the pronoun differently depending on the type of clause it appeared in. In the *während* ('while') condition, participants chose the sentence-external more often than L1ers, and this group difference was larger than for the other two connectors. Note that besides its temporal function, *während* can also be used as an adversative connector, which means that it expresses a contrast between the content of the main clause and the subordinate clause (similar to *while* in English). This property may have contributed to L2ers' increased sentence-external antecedent choices for *während* compared to the other two connectors. However, a marginal group difference was found for *als* ('when'), which does not have the described adversative function.

To summarize, L2ers had a significantly weaker preference for the prominent sentence-internal antecedent than German L1ers. However, this effect was limited to two out of three potential connectors (*während* 'while', and *als* 'when'), indicating an overemphasis of semantic differences (adversative and temporal connector vs. strictly temporal connectors) in L2 interpretation. As in Exp. 1,

where pragmatic and semantic information seemed to influence L2ers' but not L1ers' anaphor resolution, this result is in line with the idea that non-syntactic information is weighted more strongly in L2 language processing than in L1ers (Clahsen & Felser, 2006, 2017; Cunnings, 2016, 2017).

However, the results may also be due to cross-linguistic influence from Turkish. In Roberts et al. (2008), a similar type of difference was attributed to L1 influence. However, the L1-L2 difference in Roberts et al. (2008) was much stronger than in the present experiment, and Roberts et al. (2008) did not investigate a potential influence of semantic information. Knowing the antecedent preferences of Turkish monolingual L1ers in these constructions may help evaluate the L1 influence hypothesis. Exp. 4 represents a Turkish version of the present experiment. Therefore, the discussion of the present results and a potential L1 influence will be continued in the general discussion of this chapter, after reviewing the results of Exp. 4.

4.4 Experiment 3: Monolingual and HS resolution of the Turkish reflexives *kendi* and *kendisi*

Turning from German to Turkish now, Exp. 3 examined the interpretation of the two Turkish forms *kendi* and *kendisi* by both Turkish monolinguals and Turkish-German bilinguals. The bilingual group will be referred to as HSs of Turkish in Exps. 3 and 4. The present experiment was developed in parallel with the German Exp. 1, and the experimental sentences of Exp. 3 were Turkish translations of those used in Exp. 1.

This experiment set out to test the relative distribution of local vs. non-local assignment for the two Turkish forms *kendisi* and *kendi*. Predictions for L1ers' interpretation of these two forms are based on the information gained from descriptive grammars and theoretical accounts described in Ch. 2, and specifically on the conclusion that *kendi* has a strong preference for local antecedents, in accordance with Condition A, while *kendisi* is free to refer to local, non-local and even sentence-external antecedents.

A second aim of Exp. 3 was to examine whether HSs of Turkish would perform native-like in their interpretation of the two reflexives. As several studies report that HSs may lose grammatical distinctions, it is possible that HSs fail to identify differences in antecedent preferences between *kendi* and *kendisi*. Furthermore,

HSs have been less likely to recognize the referential ambiguity in forms such as Turkish *kendisi* and Korean *casin*. Therefore, differences from monolingual L1ers may be more pronounced for *kendisi* than for *kendi*. Another finding is that HSs prefer linearly close antecedents more strongly than monolinguals, possibly to reduce the load on working memory during processing in their non-dominant language.

Previous studies have also found that HSs with a higher HL proficiency and/or a later AoA of their L2 perform more like monolingual L1ers. For this reason, the role of individual differences in proficiency and AoA will also be explored.

4.4.1 Method

4.4.1.1 Participants

Table 4.12 *Participant information for the HS group in Exps. 3 and 4*

Variable	mean	range	sd
Age	22.63	18-36	3.66
German proficiency (%)	90.80	73.33-100.00	5.01
Turkish proficiency (%)	75.43	50.00-100.00	15.03
German AoA	2.07	0-6	2.07
Length of exposure to German (years)	20.55	14-32	3.92

54 Turkish monolinguals and 54 Turkish HSs with L2 German participated in the questionnaire. Participants were recruited through personal contacts and social media. All participants in the monolingual group reported Turkish as their L1, and had not learned any other language before the age of seven (except for one participant who reported being exposed to Arabic from age one). The average age in the monolingual group was 28.60 (range=19-57, sd=8.95).

The HS group (see Table 4.12) consisted of self-reported L1ers of Turkish, who had started learning German between the age of 0 and 6 . The length of exposure to German varied between 14 and 32 years. Hence, the group included 23 simultaneous bilinguals and 31 early L2ers, but no late L2ers of German. The average age in the HS group was 22.63.

As well as the questionnaire, the HSs also filled out a German and a Turkish placement test (Goethe and TELC C1 test, respectively, see 4.2.1.1). The aver-

age score on the Goethe test was 27.24 out of 30 points (90.80%), indicating an overall very high German proficiency in the HS group. For Turkish proficiency, participants' average TELC Score was 16.6 out of 22 points (75.43%). Even though the lowest-scoring participants only achieved 50% correct in the TELC test, this was deemed sufficient to take part in the experiment. None of the participants indicated that they had any difficulty understanding the instructions or the sentences of the questionnaire, and all reported regularly using Turkish.

4.4.1.2 Materials

The materials consisted of 24 experimental sentences and 48 filler items, listed in Appendices A.1.4 and A.1.6, respectively. The experimental items were translations of the materials from Exp. 1 on German (see section 4.2.1.2). The only difference from the materials in Exp. 1 was that the German experiment tested the reflexive and an intensified reflexive construction (*sich selbst*), while the present experiment tested two single-word Turkish anaphors.

Experimental sentences always contained a matrix clause and a nominalized subordinate clause, realized with a non-finite verbal noun using the subordinating suffix –dIk (cf. Göksel & Kerslake, 2005). The reflexive and one potential antecedent were contained in the subordinate clause, and the second potential antecedent was always the main clause subject (see (4.5)). Each experimental sentence was followed by a question which probed the interpretation of the reflexive (see (4.6)). In order to respond to the question, participants had to select one out of five answer options on a Likert scale. As in Exp. 1, the options went on an ordinal scale from the local antecedent to the non-local antecedent.

(4.5) a. Savaşi Azizj'in **kendine?i/j** heyecan dolu bir kitap
Savaş Aziz himself$_{Dat}$ suspense full a book
aldığını öğrendi.
buy-that$_{3^{rd}SingPast}$ learn$_{3^{rd}SingPast}$
'Savaş learned that Aziz had bought himself a suspenseful book.'

b. Savaşi Azizj'in **kendisinei/j** heyecan dolu bir kitap
Savaş Aziz self$_{Dat}$ suspense full a book
aldığını öğrendi.
buy-that$_{3^{rd}SingPast}$ learn$_{3^{rd}SingPast}$
'Savaş learned that Aziz had bought him/himself a suspenseful book.'

(4.6) a. Aziz kime heyecan dolu bir kitap aldı?
Aziz whom suspense full a book bought
'For whom did Aziz buy a suspenseful book?'

b. response options:
kesinlikle Savaş'a – daha olası Savaş'a – Savaş'a ya da Aziz'e olabilir – daha olası Aziz'e – kesinlikle Aziz'e
'definitely for Savaş – probably for Savaş – could be for Savaş or for Aziz – probably for Aziz – definitely for Aziz'

The 48 filler items consisted of 36 items which represented the experimental items of Exp. 4, and 12 additional filler sentences. All other aspects of the materials were identical to Exp. 1.

As with all experiments involving Turkish in this thesis, the materials were reviewed and revised by L1ers of Turkish regarding their grammatical and semantic well-formedness prior to conducting the experiment.

4.4.1.3 Procedure

The procedure of Exp. 3 was identical to Exp. 1 (see section 4.2.1.3), with the exception that, due to the higher number of filler items from Exp. 4, the experiment took approximately 20 minutes instead of 15 minutes.

4.4.1.4 Analysis

The main analysis of Exp. 3 was identical to Exp. 1 (see section 4.2.1.4), so the coding of the response options again went down from the most local option (*kesinlikle Aziz'e* in (4.6)), which was coded as 5, to the most non-local option (*kesinlikle Savaş'a* in (4.6)), coded as 1.

A second analysis investigated participants' tendency to choose the endpoint of the scale rather than the ambiguous options. For this, the two endpoints ('definitely Aziz' and 'definitely Savaş') were put into one category, while the three other response options were put in another category. Then, between-group analyses were computed separately for *kendi* and *kendisi*. Because the dependent variable in this approach is categorical and binomial, mixed-effects logistic regression models were computed with random effects for subjects and items. As for the cumulative link models in the main analysis, the best-fitting model was selected through model comparison.

4.4.1.5 Predictions

The following predictions were made:

1. Turkish *kendi* is interpreted as referring to the local antecedent in the monolinguals, following Condition A.

2. Turkish *kendisi* receives significantly fewer local interpretations than *kendi* in monolinguals due to its referential ambiguity.

3. If HSs lose grammatical distinctions in their HL, I expect significantly less discrimination of antecedent preferences between *kendi* and *kendisi* in HSs compared to monolinguals.

4. If HSs have a general preference for linearly close antecedents, I expect a stronger preference for the local antecedent compared to monolinguals for both *kendi* and *kendisi*.

5. If HSs have trouble recognizing the ambiguity of referentially ambiguous forms, the divergence from monolingual preferences should be stronger for *kendisi* compared to *kendi*. This divergence may express itself in a non-monolingual-like tendency to choose unambiguous over ambiguous response options.

4.4.2 Results

Results for the HS and the monolingual group are plotted separately in Fig. 4.10. In the monolingual group, there was a tendency to assign *kendi* to the local antecedent: 37.65% of clicks went on 5, which was the most frequent choice out of all response options (with the mean response being 3.52). *Kendisi* responses were more spread out across the whole scale: only 22.22% of clicks went on 5, and the mean response was 2.86. The most ambiguous response option (3), was the most frequently chosen option (receiving 30.56% of all clicks) for *kendisi*. In the HS group, *kendi* had a clear local preference: 56.94% of clicks went on 5, and the mean response was 3.97. As in the monolingual group, *kendisi* interpretations were more spread out than *kendi* for the HSs: only 29.48% of clicks went on 5, with the mean response being 2.89. The most frequently chosen response for *kendisi* in the HSs group however was 1 ('definitely non-local'), which received 34.31% of clicks.

Results from the winning model of the cumulative link analysis can be found in Table 4.13. The two conditions differed significantly from each other in the monolingual group, with *kendi* receiving significantly more local interpretations than *kendisi* ($p<0.001$). Furthermore, the two groups differed significantly in their interpretation of *kendi*: HSs interpreted *kendi* as more local than monolinguals did ($p<0.001$). There was also a significant interaction of Reflexive

Type and Group ($p<0.01$), indicating that the difference between conditions was larger in HSs than in monolinguals.

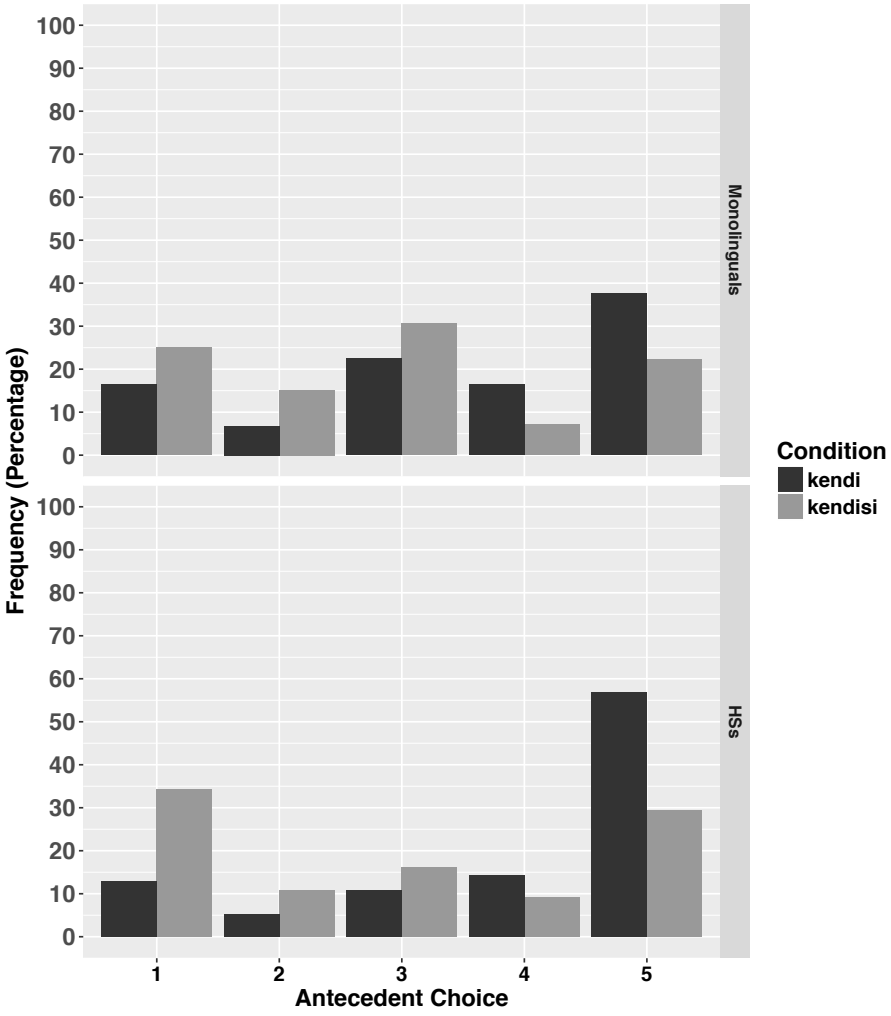

Figure 4.10. Response pattern for Exp. 3, separately for groups and conditions. Codes for Antecedent Choice were 1='definitely non-local', 2='rather non-local', 3='local or non-local', 4='rather local', 5='definitely local'.

Table 4.13 *Results of the cumulative link analysis for Exp. 3*

Fixed Effect	Estimate (SE)	z-value
ReflexiveType$_{kendisi}$	-0.99 (0.25)	**-3.91**
Group$_{\text{HSs}}$	0.88 (0.25)	**3.48**
ReflexiveType$_{kendisi}$ * Group$_{\text{HSs}}$	-0.97 (0.36)	**-2.67**

Note. Treatment contrasts, baseline was the *kendi* condition in the monolingual group. Marginal or significant effects are boldfaced.

4.4.2.1 Effects of proficiency and AoA

The effects of German AoA, Goethe Score, and TELC Score on HSs' responses are plotted in Figs. 4.11, 4.12, and 4.13, respectively. The average response remained relatively stable across the different levels of German AoA and Goethe Score. For TELC Score, higher-proficiency HSs had a stronger tendency to assign *kendisi* to the non-local antecedent, while the opposite effect is observed for *kendi* (i.e., higher-proficiency HSs had a stronger local preference for *kendi*). The correlation between TELC Score and participants' average response appears to be slightly stronger for *kendisi* than for *kendi*.

The results from the winning cumulative link model for the individual differences analysis can be found in Table 4.14. In the baseline condition *kendi*, none of the individual differences variables reached marginal or full significance. However, an interaction of Reflexive Type and TELC Score was found ($p<0.05$), indicating that the influence of TELC Score was larger for *kendisi* than for *kendi*. To determine whether this meant that TELC Score significantly influenced the interpretation of *kendisi*, the two reflexive types were split up and analyzed separately. In the separate analysis, there were again no effects for the *kendi* condition (see Table 4.15). For *kendisi* (see Table 4.16), a significant effect of TELC Score was found ($p<0.01$), indicating that participants with a higher TELC Score interpreted *kendisi* as referring to the non-local antecedent more strongly than participants with a lower TELC Score.

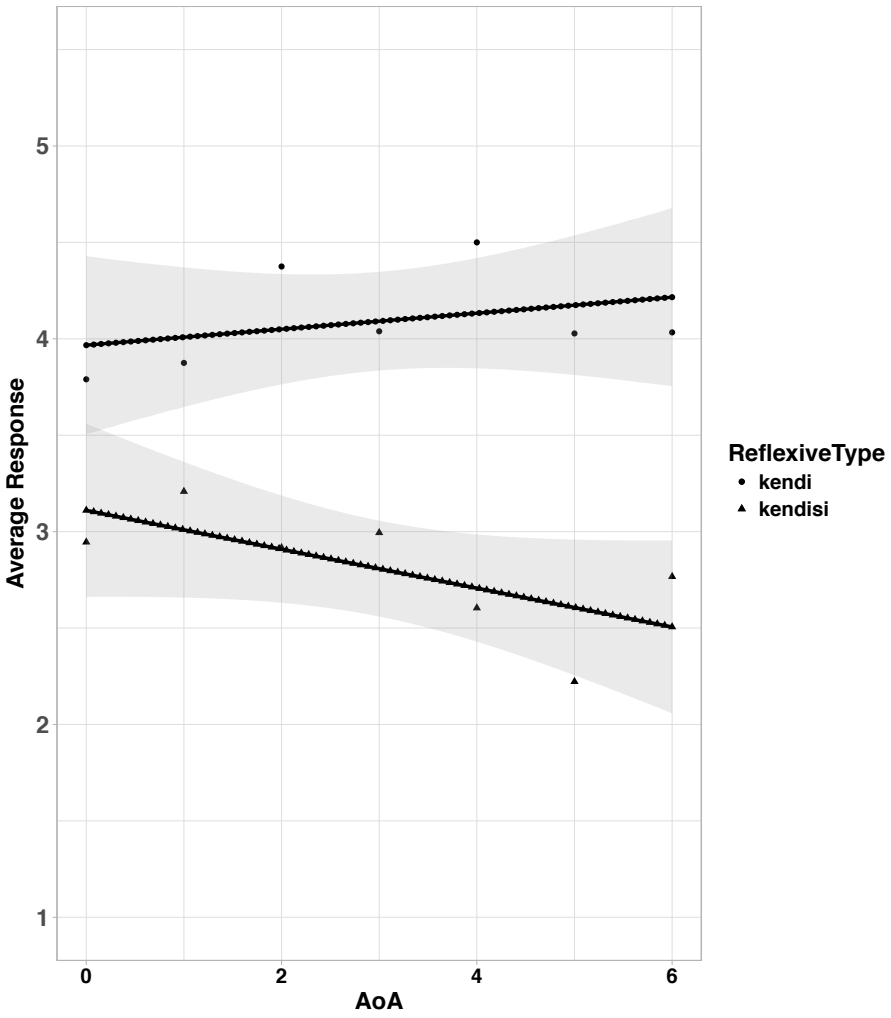

Figure 4.11. Response pattern for Exp. 3 by German AoA.
Codes for Average Response were 1='definitely non-local', 2='rather non-local', 3='local or non-local', 4='rather local', 5='definitely local'.

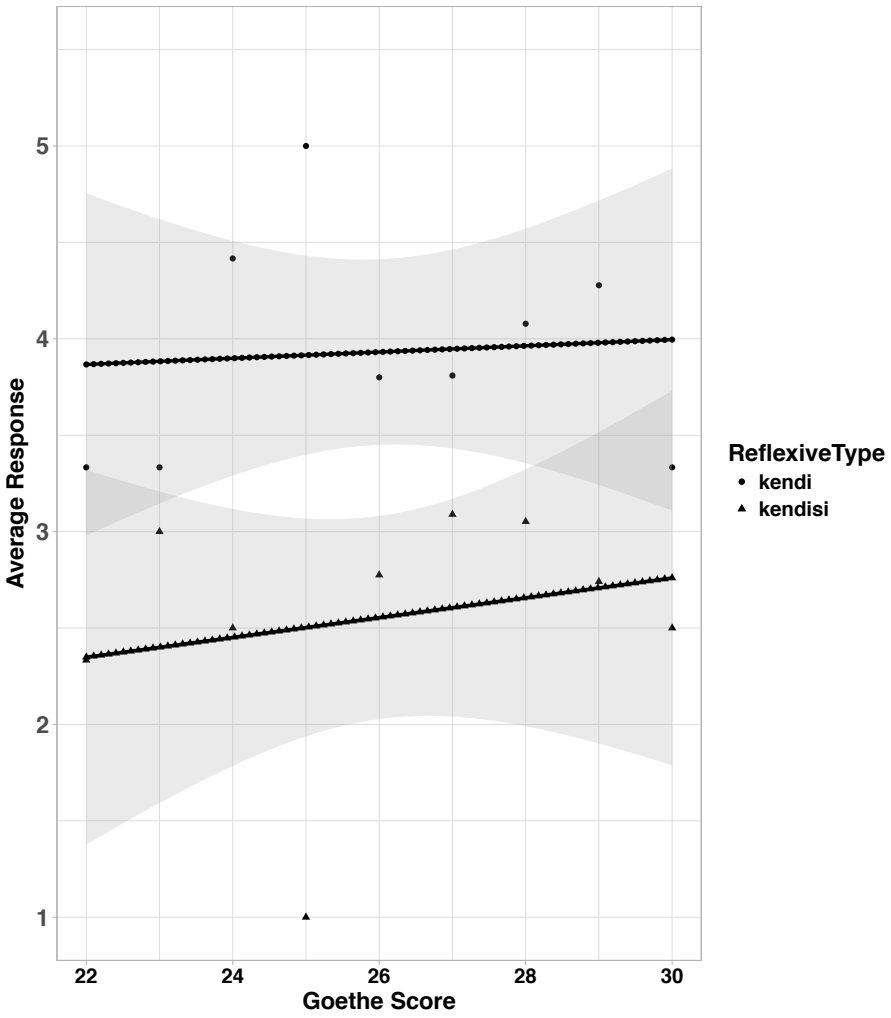

Figure 4.12. Response pattern for Exp. 3 by Goethe Score.
Codes for Average Response were 1='definitely non-local', 2='rather non-local', 3='local or non-local', 4='rather local', 5='definitely local'.

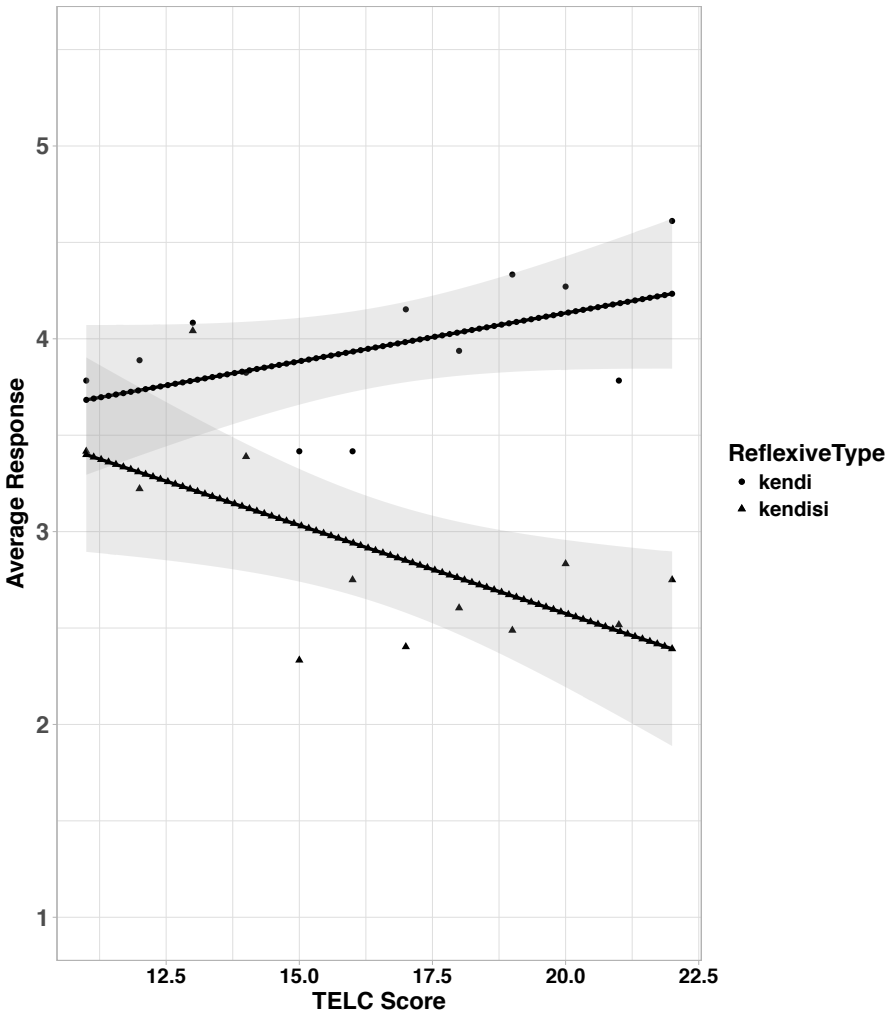

Figure 4.13. Response pattern for Exp. 3 by TELC Score.
Codes for Average Response were 1='definitely non-local', 2='rather non-local', 3='local or non-local', 4='rather local', 5='definitely local'.

Table 4.14 *Results of the cumulative link analysis with individual differences variables for the HS group in Exp. 3*

Fixed Effect	Estimate (SE)	z-value
ReflexiveType$_{kendisi}$	-1.84(0.28)	**-6.47**
AoA	0.12(0.19)	0.61
GoetheScore	0.06(0.18)	0.32
TELCScore	0.25(0.19)	1.26
ReflexiveType$_{kendisi}$ * AoA	-0.06(0.32)	-0.18
ReflexiveType$_{kendisi}$ * GoetheScore	0.18(0.30)	0.62
ReflexiveType$_{kendisi}$ * TELCScore	-0.81(0.32)	**-2.51**

Note. treatment contrasts, baseline was the *kendi* condition. Marginal or significant effects are boldfaced.

Table 4.15 *Results of the cumulative link analysis with individual differences variables for the HS group in Exp. 3 in the* kendi *condition*

Fixed Effect	Estimate (SE)	z-value
AoA	0.11(0.18)	0.62
GoetheScore	0.09(0.17)	0.56
TELCScore	0.23(0.18)	1.22

Note. Marginal or significant effects are boldfaced.

Table 4.16 *Results of the cumulative link analysis with individual differences variables for the HS group in Exp. 3 in the* kendisi *condition*

Fixed Effect	Estimate (SE)	z-value
AoA	0.07(0.21)	0.36
GoetheScore	0.24(0.19)	1.27
TELCScore	-0.58(0.21)	**-2.76**

Note. Marginal or significant effects are boldfaced.

4.4.2.2 Ambiguous vs. unambiguous response options

As described above, a second analysis with a different dependent variable was conducted, by merging the response options into two categories, unambiguous ('definitely Savaş' and 'definitely Aziz' in (4.6)) and ambiguous ('probably Savaş', 'unclear (Savaş or Aziz)', and 'probably Aziz' in (4.6)).

The descriptive results are displayed in Table 4.17. For both *kendisi* and *kendi*, monolinguals were relatively balanced in choosing between an unambiguous and an ambiguous response option. In the HS group, participants chose unambiguous response options at more than 60% in both conditions. These numerical trends seem to indicate that HSs overall preferred unambiguous response options more strongly than monolinguals.

This contrast can be observed in Fig. 4.10. The main analysis could not capture the group difference for *kendisi*, as the local vs. non-local preference was the same for monolinguals and HSs.

Table 4.17 *Unambiguous vs. ambiguous response choices by group in Exp. 3*

Group & Condition	unambiguous	ambiguous
Turkish monolinguals		
kendi	54.16%	45.83%
kendisi	47.22%	52.78%
Turkish HSs		
kendi	69.75%	30.25%
kendisi	63.89%	36.11%

The mixed-effects logistic regression analysis of the preference for ambiguous vs. unambiguous response options (see Table 4.18) revealed a significant effect of Group for the *kendi* condition ($p<0.05$) and a significant effect of Reflexive Type for the monolinguals ($p<0.001$), but no interaction between the two factors ($p>0.1$). This suggests that for both groups, *kendisi* received more ambiguous responses than *kendi*, and that, for both anaphors, the HS group chose unambiguous response options significantly more often than the monolingual group.

Table 4.18 *Results for the mixed-effect logistic regression analysis on ambiguous vs. unambiguous responses in Exp. 3*

Fixed Effect	Estimate (SE)	z-value
Intercept	-0.50(0.38)	-1.33
ReflexiveType$_{kendisi}$	0.57(0.16)	**3.59**
Group$_{\text{HSs}}$	-1.06(0.52)	**-2.06**
ReflexiveType$_{kendisi}$ * Group$_{\text{HSs}}$	-0.11(0.22)	-0.49

Note. Treatment contrasts, baseline was the *kendi* condition in the monolingual group. Marginal or significant effects are boldfaced.

4.4.3 Discussion

In Exp. 3, I tested the interpretation of two types of Turkish anaphor in monolinguals and HSs. For the monolingual group, I found that both *kendi* and *kendisi* received a considerable amount of referentially ambiguous interpretations. At the same time, *kendi* was interpreted as significantly more local than *kendisi*. Turkish HSs also interpreted *kendi* as significantly more local than *kendisi*, but they contrasted the two forms more strongly from each other than monolinguals. Furthermore, HSs preferred unambiguous responses over ambiguous responses for both *kendi* and *kendisi* significantly more than the monolingual group.

Let us first look at what the results tell us about the two forms *kendi* and *kendisi*. As discussed in section 2.3.2.1, *kendi* has previously been assumed to either require a local antecedent or be strongly biased towards local antecedents (e.g Göksel & Kerslake, 2005; Kornfilt, 2001). Thus, I expected the response pattern for monolingual L1ers to reflect this strong locality preference in *kendi*. However, despite *kendi* receiving a preference for a local antecedent overall, 16.51% of the monolingual participants' choices went on the non-local antecedent, and ambiguous response options were chosen almost as often as unambiguous options. Thus, *kendi* must be considered at least somewhat ambiguous between a local and a non-local antecedent. Our data suggests that, at least in contexts in which a syntactically prominent, feature-matching non-local antecedent (such as the matrix subject in this experiment) is available, *kendi* is ambiguous between a local and a non-local interpretation.

In fact, *kendi* constitutes a better candidate than *kendisi* for a classical long-distance reflexive, as it aligns with most of the common features of these forms. Just like e.g. Japanese *zibun* and Korean *caki*, *kendi* is monomorphemic and has a subject preference. However, while many long-distance reflexives actually prefer the long-distance antecedent, this is not the case for *kendi* in the present

study.

There is one recent experimental study of Turkish L1ers which reports a non-local antecedent preference for *kendi* in unbiased contexts (Özbek & Kahraman, 2016). In contrast, the present experiment and another recent experimental study (Gračanin-Yüksek et al., 2017) found that L1ers accept non-local antecedents for *kendi*, but prefer local antecedents more strongly. Özbek and Kahraman (2016) mentioned that the verbs used in their materials may have favored a non-local antecedent for the anaphor, which might explain the difference in results.

The availability of the non-local antecedent in the present results is in line with Sezer's (1979) analysis of *kendi* as a potential logophor, as the experimental sentences usually described the non-local antecedent's speech, feelings or thoughts. Ch. 6 further investigates which factors determine the resolution of *kendi*, by testing different syntactic environments and tracking participants' eye movements during processing.

For *kendisi*, I wanted to first establish whether monolingual L1ers truly considered *kendisi* as ambiguous between local and non-local interpretations in sentence-internal object contexts. Based on the results of the L1ers, this question should be answered in the affirmative, which confirms our initial hypothesis. *Kendisi* received considerable amounts of both local and non-local antecedent choices, and participants also often chose ambiguous response options for *kendisi*.

Furthermore, I wanted to determine to what extent *kendisi* and *kendi* produce different interpretations in the same context. Overall, the numbers indicate a slight preference for the non-local antecedent for *kendisi*, while *kendi* received more local interpretations. This difference was significant in monolingual L1ers, showing that *kendi* and *kendisi* have distinct antecedent preferences.

Turning to the HSs, this group also showed a clear discrimination between *kendi* and *kendisi* in their local vs. non-local preference. In contrast with prediction 3 for this experiment, HSs did not merge the two forms, but even showed stronger contrasts between *kendisi* and *kendi* than monolinguals. However, this effect was modulated by Turkish proficiency: While lower-proficiency HSs did in fact show the predicted pattern of merging, higher-proficiency HSs contrasted the forms from each other more strongly than monolinguals.

The prediction that HSs would show a stronger preference for the local antecedent than monolinguals was only partially confirmed, as HSs had a significantly stronger preference for the local antecedent only for *kendi*, but not

kendisi. Looking at the influence of proficiency, one can observe a stronger local preference for *kendisi* only in lower-proficiency HSs, and a stronger local preference for *kendi* only in higher-proficiency HSs. At the same time, the higher-proficiency HSs also had a slightly stronger non-local preference for *kendisi* than monolinguals.

These results show that rather than finding a unified pattern of HSs' anaphor resolution, proficiency plays an important role in which antecedents HSs choose for object anaphors. I will further explore this point in the general discussion of this chapter.

Another interesting observation was that HSs showed difficulties with recognizing the referential ambiguity of anaphors, as predicted. Because both *kendisi* and *kendi* were actually rated as referentially ambiguous fairly frequently by monolinguals, differences from monolinguals were observed for both forms. This was only revealed by merging ambiguous and unambiguous response options and comparing the preference for ambiguous options between groups.

While the effect for *kendi* may be interpreted as HSs simply having a stronger local preference than monolinguals, for *kendisi*, it is obvious that HSs did not have qualitatively the same bias as the monolinguals merely shifted in one direction or the other. Rather, they dispreferred the ambiguous options, and made a clear decision regarding which antecedent *kendisi* referred to. This finding is in line with Gürel and Yilmaz (2011), who found a reduced sensitivity to the referential ambiguity of Turkish (non-reflexive) pronouns in HSs and attriters.

4.5 Experiment 4: Monolingual and HS resolution of Turkish overt and null subject pronouns

As described in Ch. 2, Turkish is a pro-drop language that also has two overt third person pronouns, *o* and *kendisi*. Previous studies of Turkish subject pronouns have focused on differences between the null pronoun and *o*, suggesting that the overt pronoun signals topic shift, while the null pronoun refers back to the most prominent entity in the discourse (Dinçtopal-Deniz, 2009; Enç, 1989).

Exp. 4 used Turkish translations of the experimental sentences from Exp. 2, in which a pronoun could refer to either a prominent sentence-internal antecedent, or to a less prominent sentence-external antecedent. Based on the

proposals made by Dinçtopal-Deniz (2009), Enç (1989), and the Givenness hierarchy (Gundel et al., 1993, see 2.3.1.2), it is expected that monolingual L1ers interpret *pro* as referring to the more prominent antecedent, while the overt pronoun should be interpreted as referring to the sentence-external and less prominent antecedent.

For *kendisi*, predictions are somewhat harder to make. Based on the phrasal analysis of *kendisi* (Dinçtopal-Deniz, 2009; Kornfilt, 2001), it is referentially ambiguous between a sentence-internal and a sentence-external antecedent. Schlyter (1978) and Sezer (1979) claim that *kendisi* has a preference for prominent antecedents, suggesting a preference for the sentence-internal antecedent in this experiment.

As mentioned before, a common pattern in previous HS studies was that HSs lose pragmatic distinctions in their HL, for example between different types of subject pronoun in Turkish (Gürel & Yilmaz, 2011) and other languages (Keating et al., 2011; Rinke, 2016; Sorace & Filiaci, 2006; Sorace & Serratrice, 2009). Furthermore, HSs have been said to have difficulties with referential ambiguity, as well as a preference for antecedents that are linearly closer to the anaphor. I will investigate these hypotheses in the present experiment. Exp. 3 further showed that proficiency may strongly influence HSs' response patterns in reflexive resolution, and I will investigate the role of proficiency as well as AoA in the present experiment as well, to test whether this finding extends to HSs' subject pronoun resolution.

4.5.1 Method

4.5.1.1 Materials

The items in (4.7) were translations of the German materials in Exp. 2. However, while Exp. 2 only investigated one pronoun (*er*), the present experiment had three different conditions: The pronoun in the matrix subject position of the second sentence was either the null pronoun (*pro*), the overt pronoun *o*, or the overt pronoun *kendisi*. Thus, there were 36 experimental items instead of the 12 experimental items of Exp. 2. The experimental items are listed in Appendix A.1.5. Together with the 36 filler items (24 experimental sentences of Exp. 3 and 12 additional filler items, see section 4.4.1.2 for a description, and Appendix A.1.6 for the full list), the experiment contained a total of 72 trials per participant. As the items were presented in a Latin Square design, each participant saw 12 items in each of the three Pronoun Type conditions. The

order of trials was pseudo-randomized such that two experimental trials could not follow each other.

As in the German experiment, the temporal clause at the beginning of the second sentence contained one of three types of connector, in this case *-rken* ('when'), *-dIktAn sonra* ('after'), or *-dIğI zaman/anda* ('while'). In the following, the different connectors will be referred to as *ken*, *sonra* and *zaman*, respectively. Unlike the German connectors, these connectors appeared at the end of the temporal clause. After each experimental item, a question was presented (see (4.8)). This question asked for participants' interpretation of the pronoun. As in Exp. 2, participants were given five response options, which were coded on an ordinal scale to reflect participants' preference for the sentence-internal vs. sentence-external antecedent.

(4.7) a. Gülbahar$_{i}$ ve Zeynep$_{j}$ geziyorlardı. Zeynep$_{j}$ bir fıkra
Gülbahar and Zeynep stroll$_{3^{rd}\text{PlurPast}}$. Zeynep an anecdote
anlatırken, **o$_{i/?j}$** tökezledi.
tell-when, he/she stumble$_{3\text{rdSingPast}}$.
'Gülbahar and Zeynep took a walk. When Zeynep was telling a story, she stumbled.'

b. Gülbahar$_{i}$ ve Zeynep$_{j}$ geziyorlardı. Zeynep$_{j}$ bir fıkra
Gülbahar and Zeynep stroll$_{3^{rd}\text{PlurPast}}$. Zeynep an anecdote
anlatırken, **kendisi$_{i/j}$** tökezledi.
tell-when, he/she stumble$_{3^{rd}\text{SingPast}}$.
'Gülbahar and Zeynep took a walk. When Zeynep was telling a story, he/she stumbled.'

c. Gülbahar$_{i}$ ve Zeynep$_{j}$ geziyorlardı. Zeynep$_{j}$ bir fıkra
Gülbahar and Zeynep stroll$_{3^{rd}\text{PlurPast}}$. Zeynep an anecdote
anlatırken, ***pro*$_{?i/j}$** tökezledi.
tell-when, pro stumble$_{3^{rd}\text{SingPast}}$.
'Gülbahar and Zeynep took a walk. When Zeynep was telling a story, he/she stumbled.'

(4.8) a. Kim tökezledi?
who stumble$_{3^{rd}\text{SingPast}}$
'Who stumbled?'

b. response options:
kesinlikle Zeynep – daha olası Zeynep – Zeynep ya da Gülbahar olabilir– daha olası Gülbahar – kesinlikle Gülbahar
'definitely Zeynep – probably Zeynep – either Zeynep or Gülbahar – probably Gülbahar – definitely Gülbahar'

4.5.1.2 Procedure

The procedure was identical to Exp. 3 (see section 4.4.1.3).

4.5.1.3 Analysis

The analysis was based on Exp. 2, with Pronoun Type as an additional predictor. Therefore, the predictor variables were Pronoun Type (*o* vs. *kendisi* vs. *pro*) and Group (monolingual vs. HS).

As in Exp. 3, the preference for ambiguous vs. unambiguous responses was analyzed by collapsing response options 1 and 5 ('definitely Zeynep' and 'definitely Gülbahar') as well as 2, 3 and 4 ('probably Zeynep', 'either Zeynep or Gülbahar', and 'probably Gülbahar') to produce only two response categories, and the resulting dependent variable (ambiguous vs. unambiguous) was analyzed using mixed-effects logistic regression models.

To test whether the type of connector used had an effect on participants' response pattern, a third analysis was carried out, in which Connector was added as a fixed predictor. Model comparison was used to identify the appropriate fixed and random effects structure.

4.5.1.4 Predictions

The following predictions were made:

1. *Pro* is interpreted as referring to the sentence-internal antecedent by monolingual L1ers.
2. *O* is interpreted as referring to the sentence-external antecedent by monolingual L1ers.
3. *Kendisi* is interpreted as referentially ambiguous, but with a preference for the sentence-internal antecedent by monolingual L1ers.
4. If HSs lose pragmatic distinctions in their HL, I expect significantly less discrimination of antecedent preferences between the three forms in HSs compared to monolinguals.
5. If HSs have a general preference for antecedents that are linearly close to the anaphor, I expect a stronger preference for the sentence-internal antecedent over the sentence-external antecedent in HSs compared to monolinguals.

6. If HSs have trouble recognizing the ambiguity of referentially ambiguous forms, the strongest divergence from monolinguals should appear for the forms that receive the most ambiguous interpretation in monolinguals' responses. The divergence may express itself in a non-monolingual-like tendency to choose unambiguous over ambiguous response options.

4.5.2 Results

Results for the two groups are plotted in Figure 4.14.

In the monolingual group, the mean response for *o* was 2.26 (with the most frequent response option, 1 or 'definitely sentence-external', receiving 41.72% of clicks). For *kendisi*, monolinguals had a mean response of 2.95, indicating no clear preference for either antecedent. The most frequently chosen response for *kendisi* was also 1, which received 24.73% of clicks. The null pronoun had a clear sentence-internal antecedent preference in monolinguals, receiving a mean response of 4.25 and 59.72% of clicks on 5 ('definitely sentence-internal').

In the HS group, the mean response for *o* was 2.23, with 45.52% of clicks going on 5. HSs' mean response for *kendisi* was 3.61, with the most frequent response option being 5 and receiving 45.68% of clicks. The null pronoun received an average rating of 4.69, and 82.07% of clicks on 5. Thus, HSs had a stronger sentence-internal antecedent preference for both *kendisi* and *pro*.

The cumulative link analysis (see Table 4.19) revealed a significant Group effect for the baseline condition *kendisi* ($p<0.01$), indicating that the HSs had a stronger sentence-internal preference for *kendisi* than monolinguals. In the monolinguals, *kendisi* differed significantly from both other types of pronoun: participants had a weaker sentence-internal preference for *kendisi* than for *pro* ($p<0.001$), but a stronger sentence-internal preference for *kendisi* than for *o* ($p<0.001$). Furthermore, there was a significant interaction between Group and $\text{PronounType}_{kendisi\text{-}o}$ ($p<0.001$), indicating that HSs contrasted *kendisi* and *o* from each other more strongly than monolinguals. No interaction was found between Group and $\text{PronounType}_{kendisi\text{-}pro}$; therefore, the difference in sentence-internal vs. sentence-external preference between these two forms was comparable between groups.

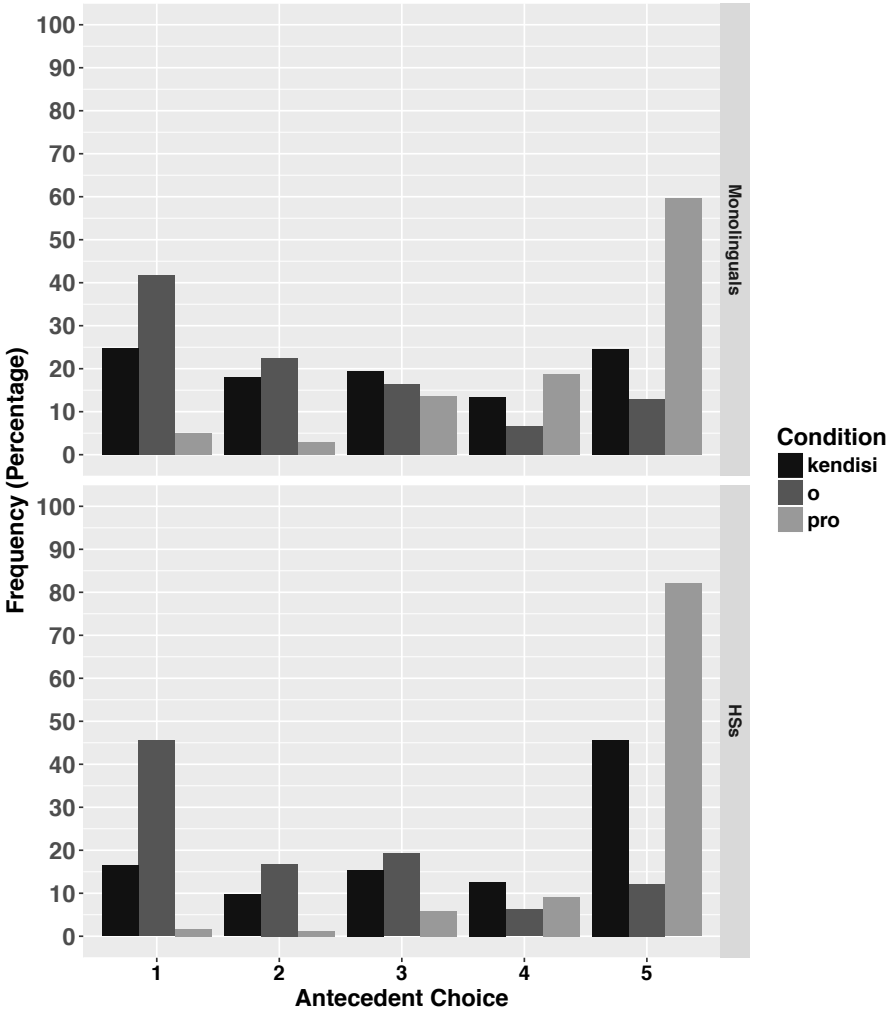

Figure 4.14. Response pattern for Exp. 4, separately for groups and conditions. Codes for Antecedent Choice were 1='definitely sentence-external', 2='rather sentence-external', 3='sentence-internal or sentence-external', 4='rather sentence-internal', 5='definitely sentence-internal'.

Table 4.19 *Results from the cumulative link analysis for Exp. 4*

Fixed Effect	Estimate (SE)	z-value
PronounType_{pro}	2.49 (0.35)	**7.08**
PronounType_{o}	-1.31 (0.25)	**-5.19**
$\text{Group}_{\text{HSs}}$	1.19 (0.37)	**3.22**
PronounType_{pro} * $\text{Group}_{\text{HSs}}$	0.44 (0.47)	0.95
PronounType_{o} * $\text{Group}_{\text{HSs}}$	-1.30 (0.35)	**-3.70**

Note. Treatment contrasts, baseline was the *kendisi* condition in the monolingual group. Marginal or significant effects are boldfaced.

4.5.2.1 Effects of proficiency and AoA

The effects of German AoA, Goethe Score and TELC Score on participants' responses are plotted in Figs. 4.15, 4.16, and 4.17, respectively. For German AoA, participants with a later AoA show a stronger preference for the sentence-external antecedent for both *kendisi* and *o*, though the effect appears much stronger for *kendisi*. Goethe Score does not seem to affect the interpretation of any of the three pronouns. For TELC Score, an influence on the interpretation of *kendisi* can be observed, with higher-proficiency HSs showing a stronger sentence-external antecedent preference. A small correlation appears for the null pronoun *pro*, with higher-proficiency HSs showing a stronger preference for the sentence-internal antecedent.

The results of the cumulative link analysis of individual differences are listed in Table 4.20. In the baseline condition *kendisi*, only AoA was a significant predictor of HSs' responses ($p<0.001$). Furthermore, significant interactions were observed for AoA with both $\text{PronounType}_{kendisi\text{-}pro}$ ($p<0.01$) and $\text{PronounType}_{kendisi\text{-}o}$ ($p<0.05$), indicating that the influence of AoA on participants' responses was stronger for *kendisi* than for both *o* and *pro*. In order to determine whether a significant effect of AoA could be found for the other two conditions, the influence of the individual differences variables was analyzed separately for each pronoun type.

The results of the separate analyses for *o*, *kendisi* and *pro* are listed in Tables 4.21, 4.22, and 4.23, respectively. For *kendisi*, AoA was again the only significant predictor ($p<0.001$), indicating that participants who had started learning German later were more likely to choose a sentence-external antecedent for *kendisi*. No effects were found for *o* and *pro*. Thus, the above-mentioned interaction was caused by the fact that a significant influence of AoA was found for *kendisi*, but not *o* or *pro*.

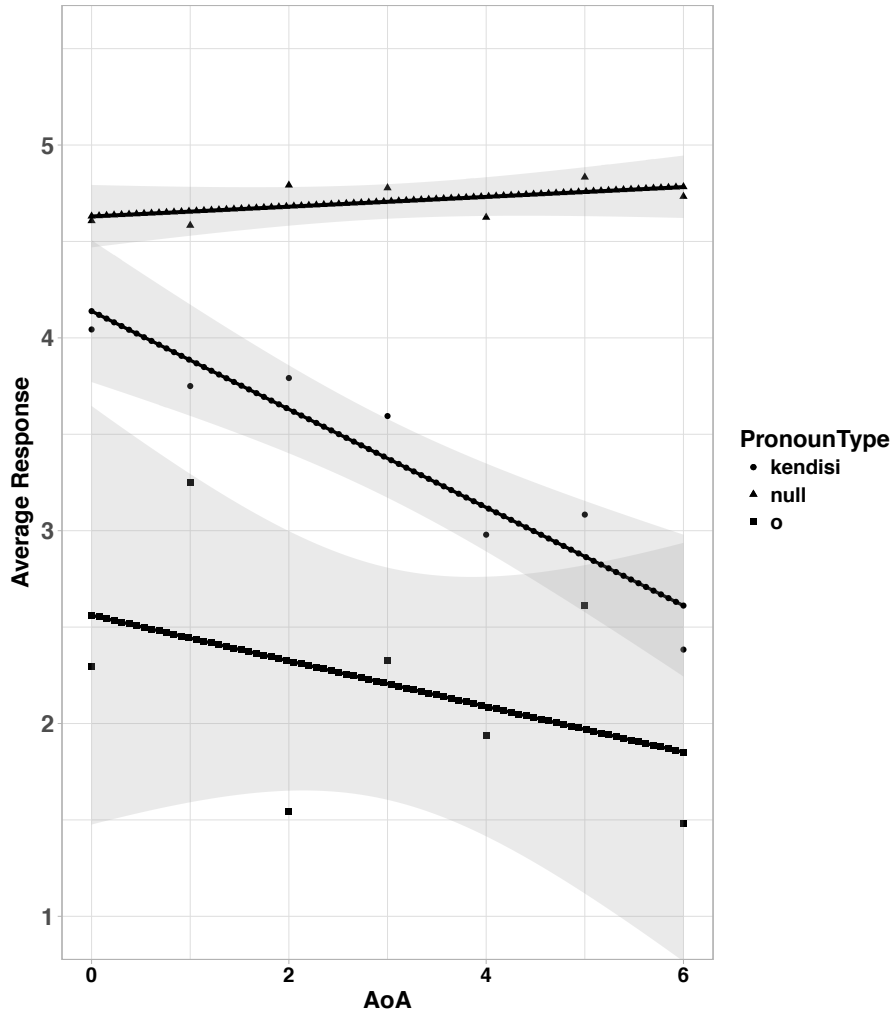

Figure 4.15. Response pattern for Exp. 4 by German AoA.
Codes for Average Response were 1='definitely sentence-external', 2='rather sentence-external', 3='sentence-internal or sentence-external', 4='rather sentence-internal', 5='definitely sentence-internal'.

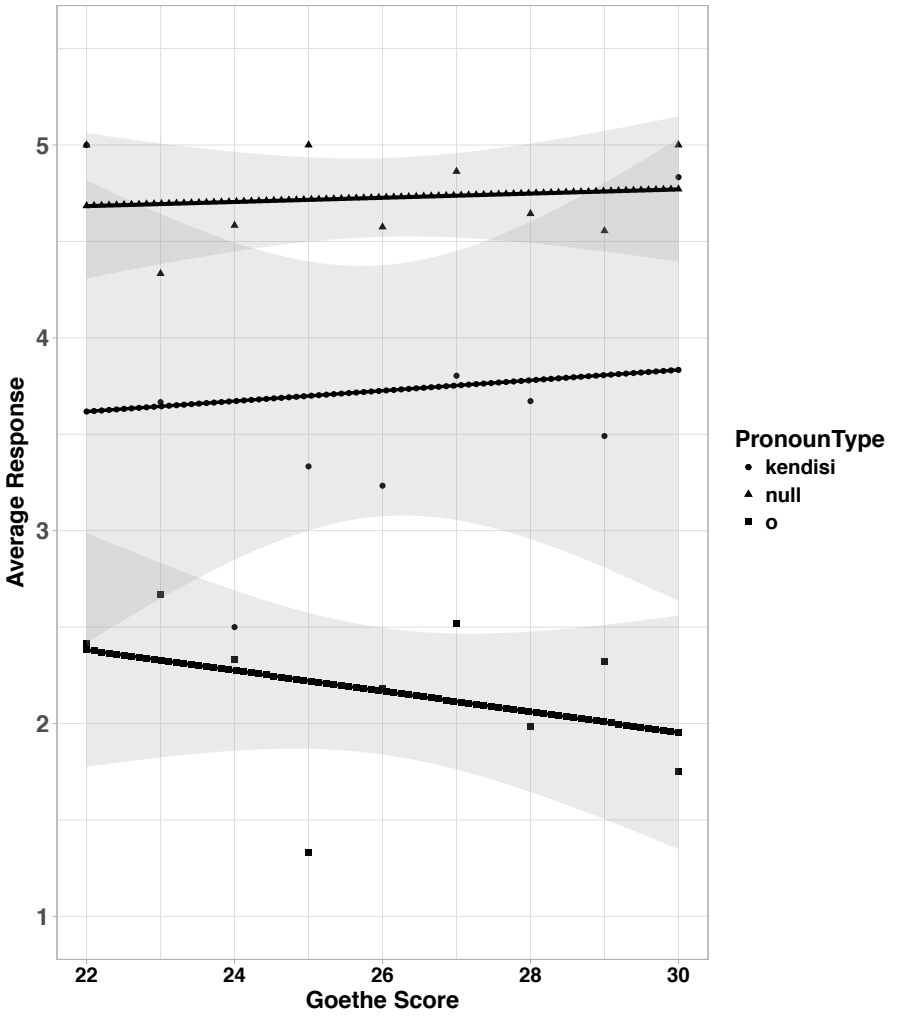

Figure 4.16. Response pattern for Exp. 4 by Goethe Score.
Codes for Average Response were 1='definitely sentence-external', 2='rather sentence-external', 3='sentence-internal or sentence-external', 4='rather sentence-internal', 5='definitely sentence-internal'.

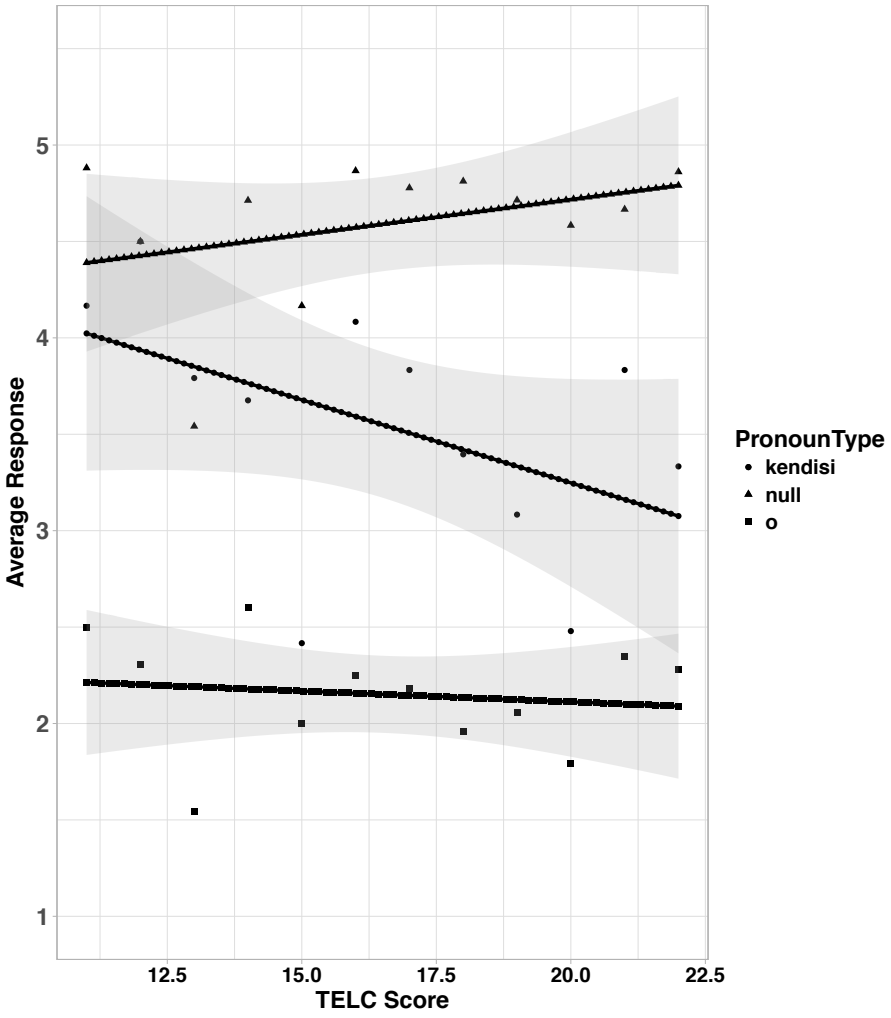

Figure 4.17. Response pattern for Exp. 4 by TELC Score.
Codes for Average Response were 1='definitely sentence-external', 2='rather sentence-external', 3='sentence-internal or sentence-external', 4='rather sentence-internal', 5='definitely sentence-internal'.

Table 4.20 *Results from the cumulative link analysis with individual differences variables for the HS group in Exp. 4*

Fixed Effect	Estimate (SE)	z-value
PronounType$_{kendisi\text{-}pro}$	2.98(0.37)	**8.16**
PronounType$_{kendisi\text{-}o}$	-2.56(0.27)	**-9.43**
AoA	-0.91(0.26)	**-3.48**
GoetheScore	-0.04(0.24)	-0.16
TELCScore	-0.10(0.26)	-0.38
PronounType$_{pro}$ * AoA	1.05(0.33)	**3.20**
PronounType$_{o}$ * AoA	0.64(0.30)	**2.17**
PronounType$_{pro}$ * Goethe Score	-0.18(0.30)	-0.59
PronounType$_{o}$ * Goethe Score	0.02(0.27)	0.08
PronounType$_{pro}$ * TELC Score	0.24(0.33)	0.74
PronounType$_{o}$ * TELC Score	0.02(0.30)	0.06

Note. Treatment contrasts, baseline was the *kendisi* condition. Marginal or significant effects are boldfaced.

Table 4.21 *Results from the cumulative link analysis with individual differences variables for the HS group in Exp. 4 in the* o *condition*

Fixed Effect	Estimate (SE)	z-value
AoA	-0.13(0.13)	-1.03
GoetheScore	-0.01(0.16)	-0.08
TELCScore	-0.02(0.08)	-0.29

Note. Marginal or significant effects are boldfaced.

Table 4.22 *Results from the cumulative link analysis with individual differences variables for the HS group in Exp. 4 in the* kendisi *condition*

Fixed Effect	Estimate (SE)	z-value
AoA	-0.09(0.25)	**-3.48**
GoetheScore	-0.04(0.23)	-0.16
TELCScore	-0.07(0.25)	-0.29

Note. Marginal or significant effects are boldfaced.

Table 4.23 *Results from the cumulative link analysis with individual differences variables for the HS group in Exp. 4 in the* pro *condition.*

Fixed Effect	Estimate (SE)	z-value
AoA	0.08(0.16)	0.50
GoetheScore	-0.10(0.20)	-0.53
TELCScore	0.05(0.10)	0.47

Note. Marginal or significant effects are boldfaced.

4.5.2.2 Ambiguous vs. unambiguous response options

The overview of ambiguous vs. unambiguous response choices per pronoun and group are displayed in Table 4.24. The HS group had a stronger preference for unambiguous responses than the monolingual group for all three types of pronoun, although the difference was quite small for *o*. Furthermore, the monolinguals chose ambiguous options more often for *kendisi* compared to the other two forms, while the HSs chose ambiguous options more often for *o* than for *kendisi*.

Table 4.24 *Unambiguous vs. ambiguous response choices by group in Exp. 4*

Group & Condition	unambiguous	ambiguous
Turkish monolinguals		
o	0.55%	0.45%
kendisi	0.49%	0.51%
pro	0.65%	0.35%
Turkish HSs		
o	0.58%	0.42%
kendisi	0.62%	0.38%
pro	0.84%	0.16%

The results of the mixed-effects logistic regression analysis of participants' ambiguous vs. unambiguous responses can be found in Table 4.25. In the monolingual group, *kendisi* received the same rate of ambiguous and unambiguous responses. Furthermore, *kendisi* received more ambiguous responses than both *o* ($p<0.01$) and *pro* ($p<0.001$). There was a marginal group effect, with HSs choosing fewer ambiguous responses for *kendisi* than monolinguals ($p<0.1$). The analysis further revealed an interaction of Group and Pronoun Type$_{kendisi\text{-}o}$ ($p<0.001$) as well as Group and Pronoun Type$_{kendisi\text{-}pro}$ ($p<0.05$). The interactions indicate that the group difference is smaller for *o* than for *kendisi*, and larger for *pro* than for *kendisi*.

To further explore the interactions, I analyzed the two groups' responses separately. In monolinguals (see Table 4.26), there was no preference for ambiguous over unambiguous responses for *kendisi*. However, the rate of ambiguous responses was higher for *kendisi* than for both *o* ($p<0.001$) and *pro* ($p<0.01$). For HSs (see Table 4.27), there were significantly more unambiguous than ambiguous responses for *kendisi*. Furthermore, there were more ambiguous responses for *o* than for *kendisi* in HSs ($p<0.05$), and more unambiguous responses for

pro than for *kendisi* ($p<0.001$).

Table 4.25 *Results from the mixed-effect logistic regression analysis for ambiguous vs. unambiguous responses in Exp. 4*

Fixed Effect	Estimate (SE)	z-value
Intercept	-0.02(0.35)	-0.05
PronounType_{pro}	-1.31(0.16)	**-7.95**
PronounType_{o}	-0.44(0.16)	**-2.82**
$\text{Group}_{\text{HSs}}$	-0.86(0.49)	**-1.76**
PronounType_{pro} * $\text{Group}_{\text{HSs}}$	-0.47(0.24)	**-1.98**
PronounType_{o} * $\text{Group}_{\text{HSs}}$	0.75(0.21)	**3.50**

Note. Treatment contrasts, baseline was the *kendisi* condition in the monolingual group. Marginal or significant effects are boldfaced.

Table 4.26 *Results from the mixed-effect logistic regression analysis for ambiguous vs. unambiguous responses for the monolingual group in Exp. 4*

Fixed Effect	Estimate (SE)	z-value
Intercept	-0.05(0.40)	-0.11
PronounType_{pro}	-1.33(0.17)	**-7.99**
PronounType_{o}	-0.46(0.16)	**-2.87**

Note. Treatment contrasts, baseline was the *kendisi* condition. Marginal or significant effects are boldfaced.

Table 4.27 *Results from the mixed-effect logistic regression analysis for ambiguous vs. unambiguous responses for the HS group in Exp. 4*

Fixed Effect	Estimate (SE)	z-value
Intercept	-0.83(0.30)	**-2.81**
PronounType_{pro}	-1.75(0.17)	**-10.25**
PronounType_{o}	-0.30(0.14)	**2.09**

Note. Treatment contrasts, baseline was the *kendisi* condition. Marginal or significant effects are boldfaced.

4.5.2.3 Effects of Connector

As described above, all experimental sentences contained a temporal subordinate clause, for which one of three connectors was used. The responses for the different connectors are plotted separately for each pronoun in Figs. 4.18-4.20. Overall, *sonra* ('after') constructions (mean response 3.47) had the strongest preference for a sentence-internal antecedent, followed by zaman ('while') (mean response 3.33), and then *-ken* ('when'), with a mean response of 3.20. However, the figures reveal differences between pronouns regarding which connector received the most sentence-internal interpretation.

Through model comparison, the appropriate fixed effects structure was specified. The winning model included interactions between PronounType and Group and well as Connector and PronounType as fixed effects. Further interactions were not added, as they did not increase model fit. This suggests that the Group by Connector interaction is not significant; the two groups showed the same overall effect of Connector, as can be seen in the graphs.

Results from the winning cumulative link model can be found in Table 4.28. There was a Group effect ($p<0.001$), with the HSs having a stronger preference for the sentence-internal antecedent in the baseline condition (*kendisi* with a *ken* ('when') construction). In the monolingual group, participants had a significantly weaker sentence-internal preference for *ken* ('when') compared to both *sonra* ('after', $p<0.001$) and *zaman* ('while', $p<0.01$) constructions. Furthermore, an interaction of Group and PronounType$_{kendisi\text{-}o}$ was found, with the HSs contrasting the two pronouns from each other more strongly than the monolinguals ($p<0.001$). Additionally, there were three significant interactions of Connector and Pronoun Type.

To further explore the interactions, separate models were fitted for each pronoun. For *o* (see Table 4.29), there were two effects: *ken* ('when') received a marginally less sentence-internal interpretation than both *sonra* ('after', $p<0.01$) and *zaman* ('after', $p<0.01$). For *kendisi* (see Table 4.30), the same effects reached significance (Connector$_{ken\text{-}sonra}$: $p<0.001$); Connector$_{ken\text{-}zaman}$: $p<0.05$). Furthermore, a group difference was observed, with HSs having a stronger sentence-internal preference for *ken* ('when') than monolinguals ($p<0.01$). For *pro* (see Table 4.31), HSs again had a stronger sentence-internal preference than monolinguals in the *ken* ('when') condition ($p<0.001$). The effects of Connector for *pro* were in the opposite direction than for *o* and *kendisi*: *ken* ('when') was interpreted as **more** sentence-internal than both *sonra* ('after', $p<0.1$) and *zaman* ('while', $p<0.01$).

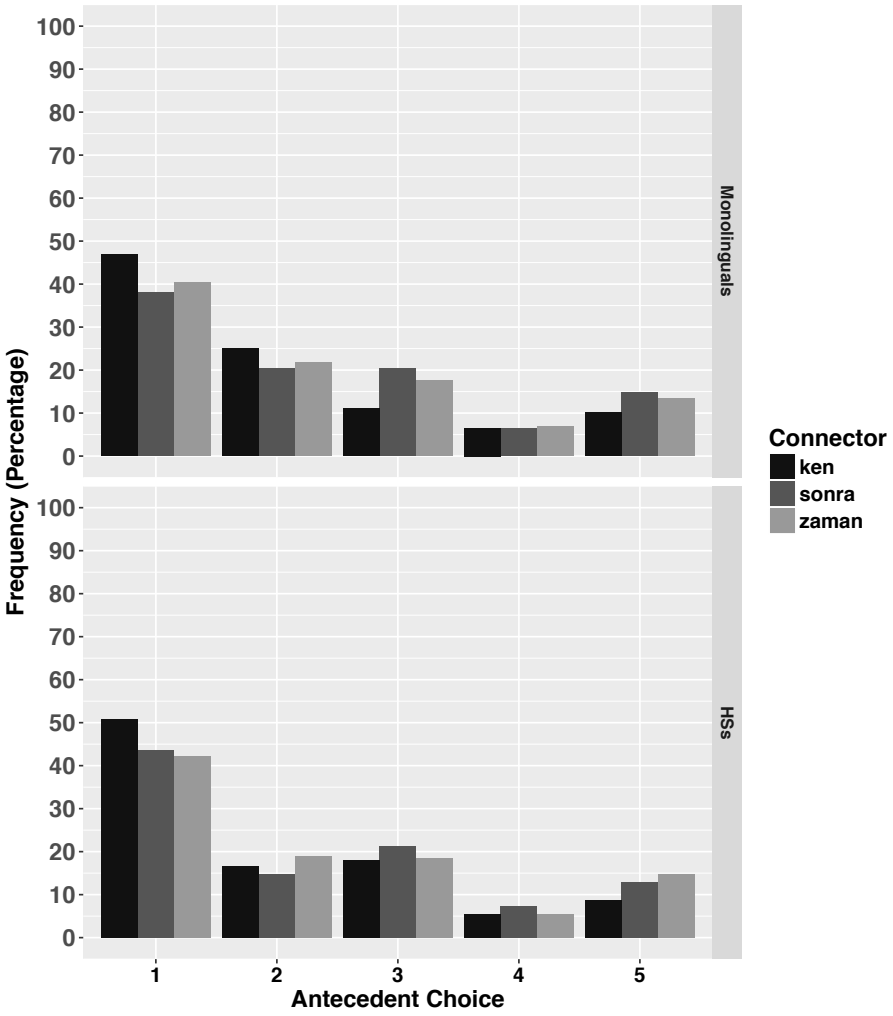

Figure 4.18. Response pattern for the *o* condition in Exp. 4, separately for Groups and Connector types (*ken* 'when', *sonra* 'after', and *zaman* 'while').
Codes for Antecedent Choice were 1='definitely sentence-external', 2='rather sentence-external', 3='sentence-internal or sentence-external', 4='rather sentence-internal', 5='definitely sentence-internal'.

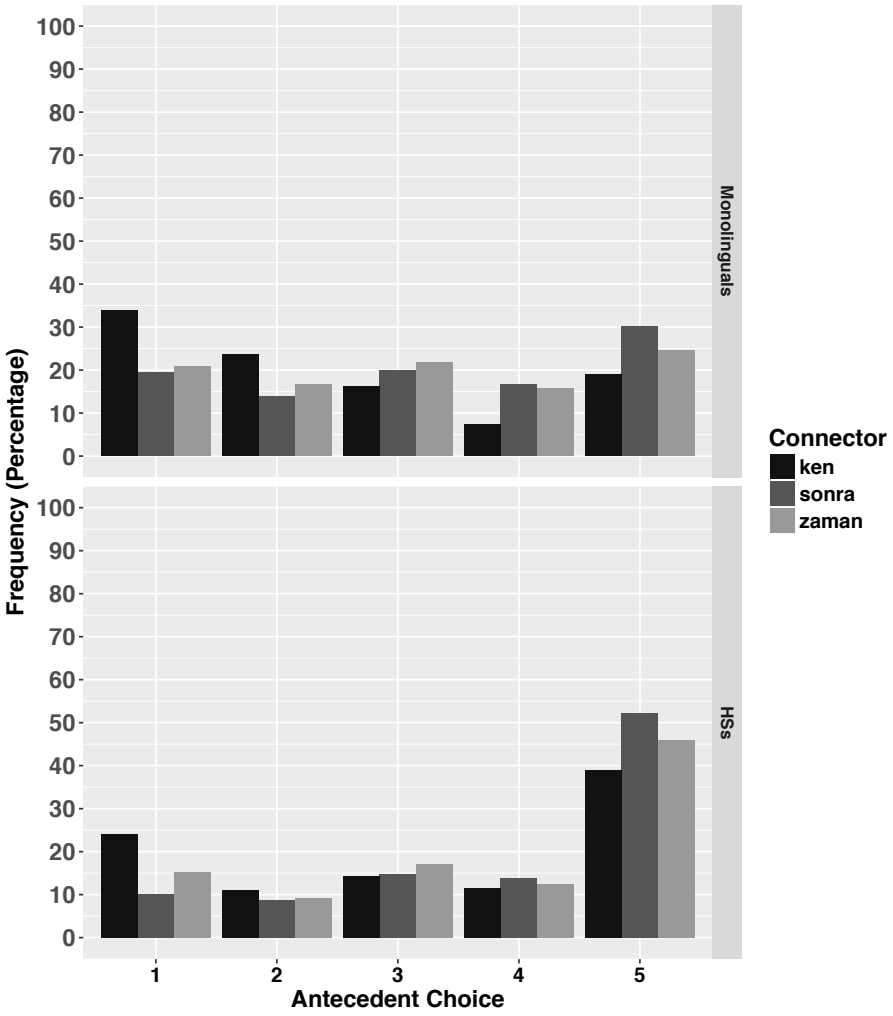

Figure 4.19. Response pattern for the *kendisi* condition in Exp. 4, separately for Groups and Connector types (*ken* 'when', *sonra* 'after', and *zaman* 'while').
Codes for Antecedent Choice were 1='definitely sentence-external', 2='rather sentence-external', 3='sentence-internal or sentence-external', 4='rather sentence-internal', 5='definitely sentence-internal'.

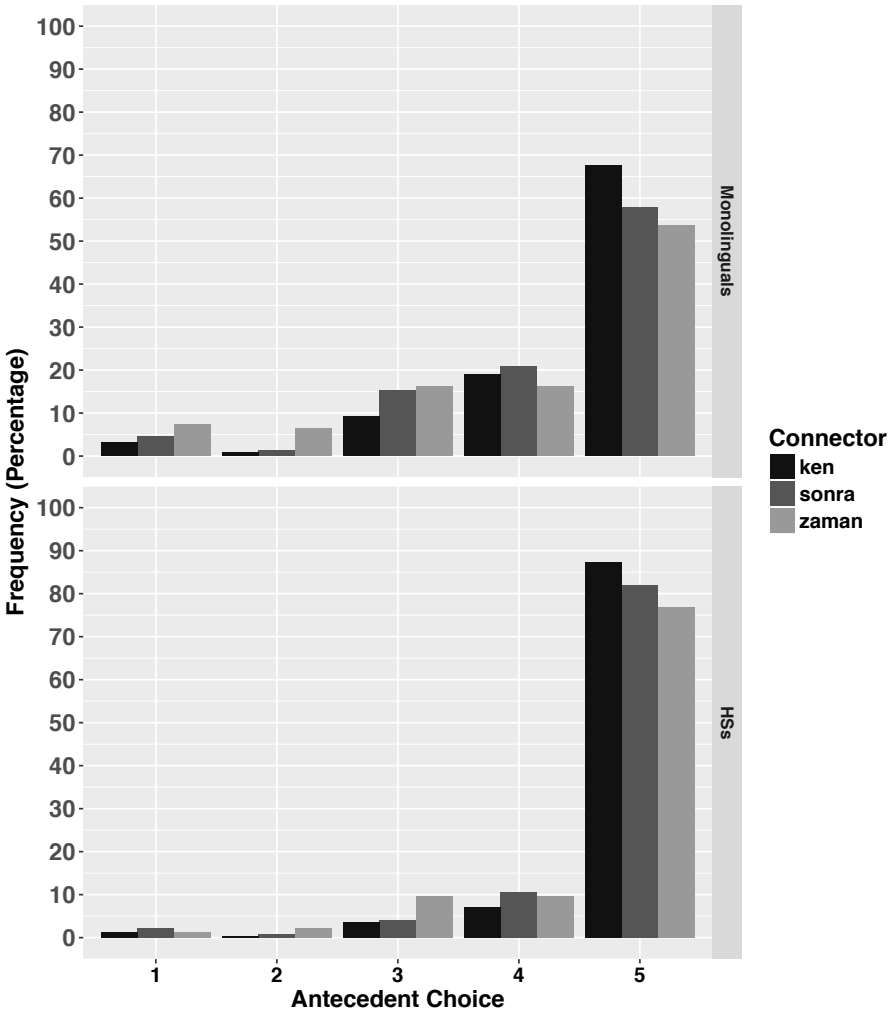

Figure 4.20. Response pattern for the *pro* condition in Exp. 4, separately for Groups and Connector types (*ken* 'when', *sonra* 'after', and *zaman* 'while').
Codes for Antecedent Choice were 1='definitely sentence-external', 2='rather sentence-external', 3='sentence-internal or sentence-external', 4='rather sentence-internal', 5='definitely sentence-internal'.

Table 4.28 *Results from the cumulative link analysis with Connector in Exp. 4*

Fixed Effect	Estimate (SE)	z-value
PronounType$_{pro}$	4.04(0.51)	**7.98**
PronounType$_{o}$	-0.99(0.28)	**-3.48**
Group$_{\text{HSs}}$	1.19(0.36)	**3.29**
Connector$_{sonra}$	1.29(0.29)	**4.41**
Connector$_{zaman}$	0.89(0.30)	**2.95**
Pronoun Type$_{pro}$*Group$_{\text{HSs}}$	0.54(0.43)	1.24
Pronoun Type$_{o}$*Group$_{\text{HSs}}$	-1.35(0.36)	**-3.77**
Connector$_{sonra}$*PronounType$_{pro}$	-2.13(0.40)	**-5.39**
Connector$_{zaman}$*PronounType$_{pro}$	-0.69(0.23)	**-2.98**
Connector$_{sonra}$*PronounType$_{o}$	-2.22(0.40)	**-5.53**
Connector$_{zaman}$*PronounType$_{o}$	-0.32(0.24)	-1.34

Note. Baselines were *kendisi* and *ken* in the monolingual group. Marginal or significant effects are boldfaced.

Table 4.29 *Results from the cumulative link analysis with Connector for the* o *condition in Exp. 4*

Fixed Effect	Estimate (SE)	z-value
Group$_{\text{HSs}}$	-0.12(0.33)	-0.37
Connector$_{sonra}$	0.49(0.25)	**1.94**
Connector$_{zaman}$	0.46(0.25)	**1.82**

Note. Baseline was *ken* in the monolingual group. Marginal or significant effects are boldfaced.

Table 4.30 *Results from the cumulative link analysis with Connector for the* kendisi *condition in Exp. 4*

Fixed Effect	Estimate (SE)	z-value
$\text{Group}_{\text{HSs}}$	1.13(0.36)	**3.17**
Connector_{sonra}	1.12(0.29)	**3.84**
Connector_{zaman}	0.74(0.30)	**2.47**

Note. Baseline was *ken* in the monolingual group. Marginal or significant effects are boldfaced.

Table 4.31 *Results from the cumulative link analysis with Connector for the* pro *condition in Exp. 4*

Fixed Effect	Estimate (SE)	z-value
$\text{Group}_{\text{HSs}}$	1.69(0.37)	**4.56**
Connector_{sonra}	0.56(0.31)	**-1.81**
Connector_{zaman}	-1.01(0.31)	**-3.25**

Note. Baseline was *ken* in the monolingual group. Marginal or significant effects are boldfaced.

4.5.3 Discussion

Exp. 4 set out to test the interpretation of subject pronouns in Turkish. The three forms *o*, *kendisi* and *pro* were tested in this experiment.

The first goal of this study was to establish whether the three forms all had different pragmatic biases. The results from the Turkish monolinguals showed that *kendisi* behaves significantly differently from both other forms. While *o* serves to indicate topic shift, and *pro* indicates topic maintenance, *kendisi* lies between these two forms. It does not show any preference for either the sentence-internal or the sentence-external antecedent, which does not align with the sentence-internal preference predicted based on Schlyter (1978) and Sezer (1979). Instead, *kendisi* may be considered the most neutral of the three pronouns in the given context. Further experimental research is necessary to investigate L1ers' interpretation of *kendisi* in different pragmatic contexts, in order to determine *kendisi*'s specific pragmatic usage conditions.

Another interesting result is that, while *pro*'s preference for a sentence-internal antecedent is very strong, *o* also receives a fair amount of sentence-internal interpretations, despite having a bias for the sentence-external antecedent. The finding that a null pronoun's bias to refer to a topical antecedent is stronger than an overt pronoun's bias to refer to a non-topic has previously been reported for other languages, e.g. for Italian (Carminati, 2002).

Exp. 4 also aimed to examine whether HSs of Turkish would be able to discriminate between the three types of pronoun to the same extent as monolinguals. This was the case, as the response preferences were significantly different for all three pronouns in both monolinguals and HSs. At the same time, the HSs still differed from L1ers in contrasting the overt pronoun *o* more strongly from the other two forms, *kendisi* and *pro*. It seems that the HSs were more rigid in distinguishing between the forms. A similar effect was observed in Exp. 3, where HSs contrasted the two reflexive forms *kendisi* and *kendi* from each other more strongly than the monolingual native speaker group.

These results do not align with the predictions that HSs merge different pronouns in interpretation, or show a stronger preference for sentence-internal antecedents for all three forms. However, when looking at individual differences, it becomes clear that a subset of HSs shows a pattern similar to what was predicted: *Kendisi* and *pro* received similar interpretations in early-AoA HSs, and this pattern of merging appeared because *kendisi* was assigned to sentence-internal antecedents more strongly in this group.

The observed pattern illustrates the importance of considering individual differences when analyzing HS comprehension. The joint analysis of the different individual differences variables allows us to determine the strongest predictor of participants' responses in each experiment. Interestingly, the strongest predictor in Exp. 3 was HL proficiency, while in the present experiment, it was German AoA.

This result contrasts with the lack of AoA effects in Greek overt and null subject pronoun resolution reported in Kaltsa et al. (2015) (discussed in section 3.4.2). The contrast may be explained by cross-linguistic differences: In the present study, AoA only influenced the interpretation of *kendisi*, a form which does not have a Greek counterpart. In addition, a strong correlation between German AoA and HL proficiency was observed in the participant sample. Looking at the graph for HL proficiency effects in Fig. 4.17, it becomes obvious that the same effect as in Exp. 2 appeared numerically: Lower-proficiency HSs merged *kendisi* and *kendi*, while higher-proficiency HSs contrasted all three forms from each other more strongly. In the present experiment, no significant effects for TELC Score appeared, because the AoA had an even stronger influence. In future studies, recruiting an even larger sample of HSs, which includes more high-proficiency, early-AoA as well as low-proficiency, late-AoA HSs, will allow investigating the individual predictive value of each variable more thoroughly.

In terms of the predicted difficulty with referentially ambiguous forms in HSs, the results were mixed. First, the strongest divergence from monolinguals' responses appeared for the most referentially ambiguous form *kendisi*, especially in lower-proficiency HSs. However, group differences were also observed for *pro*, which had a clear bias towards the sentence-internal antecedent in monolinguals, while *o*, for which monolinguals only had a weak sentence-external preference, received identical interpretations in monolinguals and HSs. Overall, it seems that HSs do have a stronger preference for unambiguous response options than monolinguals, but there is no clear connection between the degree of referential ambiguity of a subject pronoun and the divergence from monolingual patterns in the interpretation of this form in HSs.

No predictions were made regarding an influence of the connector on the interpretation of the pronouns, but interesting effects were observed. Specifically, null and overt pronouns differed from each other regarding the connector effect. For *pro*, constructions with *ken* ('when') led to the strongest sentence-internal antecedent preference, while for *kendisi* and *pro*, *ken* constructions were interpreted as more sentence-external than the other two types of construction. The implications of these effects of connector will be discussed in the following gen-

eral discussion, together with the connector effects observed for German in Exp. 2.

4.6 General Discussion

In this chapter, four experiments dealing with the interpretation of pronouns and reflexives in Turkish-German bilinguals were described and discussed. In the following, I will give a brief summary of each experiment, before moving on to the discussion of the overall results.

In Exp. 1, German L1ers chose only local antecedents for the reflexive *sich* as well as the emphatic reflexive *sich selbst*. Turkish-speaking L2ers of high proficiency were able to achieve native-like interpretations of German reflexives. Lower-proficiency L2ers tended to interpret the two forms differently, by accepting a non-local antecedent more often than L1ers for *sich*, but not *sich selbst*.

Exp. 2 tested the interpretation of the referentially ambiguous subject pronoun *er* in L1ers and L2ers of German. Turkish-speaking L2ers of German had a weaker preference for the sentence-internal antecedent than L1ers, who had a strong sentence-internal preference. This effect was again modulated by German proficiency. A surprising finding was that the type of connector used in the temporal clause preceding the pronoun determined whether an L1-L2 difference was observed: only for *während* ('while') and *als* ('when'), but not for *nachdem* ('after') did the bilinguals choose a sentence-external antecedent for *er* more often than the L1 group.

Exp. 3 investigated the interpretation of Turkish anaphors, specifically *kendisi* and *kendi* in object position. The standard reflexive *kendi* did not have a strong preference for a local antecedent in Turkish L1ers, in contrast to what was expected based on theoretical and descriptive accounts of Turkish reflexives (Göksel & Kerslake, 2005; Kornfilt, 2001). *Kendisi* was also considered ambiguous between a local and non-local antecedent, which is in line with previous research (Dinçtopal-Deniz, 2009; Göksel & Kerslake, 2005; Gürel, 2002; Kornfilt, 2001; Rudnev, 2011). These findings suggest that there is no Turkish reflexive which strictly abides by Condition A.

Exp. 3 also compared monolingual Turkish L1ers to HSs of Turkish with L2 German. HSs preferred a local antecedent for *kendi* more strongly than the monolinguals, while having the same overall local vs. non-local preference for *kendisi*. Effects of HL proficiency revealed that higher-proficiency HSs contrasted the two forms from each other more strongly than monolinguals, while

lower-proficiency HSs showed a pattern of merging. Another finding was the stronger preference for unambiguous responses in the HSs compared to monolinguals.

Exp. 4 investigated the resolution of three Turkish subject pronouns: the null pronoun *pro*, and the two overt pronouns *o* and *kendisi*. The pattern of results from monolingual L1ers supports the prediction that *o* and *pro* have different pragmatic functions (e.g. Enç, 1989). *Kendisi* did not pattern with either of the two forms in terms of its pragmatic bias for a sentence-internal or sentence-external antecedent. As in Exp. 2 on German, the connector in the temporal clause that appeared before the pronoun had an impact on monolinguals' antecedent choices. However, the direction of the effect depended on the pronoun: While the null pronoun preferred sentence-internal antecedents more strongly when appearing after *ken* ('when') constructions compared to *sonra* ('after') and *zaman* ('while') constructions, both *kendisi* and *o* received more sentence-external interpretations after *ken* compared to *sonra* and *zaman*.

Exp. 4 also had interesting results regarding interpretative differences between HSs and monolinguals. Turkish HSs had a significantly stronger sentence-internal antecedent preference than monolinguals for both *kendisi* and *pro*, while not differing from the monolinguals in keeping distinct pragmatic biases for all three pronoun forms. An effect of German AoA appeared for the interpretation of *kendisi*: HSs who had started learning German earlier treated *kendisi* similarly to the null pronoun, while later-AoA HSs had a stronger sentence-external preference for *kendisi*.

Considering these results, I will now turn to the question of how these experiments inform our understanding of anaphor resolution in L2ers and HSs, and whether I find similarities or differences between these populations.

Considering **L2 anaphor resolution**, Exp. 1 and 2 both found significant differences between L1ers and L2ers. However, the differences were not very big, with the L2 group showing the same preferences as the L1ers, only less extreme. Furthermore, proficiency effects were observed for both experiments, suggesting that with increasing proficiency, L2ers can achieve native-like performance in their judgments.

The results of both Exp. 1 and Exp. 2 are in line with accounts which propose that L2ers consider non-syntactic information more strongly during sentence processing than L1ers (Clahsen & Felser, 2006, 2017; Cunnings, 2016, 2017). In Exp. 1, L2ers were influenced by the semantic distinction between the two reflexive constructions *sich* and *sich selbst* and sometimes accepted a prominent

non-local antecedent for the reflexive, even though it was syntactically inaccessible. In Exp. 2, L2ers considered the semantic information of the connector between the clause containing the pronoun and the clause containing a potential antecedent, while no such effect was observed for L1ers.

Considering the proficiency effects found in both experiments on German, another possibility is that proficiency is the main determinant of whether an L2 speaker performs native-like or not in syntactic processing. This was suggested by Hopp (2006) based on self-paced reading and speeded acceptability judgment data for L2ers of German. The current study does not test L2 online processing, but rather looks at L2ers' offline interpretations. As mentioned in Ch. 3, several studies have found differences between L2ers' offline and online performance (e.g. Felser & Cunnings, 2012; Roberts et al., 2008).

Another common assumption in the L2 literature is that participants' native language may have influenced their processing or interpretation of the L2 structure. For example, an influence of the L1 on the offline interpretation of non-reflexive pronouns was found for Turkish-speaking L2ers of Dutch in Roberts et al. (2008). Using very similar materials, the difference between L1ers and L2ers observed in Exp. 2 was not nearly as strong as in Roberts et al. (2008). Exp. 1 also found a small but highly significant difference between L1ers and L2ers. In order to test whether this difference is due to L1 influence, it is necessary to compare L2ers from different L1 backgrounds, where one language aligns with the L2 in the relevant phenomenon, while the other one does not. This was done in Exp. 5 (see Ch. 5), where in addition to the Turkish-German bilinguals tested in this chapter, I also included a group of Russian-speaking L2ers of German.

In order to further test the competing hypotheses about the characterization of L2 anaphor resolution, this thesis also includes Visual-World eye-tracking studies which provide online processing data of two kinds: participants' fixations after hearing an anaphor, as well as their responses to comprehension questions, in which they were also instructed to respond as quickly and as correctly as possible. These data on the L2 processing of German anaphors are presented in Ch. 5. Furthermore, the General Discussion of this thesis in Ch. 7 will try to establish what the combination of offline interpretation and online processing patterns found in Chapters 4 and 5 reveals about L2 language processing and anaphoric resolution.

Turning to the characterization of **anaphor resolution in HSs**, the results from Exps. 3 and 4 showed a remarkable difference between HSs and monolingual controls. While HSs were able to discriminate between different pronominal forms and their respective antecedent biases, they significantly differed from

monolinguals in contrasting the different forms from each other more strongly in their interpretations. However, individual differences depending on participants' HL proficiency were observed, which will be discussed below.

A second difference between monolinguals and HSs was HSs' stronger preference for unambiguous response options. Evidence that this was not merely a case of over-applying monolinguals' tendencies comes from Exp. 3, where monolinguals interpreted *kendisi* as ambiguous between a sentence-external and a sentence-internal antecedent, but HSs dispreferred ambiguous response options, and chose the sentence-external and sentence-internal antecedents as the definite antecedent for *kendisi* to about the same extent.

As mentioned above, the HSs' results in Exps. 3 and 4 revealed significant effects of proficiency and AoA, respectively. In both experiments, higher-proficiency (and later-AoA) HSs contrasted different pronominal forms from each other more strongly than lower-proficiency HSs. Thus, HSs with a higher proficiency were actually more different from monolingual L1ers than lower-proficiency HSs in this regard. Looking at the results more closely, it appears that HSs can be divided into two subgroups: while the low-proficiency speakers tended to collapse *kendisi* in its bias either with *kendi* (Exp. 3) or the null pronoun (Exp. 4), high-proficiency HSs showed the pattern found for the overall group, i.e. stronger contrasts between all forms. The less proficient participants' pattern of collapsing different categories in interpretation has previously been reported for HSs' interpretation of Korean reflexives (J.-H. Kim et al., 2009), and of the gender system in Russian (Polinsky, 2008).

The lower-proficiency and early-AoA HSs in this study align with the predictions based on previous HS studies, which mostly focused on HSs living in the USA. As described in Ch. 3, HSs living in Europe often have a higher HL proficiency, and several studies of Europe-based HSs have reported results that contrasted with previous findings on HSs in North America (Flores, 2015; Kupisch, 2013). Future hypotheses and models of HS language comprehension should take into account the heterogeneity of this type of bilingual, not only in terms of their proficiency and their their language acquisition experience, but also regarding their performance in specific linguistic tasks.

The observation that high-proficiency HSs tend to contrast different anaphors from each other more strongly than monolingual L1ers is a new finding and adds to our as yet limited understanding of language comprehension in HSs. It seems these HSs have acquired the different categories of their native language, but still differ subtly from L1ers who have not been exposed to a second language from early childhood. The observed effects could be an instance of overgrammati-

calization (i.e., the tendency to overemphasize grammatical biases by treating them as hard constraints) in HSs, which has been reported in previous studies of other languages and linguistic phenomena (Putnam, 2016; Sánchez-Alonso, Deo, & Pinango, 2016).

Did L2ers of German and HSs of Turkish show **parallels or differences** in terms of how their anaphor resolution compared to monolingual L1ers? As mentioned before, some studies report parallel language processing and comprehension patterns for these distinct types of bilinguals. In this study, I tested offline interpretation, but not processing. A potential parallel between HS and L2 interpretation could be a difficulty with referentially ambiguous pronouns, reported for HSs in Gürel and Yilmaz (2011) and for L2ers in Patterson et al. (2014). My experiments however did not result in a similar finding when using the same materials in two languages: While HSs avoided ambiguous response options in Exps. 3 and 4, this was not observed for L2ers of German. (No statistical analysis was carried out for this, but the numerical trends point in the opposite direction from the effect found for HSs.)

HSs in Exps. 3 and 4 as well as L2ers in Exp. 1 showed stronger differences between different forms compared to monolingual L1ers. While this appears to be a parallel, it is important to note that this effect was specific to high-proficiency HSs, but the effect declined as proficiency increased for the L2ers in Exp. 1. Furthermore, the HSs created this contrast by giving more extreme judgments to some forms compared to monolinguals, while the L2ers gave less extreme judgments than the L1ers to some forms, but not others. Thus, despite the fact that high-proficiency HSs and low-proficiency L2ers contrasted forms from each other more strongly than monolinguals did, this cannot be considered a parallel interpretation pattern between HSs and L2ers.

Overall, these findings suggest that differences from monolingual L1ers are present in both L2ers and HSs in the domain of pronoun resolution, but that these two groups differ from monolinguals in different ways; they do not constitute examples of a unified form of bilingual language comprehension.

An unexpected finding of Exps. 2 and 4 was that the connector used in the temporal adverbial clause affected participants' interpretations of both German and Turkish pronouns. While in German, this effect only appeared in the L2 group, in Exp. 4, both Turkish monolingual L1ers and HSs showed an effect of connector on antecedent choice. Furthermore, the contrasts were different for the two languages: In German, *nachdem* ('after') received a different bias than the other two connectors (*während* 'while', and *als* 'when/as'), but in Turkish, *ken* ('while') constructions differed from *sonra* ('after') and *zaman* ('when').

Thus, the connector effects observed for L2ers in Exp. 2 cannot be explained by the antecedent preferences of different connectors in Turkish.

Previous studies have reported semantic effects of the connector between a matrix and a subordinate clause on intra-sentential pronoun interpretation (de la Fuente & Hemforth, 2014; Schlenter, 2013). However, I am not aware of studies that compared the role of different temporal connectors in pronoun resolution. Colonna, Schimke, and Hemforth (2015), Hemforth, Vaillant, Konieczny, and Scheepers (2010), and de la Fuente and Hemforth (2012) showed that German and English pronouns in temporal subordinate clauses generally disprefer focused antecedents and/or prefer topical antecedents, and tend to prefer antecedents within the same sentence. It is possible that connectors that unambiguously indicate a temporal subordinate clause lead to a stronger sentence-internal preference than other connectors.

In German, *während* may also be interpreted as adversative. The Turkish connector *ken* always has a temporal connotation, but unlike the other two connectors, it can also be combined with a noun or adjective, e.g. *küçük-ken* ('when I was little').[16] Further research is necessary to identify the role of connector type in anaphor resolution across different languages. For now, it is clear that antecedent preferences for subject pronouns may be influenced by the connector, which should be considered when designing studies of subject pronoun resolution.

4.7 Conclusion

This chapter investigated offline interpretation of object and subject anaphors in German and Turkish. The results revealed that L2ers and HSs differed from monolinguals in different ways. L2ers of German were more sensitive to semantic information during pronoun resolution and slightly less sensitive to syntactic constraints on the reflexive, compared to L1ers. HSs, on the other hand, were able to discriminate between different Turkish anaphors overall, but further analysis revealed different response patterns depending on proficiency. While lower-proficiency HSs had a tendency to merge different forms in interpretation, higher-proficiency HSs overemphasized contrasts between forms compared to monolinguals. Regarding the Turkish anaphor *kendisi*, the results revealed that both in object and subject position, its biases were distinct from the other Turkish anaphors.

[16] This is due to the fact that Turkish allows for null copula sentences, in which the verb 'to be' is dropped.

The present conclusions are based on participants' responses in an offline questionnaire. In order to gain a deeper understanding of how bilinguals process anaphors in real-time, Chapters 5 and 6 will present two Visual-World eye-tracking studies of German and Turkish anaphors, respectively. Ch. 5 will also look into the role of L1 background in L2 anaphor resolution. Ch. 6 will further investigate the properties of Turkish anaphors, with a specific focus on *kendisi*.

Chapter 5

The online application of Conditions A and B in L1ers and L2ers of German

5.1 Introduction

As described in Ch. 3, most studies of L1 anaphor resolution claim that L1ers adhere to binding principles online, but exceptions have been reported both for reflexives and pronouns. No previous visual-world study has tested both pronouns and reflexives in the same experiment in German.

In Ch. 4, Turkish-speaking L2ers of German relied more strongly on non-syntactic information (such as the semantic distinction between *sich* and *sich selbst*, and the semantic distinction between strictly temporal connectors *als* and *nachdem* and the potentially adversative connector *während*) compared to L1ers when resolving anaphors offline. This is in line with the SSH (Clahsen & Felser, 2006, 2017) and the memory interference hypothesis (Cunnings, 2016, 2017). However, the observed L1-L2 differences were quite small, and L1 influence could not be ruled out as an explanation of the L2ers' pattern of results. Previous online studies of L2 anaphoric processing suggest that non-native-like anaphor resolution in L2ers may be more pronounced online compared to offline (Badecker & Straub, 2002; Felser & Cunnings, 2012; Felser et al., 2009; Sturt, 2003).

As described in Ch. 3, the divergence from monolingual patterns observed in

bilingual populations may be influenced by proficiency and/or AoA. In Ch. 4, non-native-like interpretation of *sich* in Condition A contexts was limited to intermediate- and upper-intermediate-proficiency, but not advanced L2ers of German. The present study again tests German L1ers and a group of Turkish-speaking L2ers of German with a relatively broad range of proficiency and AoA. This chapter first focuses on comparing the German L1ers with the Turkish-speaking L2 group. After that, individual differences in proficiency and AoA are investigated within the L2 group.

L1 influence is commonly discussed in the L2 literature as a source of L1-L2 differences. As described in Ch. 3 and confirmed by experimental results in Ch. 4, Turkish and German differ in the properties of object anaphors: The Turkish reflexive *kendi* does not fully adhere to Condition A, while the German reflexive *sich* does. The Turkish anaphor *kendisi*, which has been categorized both as a reflexive and a pronoun, seems to be unrestricted by either Condition A or B. To determine whether potential differences in processing patterns between German L1ers and Turkish-speaking L2ers of German were due to an influence of Turkish, a second L2 group was tested. This group consisted of L1ers of Russian. Russian and German have identical syntactic constraints on pronouns and reflexives in the contexts of interest (Conditions A and B; see Ch. 2 for German, and Bailyn (2012) for Russian). Thus, the third focus of this chapter is the comparison of Turkish-speaking and Russian-speaking L2ers in proficiency-matched groups.

In the following, two main experiments (Exps. 5 & 6) are presented, which investigated the processing of both pronouns and reflexives in German. The main experiments differed from each other only in their experimental materials. Each main experiment consisted of two sub-experiments: In Exps. 5a and 6a, German L1ers were compared to Turkish-speaking L2ers of German, and the role of individual differences in Turkish-speaking L2ers' anaphor resolution was explored. In Exps. 5b & 6b, the Turkish-speaking L2 group was compared to a Russian-speaking L2 group to test whether potential L1-L2 differences in Exps. 5a & 6a could be due to L1 influence.

5.2 Experiment 5a: L1 and L2 processing of German pronouns and reflexives

The present experiment aimed to expand on the results from Ch. 4 and previous research on L2 anaphor resolution to test whether potential L1-L2 differences in Turkish-speaking L2ers' online processing of German anaphors in Condition

A and B environments can be explained by a stronger reliance on non-syntactic information, as suggested by recent models of L2 language comprehension (Clahsen & Felser, 2006, 2017; Cunnings, 2016, 2017).

As described in section 3.3.1, several studies have found effects of proficiency on the resolution of both pronouns and reflexives. However, only few studies have investigated online processing. Furthermore, AoA has been claimed to be an important factor in L2 language comprehension, but no study has yet directly compared L2ers of different AoAs in offline or online anaphor resolution. The relative influence of AoA vs. proficiency in L2 comprehension has been discussed in previous literature, but has not yet been examined for anaphor resolution.

Exp. 5a also analyzed the individual differences in Turkish-speaking L2ers' interpretation and processing of Conditions A and B. This analysis considered the role of German AoA and proficiency in both German and Turkish.

5.2.1 Method

5.2.1.1 Participants

32 L1ers of German (20 female, 12 male) with a mean age of 25.15 (range=20-33, sd=3.47) were tested. All participants were living in the Berlin-Potsdam metropolitan area and were recruited from the PRIM database and personal contacts. No participant reported having a second L1, thus all were raised monolingually before learning an L2 in school.

Table 5.1 *Participant information for the Turkish-speaking L2 group in Exps. 5a and 6a*

Variable	mean	range	sd
Age	25.75	17-46	5.68
German proficiency (%)	86.01	43.33-100.00	12.13
Turkish proficiency (%)	74.94	13.64-100.00	22.68
German AoA	5.86	0-30	8.10
Length of exposure to German (years)	19.87	2.00-38.00	7.04

The L2 group (see Table 5.1) consisted of 56 native speakers of Turkish (35 female, 21 male). Their German AoA ranged from 0 to 30, with a mean of

5.86. 16 of the 56 participants in the bilingual group were simultaneous bilinguals (AoA=0), 24 were early bilinguals (0<AoA<6), and 16 were late bilinguals (AoA>5). The level of German proficiency was tested using the Goethe test, with the average score being 25.80 (86.01%). Hence, the L2 group had an average CEFR level of C1 ('advanced'), with individual scores ranging from B1 ('intermediate') to C2 ('proficient'). Their Turkish proficiency was also tested using the TELC C1 score, and participants scored 16.49 out of 22 points (74.94%) on average.

In both groups, all participants had normal or corrected-to-normal vision and normal hearing. Furthermore, all had completed or were about to complete secondary education, with the majority of participants being university educated. Participants received either 8€ or class credit for participation.

5.2.1.2 Design and Materials

Task: Visual-World paradigm The experiment used eye-tracking, specifically the Visual-World paradigm (VWP), which differs from the eye-tracking-during-reading paradigm more commonly used in psycholinguistic research. The VWP always consists of a combination of a visual display with auditory input: participants look at the display while listening to an utterance. The display may contain realistic or semi-realistic visual scenes, pictures of objects, animals or humans, or written words.[17] The basic principle of the VWP is that participants automatically move their gaze according to the auditory input, such that they look at the things they associate with what they are hearing at a given time (Tanenhaus, Spivey-Knowlton, Eberhard, & Sedivy, 1995) (taking into account the time it takes to compute an eye-movement). This is generally referred to as the 'linking' assumption, and provides the basis for the VWP.

The linking assumption allows the VWP to give insight into the time-course of sentence processing, e.g. for prediction (e.g., Altmann & Kamide, 1999; Knoeferle, Crocker, Scheepers, & Pickering, 2005), and for the integration of information from different modalities (e.g., Knoeferle & Crocker, 2006; Tanenhaus et al., 1995). For a review of the use of the Visual-World paradigm in psycholinguistics, refer to Huettig, Rommers, and Meyer (2011) or Brooks and Kempe (2014). A major advantage of the VWP is that it can be used with populations who cannot read, such as young children, or whose reading speed is often slowed down compared to adult monolingual L1ers, such as L2ers and HSs.

[17] However, unlike eye-tracking-during-reading, only single words but not sentences may be presented on screen in a Visual-World experiment.

The VWP has also been used in research on anaphoric processing (Clackson et al., 2011; Kaiser, Runner, Sussman, & Tanenhaus, 2009; Runner & Head, 2014; Runner, Sussman, & Tanenhaus, 2006). Participants' looking at the pictures of potential antecedents after hearing a pronoun can give insight into which antecedent they associate with the pronoun, and whether these associations change over time.

The design of this study was inspired by Clackson et al. (2011) (see section 3.2). Clackson et al. (2011) tested adult and child L1ers of English on the processing of both pronouns and reflexives. They used a gender-mismatch paradigm with two potential antecedents, one accessible and one inaccessible antecedent. By manipulating the gender of the potential antecedents, it was possible to test whether semantic features of a syntactically inaccessible antecedent influence how an anaphor is processed.

For German, it was not possible to use a gender mismatch paradigm, because the German reflexive *sich* is not gender-marked. Furthermore, German has gender marking on nouns, which makes feminine nouns morphologically more complex and possibly less attractive as antecedents than masculine nouns. The alternative would be to use proper names that are unambiguously used only for one gender (e.g. *Anna* and *Paul*), but using many different characters with different names may be confusing for participants. For these reasons, I opted for a simpler design, in which the gender of the potential antecedents always matched the gender of the anaphor.

In each trial, participants first listened through headphones to a sentence containing an anaphor, followed by a comprehension question which asked for one of the pictures. The question was answered by clicking on the picture with a mouse. For the experimental items, the comprehension question always asked for the antecedent of the pronoun or reflexive. Each display contained the target picture, a competitor picture that displayed a second character mentioned in the previous sentence, and a pair of distractors which did not appear in the sentence. An example of a visual display can be found in Fig. 5.1, with the corresponding auditory input being either of the examples in (5.1). The pictures appeared on the screen for 1 s before the auditory instructions were played in order to reduce effects of capture due to the intrinsic attractiveness of the different pictures. By giving participants a preview time of 1 s, they had time to first 'scan' the display. They were instructed to listen to the sentences while looking at the screen and give a click response after hearing the question, as quickly and correctly as possible. After the click response, the next trial started. There was no feedback on the correctness or speed of the reaction.

Auditory stimuli An experimental session had 24 experimental trials and 96 filler sentences (of which 24 were experimental trials for Exp. 6, see section 5.4.1.1), leading to a total of 120 trials. The experimental trials were taken from a pool of 48 experimental items.[18] An example of an experimental sentence can be found in (5.1). The auditory stimuli consisted of a single sentence in which the anaphor appeared, followed by a comprehension question which asked for the interpretation of the anaphor. Each experimental sentence contained two singular masculine potential antecedents (*Wanderer* and *Bauarbeiter* in (5.1)) and one masculine pronoun (*ihn* or *ihm*) or non-gender-marked reflexive (*sich*). The experimental sentences always consisted of a matrix clause and a complement clause. For all sentences, the anaphor was in the (direct or indirect) object position of the subordinate clause. The verb in the subordinate clause was chosen to be ambiguous between a transitive and a reflexive interpretation, in order to ensure that the antecedent of the pronoun could not be determined through verb semantics. Appendix A.1.7 lists all experimental items of Exp. 5.

(5.1) Example stimulus set, Exp. 5

a. Der Wanderer$_{i}$ wollte, dass der Bauarbeiter$_{k}$ aus
the wanderer want$_{3^{rd}SingPast}$ that the construction worker
Wuppertal sich$_{*i/k}$ sorgfältig bürstete.
from Wuppertal himself carefully brush$_{3^{rd}SingPast}$
'The wanderer wanted the construction worker$_k$ from Wuppertal to brush himself carefully.'

b. Der Wanderer$_{i}$ wollte, dass der Bauarbeiter$_{k}$ aus
the wanderer want$_{3^{rd}SingPast}$ that the construction worker
Wuppertal ihn$_{i/*k}$ sorgfältig bürstete.
from Wuppertal him carefully brush$_{3^{rd}SingPast}$
'The wanderer wanted the construction worker from Wuppertal to brush him carefully.'

Two versions of each experimental sentence were constructed by manipulating the type of anaphor used (reflexive vs. pronoun). An example of this can be found in (5.1). The experimental sentences were arranged in a Latin Square Design with two lists. Hence, each participant only heard each experimental sentence in one condition, and received twelve items of each condition. Fillers were the same for both lists. Items were pseudo-randomized for each list, such that the experiment started with two filler trials and experimental trials were

[18] 48 bases for experimental items were created for Exps. 5 and 6. These items could be turned into experimental items for each experiment (see Appendices A.1.7 and A.1.8). Four lists were created, all of which contained 24 experimental items of Exp. 5, with the remaining 24 bases for experimental items from the pool being used for Exp. 6.

always separated by at least one filler trial.

Both potential antecedents appeared before the pronoun and c-commanded the pronoun, but only one of them was inside the pronoun's governing category and therefore a local antecedent, constituting the subject of the complement clause. The other potential antecedent was the matrix subject as well as the first-mentioned entity in the sentence. Because the matrix subject also c-commanded the pronoun, it was a potential long-distance binder. Between the second-mentioned (local) antecedent and the pronoun, a four- to five-syllable adjective phrase was inserted which contained the name of a German city or a country (e.g. in (5.1): *aus Wuppertal*, 'from Wuppertal') and modified the local antecedent.

Note that the materials in the reflexive condition of Exp. 5 are very similar to the materials in the reflexive condition of Exp. 1 (cf. section 4.2.1.2). The only differences in the materials were the insertion of the adjective phrase described above in Exp. 5, but not Exp. 1, and the use of proper names for the antecedents in Exp. 1, while the present experiment used descriptive noun phrases. Other differences were in the experimental setup, such as the mode of presentation and the number and type of other experimental as well as filler items.

Figure 5.1. Example display for Exp. 5.

Filler sentences were divided into three categories: There were 18 pseudo-fillers which contained similar anaphors to the experimental items, but also included feminine characters. Furthermore, there were 18 structurally similar fillers which also contained anaphors (but e.g. with only one potential antecedent), or which

were similar to the experimental items in their overall structure, i.e. they consisted of a matrix clause and a complement clause with a different subject each. Finally, 36 structurally different fillers differed from the experimental items either in the number of characters mentioned or in sentence structure, and they often contained an adverbial phrase in the beginning of the sentence. Examples for each type of filler item can be found in (5.2), and Appendix A.1.9 provides a list of all fillers. Fillers served to mask the purpose of the experiment, and to make the experiment less monotonous for the participants.

(5.2) Examples of filler items, Exp. 5.

a. pseudo-fillers

Die Königin$_{i}$ dachte, dass die Reiterin$_{k}$ aus Dänemark
The queen think$_{3^{rd}SingPast}$ that the horse-rider$_{f}$ from Denmark
sich$_{k}$ unangemessen angezogen hatte.
herself/himself inappropriately dress$_{PastPartic}$ have$_{3^{rd}SingPast}$
'The queen thought that the horse-rider had dressed (herself) inappropriately.'

b. structurally similar

Die Wirtin sah, wie die Sanitäterin aus Serbien
The hostess see$_{3^{rd}SingPast}$ how the paramedic$_{f}$ from Serbia
genüsslich ein Kuchenstück aß.
passionately a piece of cake eat$_{3^{rd}SingPast}$
'The hostess saw the paramedic from Serbia passionately eat a piece of cake.'

c. structurally different

Nach langer Überlegung kaufte sich die
After long contemplation buy$_{3^{rd}SingPast}$ herself/himself the
Indianerin aus Panama schließlich ein Abendkleid.
Native American$_{f}$ from Panama finally an evening gown.
'After long contemplation, the Native American woman from Panama finally bought an evening gown.'

Each experimental and filler sentence was paired with a comprehension question. For the experimental sentences, the comprehension question specifically asked for the participants' interpretation of the anaphor. So for (5.1-a), the corresponding comprehension question was *Wen sollte der Bauarbeiter bürsten?*

('Whom was the construction worker supposed to brush?'). The comprehension question was the same for both conditions, and could always be answered by clicking on one of the displayed pictures. Half of the comprehension questions were formulated with a passive construction, e.g. *Wer wurde gebürstet?* ('Who was brushed?'), while the other half used an active construction as in (5.1). For the filler items, comprehension questions asked for various parts of the sentence, to make sure that participants paid attention to all parts of the sentence, and also to mask the purpose of the experiment.

The sentences and comprehension questions were recorded in a sound-proof room, by two different female native speakers of German (one for the sentences, the other for the comprehension questions). The audio files of all sentences were spliced so that the section in which the reflexive or pronoun appeared was replaced by the same audio file (for each pronoun) which came from a filler sentence. It was therefore possible to control for the length, pitch and other auditory properties of the pronoun or reflexive across items.

Visual stimuli Each experimental and filler sentence was paired with a corresponding set of four pictures. Of these four pictures, two displayed the potential antecedents mentioned in the sentence, while the other two pictures were distractors. The gender and the animacy of the distractor pictures were balanced across items. The characters and animals mentioned in the sentences were depicted as Playmobil® figures, and most of the pictures of objects also used Playmobil® items. The figures were always arranged so that they faced the camera in a neutral position and were always photographed on a white surface in front of an empty white wall. The visual display for (5.1) can be found in Fig. 5.1.

Each picture had a size of 400 x 400 pixels, and the pictures were arranged on the screen so that they all had the same distance from the center of the screen and hence the same relative distance to each of their 'neighbors' (see Fig. 5.1). The display had a resolution of 1680x1050 pixels. The distribution of the relative position of the target, competitor and distractors across items was pseudo-randomized so that both target and competitor appeared in each position with the same frequency. Hence, participants would not be biased towards any of the screen positions when listening to the comprehension question and looking for the target picture. The same visual display was used for both versions of the auditorily presented experimental sentence. Hence, any difference found in participants' behavior between conditions cannot be due to differences in the visual presentation of the stimuli.

5.2.1.3 Procedure

Participants were welcomed in German by the experimenter, and the entire testing session was carried out in German for the L1 group. For the Turkish-speaking group, the only part of the testing session which was not in German was the Turkish placement test (TELC C1), which was carried out at the very end.

Before the eye-tracking experiment, participants were familiarized with the picture items. For this, they saw each picture together with the name of the depicted person or object written underneath the picture, with the display always showing two pictures at the same time. In the L1 group, participants were told to read the name and inspect the picture so that they would be able to recognize them during the experiment. Following this instruction, they could go through the pictures at their own pace and let the experimenter know if they found any picture odd or did not understand it (which was not the case for any of the participants).

In the L2 group, participants did not go through the pictures independently, but the experimenter clicked through the pictures, and read out the picture names one after the other. Like in the L1 group, participants were told to inspect the pictures in order to be able to recognize the characters in the upcoming eye-tracking experiment. Furthermore, they were asked to respond 'yes' if both of the displayed characters or objects were familiar to them, and to say 'no' if any of the two pictures displayed an unfamiliar character or object. If this was the case, the meaning of the unfamiliar picture was explained by the experimenter.

After the familiarization, participants were given written instructions for the eye-tracking experiment. They were instructed to listen to the sentences and the subsequent comprehension question, and then click on the picture which constituted the correct answer to the question. The instructions also asked participants to respond as quickly and correctly as possible (but to wait until the end of the question before clicking).

Participants were seated in front of a computer screen with a display of 1680 x 1050 pixels. Attached to the bottom side of the computer screen, the SMI RED 250 remote eye-tracking system was installed, and gaze positions were recorded with a frequency of 60 Hz (every 16 to 17 ms). The distance and angle between the eye-tracker and participants' eyes were optimized by changing the participants' seating position and the position of the eye-tracker. While carrying out the experiment, participants wore headphones (Sennheiser HD 210) and used a mouse to answer the comprehension questions. The 120 trials of the

experiment were divided into three blocks of 40 trials. Before carrying out the experiment, a 13-point calibration took place. In between blocks, participants could take a short break and were then re-calibrated using a 9-point calibration before continuing the experiment.

Following the first calibration, participants went through four practice items which contained three filler-like items and one experimental-like item. If there were any questions or problems during the practice trials, they were addressed before continuing with the actual experiment. Within each trial, participants would first see a display with four pictures. After a preview time of 1 s, they heard a sentence through the headphones while continuing to look at the screen, and after a one-second pause, they listened to the corresponding comprehension question which they subsequently answered by clicking on one of the pictures with the mouse. After the mouse click, the experimenter pressed a button to continue with the next trial.

Along with the eye-movement data, the positions of the mouse click responses were recorded for each trial. After completing the eye-tracking experiment, participants filled out the Goethe test for German. Afterwards, the L2 group additionally filled out the TELC C1 test for Turkish. Participants were allowed to take short breaks between the experiment and the Goethe test and between the Goethe and the TELC test, if needed. Participants then received their compensation (money or class credit).

5.2.1.4 Analysis

Comprehension questions For L1ers, clicks which appeared 1 s or more before, or 8 s or more after the offset of the comprehension question were excluded to ensure that participants had heard all relevant parts of the question and had answered the question within a reasonable amount of time. For L2ers, the cutoff points were chosen at 1 s before and 12 s after question offset, based on their slower overall reaction times. This led to 0.24% of data being excluded for the combined participant sample. Click responses were categorized based on the position of the mouse on the screen. If the click was on the picture of the accessible antecedent or up to 50 pixels outside of the target picture, the response was coded as 'correct'. Clicks on the inaccessible antecedent and clicks on distractor pictures were categorized in the same way.

The dependent variable was categorical and binomial: it only included clicks on either the accessible or the inaccessible antecedent. Thus, it was a direct measure of the preference for the accessible antecedent over the inaccessible

antecedent. Mixed effect logistic regression models were computed to analyze the pattern of response accuracy between participants and items. The log odds of clicking on the target picture instead of the competitor picture were used as the dependent variable in the mixed model analysis. For this, clicks on other areas of the screen were excluded. This led to the loss of an additional 1.72% of the click data. (Thus, overall, 1.96% of clicks were excluded.) The predictor variable was Group, and the L1ers were chosen as the baseline group. Each condition was analyzed separately, and the best-fitting random-effect structure was determined through model comparison.

The same data cleaning procedure was used in the analysis of individual differences within the L2 group. In this second analysis, 3.04 % of comprehension question data was removed due to data cleaning (2.43% for clicks on other parts of the screen, and 0.61% for clicks that appeared too early or too late). The inferential analysis including model building and selection was also carried out as described above, but with the three fixed effect predictors age of acquisition of German (GermanAoA), German proficiency (GoetheScore) and Turkish proficiency (TELCScore).

Eye movements For the analysis of the eye movements, all saccades were excluded and only fixations were analyzed. For the eye-movement data, I used the R package eyetracking-R (Dink & Ferguson, 2016) to prepare the data. Only looks from 200 ms after the anaphor's offset up to 2200 ms after offset were considered. Furthermore, the dataset only included looks to the four pictures on display. Thus, if participants looked at blank parts on the screen or closed their eyes, this was not included in the calculation of proportions of looks. During the data cleaning, trials in which the tracking ratio was below 30% were excluded from the analysis. This step removed 40 trials. As no other steps were carried out in the eye-movement data cleaning, the total data loss amounted to 1.92% of total trials for the eye-movement data.

The first 200 ms after hearing the anaphor were excluded because it is generally assumed that it takes approximately 200 ms to program an eye-movement (Rayner, Slowiaczek, Clifton, & Bertera, 1983). During the following two seconds, participants heard the remaining parts of the sentence, and, for some trials, the beginning of the one-second silence between the sentence and the comprehension question. For none of the trials was the beginning of the comprehension question heard during the critical time window.

For the inferential statistical analysis of the eye-movement data, only looks to the two potential antecedents were included, resulting in a binomial variable

that indicated whether participants looked at the local (coded as 1) or the non-local antecedent (coded as 0). Then, an empirical logit transformation of the proportions of looks was carried out with time bins of 50 ms, and the data were analyzed using mixed effect empirical logit regression models. The first analysis investigated the overall increase in looks to the local vs. the non-local antecedent for each of the anaphors for the full two-second time window after hearing the pronoun. Fixed effects were selected through model comparison, but an interaction between the two-level Group variable (L1 vs. L2) and the linear time variable was always included.

While a linear function can only indicate whether looks to an antecedent increased or decreased over time, a quadratic function is curved, which indicates that the direction of the gaze shift changed (e.g. from the non-local antecedent to the local antecedent and back to the non-local antecedent). In order to be able to discover potential changes in gaze shift direction over the time window, it is necessary to include non-linear functions of time (Barr, 2008). Therefore, linear, quadratic, cubic, and quartic time variables were tested in this analysis. Cubic and quartic functions have two and three bends in the curve, respectively (see Fig. 5.2 for illustration). These 'polynomial' time variables were kept in the model only if they significantly improved model fit. The best-fitting random effects structure was determined through model comparison.

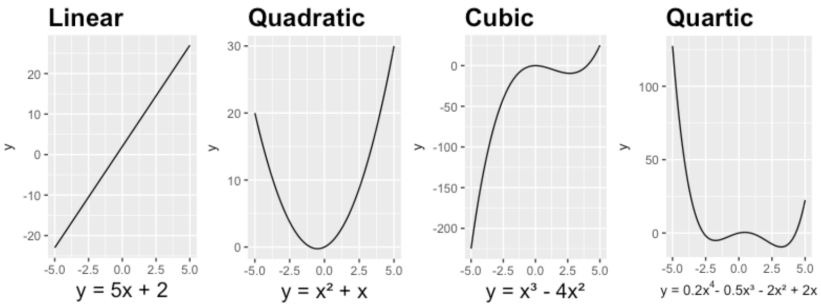

Figure 5.2. Examples of a linear, quadratic, cubic and quartic function, respectively. The different types of function were used for the time variable in the eye-movement analysis.

For a more fine-grained analysis of the time course of effects, the overall time window was split up into two 1000 ms bins, i.e. a 200-1200 ms bin, and a 1200-2200 ms bin. For each of these time bins, empirical logit models were computed separately for the pronoun and the reflexive to test for changes in looks over time. Fixed and random effects were selected in the same fashion as in the two-second time window analysis.

The individual differences analysis employed the same data cleaning procedure as in the between-group analysis, which led to the removal of 32 trials (2.43%). Furthermore, the same time windows were chosen (200-1200 ms and 1200-2200 ms after anaphor offset). As in the comprehension questions, the statistical analysis of individual differences used GermanAoA, GoetheScore and TELCScore as continuous predictors. However, to have a simple and easy-to-understand visualisation, the graphs for this analysis display the looks for two separate participant groups respectively, based on a median split for all participants for each of the predictor variables. Thus, in the graphs, the variables appear as categorical predictors with two levels: high and low.

5.2.1.5 Predictions

Native speakers For L1ers, it was expected that they would be able to correctly interpret both reflexive and pronoun constructions.

1. The following predictions were made for the comprehension questions:
    - Participants should follow Condition A in the reflexive trials, so they should choose the local antecedent for the reflexive (*Bauarbeiter* 'construction worker' in (5.1)).
    - Participants should follow Condition B and exclude the local antecedent for the pronoun. Instead, they should choose the non-local antecedent (*Wanderer* 'wanderer' in (5.1)).
2. For eye movements, the following predictions were made:
    - For both conditions, I expect an increase in looks to the accessible antecedent upon hearing the anaphor (starting around 300 ms after the onset).

L2 speakers If L2ers rely more strongly on non-syntactic information in the processing of reflexives and pronouns compared to German L1ers (Clahsen & Felser, 2006, 2017; Cunnings, 2016, 2017), they should more readily accept syntactically illicit antecedents if they are favored by non-syntactic information such as prominence. Furthermore, if L1-L2 differences are stronger in online than in offline anaphor resolution (Badecker & Straub, 2002; Felser & Cunnings, 2012; Felser et al., 2009; Sturt, 2003), L2ers should show a stronger divergence from native-like patterns in the present experiment compared to Exp. 1.

1. The following predictions were made for the comprehension questions:

- Assuming that the non-local antecedent has a higher discourse prominence than the local antecedent, due to being the matrix subject and also the sentence topic, L2ers should show a stronger preference for the non-local antecedent than L1ers in the reflexive condition, in line with Exp. 1.
- In the pronoun condition, L2ers may have a native-like strong preference for the non-local antecedent, due to its discourse prominence.

2. For eye movements, the following predictions were made:
   - In the reflexive condition, L2ers may show more looks to the non-local antecedent compared to L1ers.
   - In the pronoun condition, the non-local antecedent is the accessible antecedent and should thus be heavily favored by L1ers. Therefore, L1-L2 differences are predicted to be either very small or non-existent in this condition.

5.2.2 Results

5.2.2.1 Comprehension questions

The descriptive accuracy data is displayed in Fig. 5.3. As illustrated in the graph, both groups had a high overall accuracy (94.68% in L1ers, 87.05% in L2ers), and both groups had a higher accuracy for pronouns than for reflexives.

Table 5.2 *Results from the analysis of the comprehension questions in the reflexive condition of Exp. 5a*

Fixed Effect	Estimate (SE)	z-value
Intercept	3.69 (0.46)	**7.99**
$\text{Group}_{\text{L2ers}}$	-1.17 (0.49)	**-2.38**

Note. Treatment contrasts, baseline was the L1 Group. Marginal or significant effects are boldfaced.

Results from the winning models in the logistic regression analysis of click responses can be found in Tables 5.2 and 5.3. In the reflexive condition, Turkish-speaking participants had a significantly reduced accuracy compared to the L1ers ($p<0.05$). In the pronoun condition, the Turkish-speaking group had a native-like accuracy ($p>0.1$). In both conditions, accuracy in the L1 group was significantly above chance level ($p<0.001$).

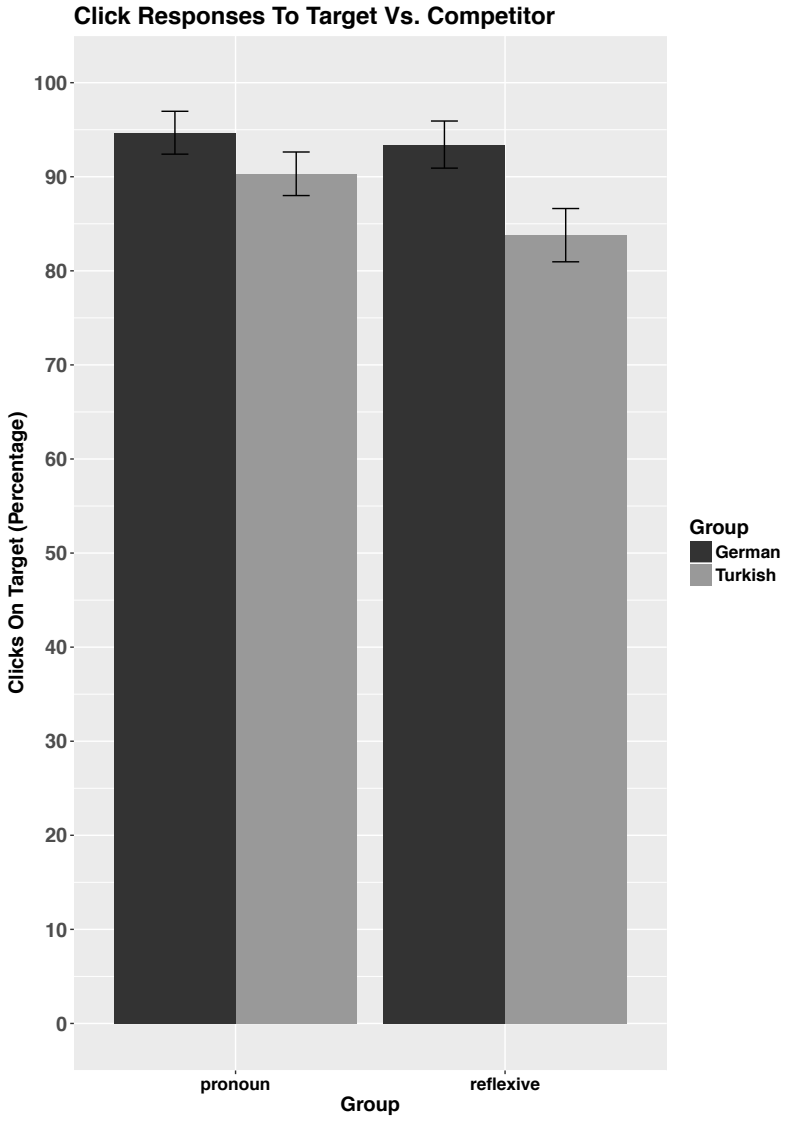

Figure 5.3. Results from the comprehension questions by condition and group, Exp. 5a (Graph).

Table 5.3 *Results from the analysis of the comprehension questions in the pronoun condition of Exp. 5a*

Fixed Effect	Estimate (SE)	z-value
Intercept	4.01 (0.48)	**8.45**
$\text{Group}_{\text{L2ers}}$	-0.74 (0.46)	-1.60

Note. Treatment contrasts, baseline was the L1 Group. Marginal or significant effects are boldfaced.

5.2.2.2 Eye movements

Figs. 5.4 and 5.5 contain graphs of the eye-movement data of both groups, with the y-axis showing the proportions of looks to the local antecedent vs. the non-local antecedent, separately for the pronoun and the reflexive condition.

In the reflexive condition (see Fig. 5.4), participants of both groups were much more likely to look at the local antecedent than the non-local antecedent at the beginning of the time window (proportions around 0.75 - 0.80). Participants from the L1 groups continued to look at the local antecedent after hearing *sich* until approximately 1500 ms after reflexive onset, when a shift towards the non-local antecedent is observed. At the end of the time window, participants' looks were almost balanced between the two antecedents. In the Turkish-speaking group, the proportions at the beginning and the end of the time window were similar to the L1 group. However, the looks to the local antecedent start to decrease somewhat earlier than for the L1ers.

In the pronoun condition (see Fig. 5.5), participants again started out with a high proportion of looks at the local antecedent, but almost immediately shifted their gaze towards the non-local antecedent upon hearing the pronoun. In the L1 group, this shift ended around 1500 ms after pronoun onset, and the proportion of looks remained around 0.5 until the end of the time window. In the L2 group, the same pattern was observed, but the gaze shift slowed down about 500 ms earlier than in the L1 group, only to slightly pick up again at 1750 ms and reach the same level as the L1 group at the end of the time window.

Despite some differences in the two groups' curves, the confidence bands of the two lines overlapped throughout the time window for both conditions. The results from the mixed effect empirical logit analysis conducted on the eye-movement data for each condition can be found in Tables 5.4 and 5.5, respectively.

In the reflexive condition, L1ers looked more to the local than the non-local

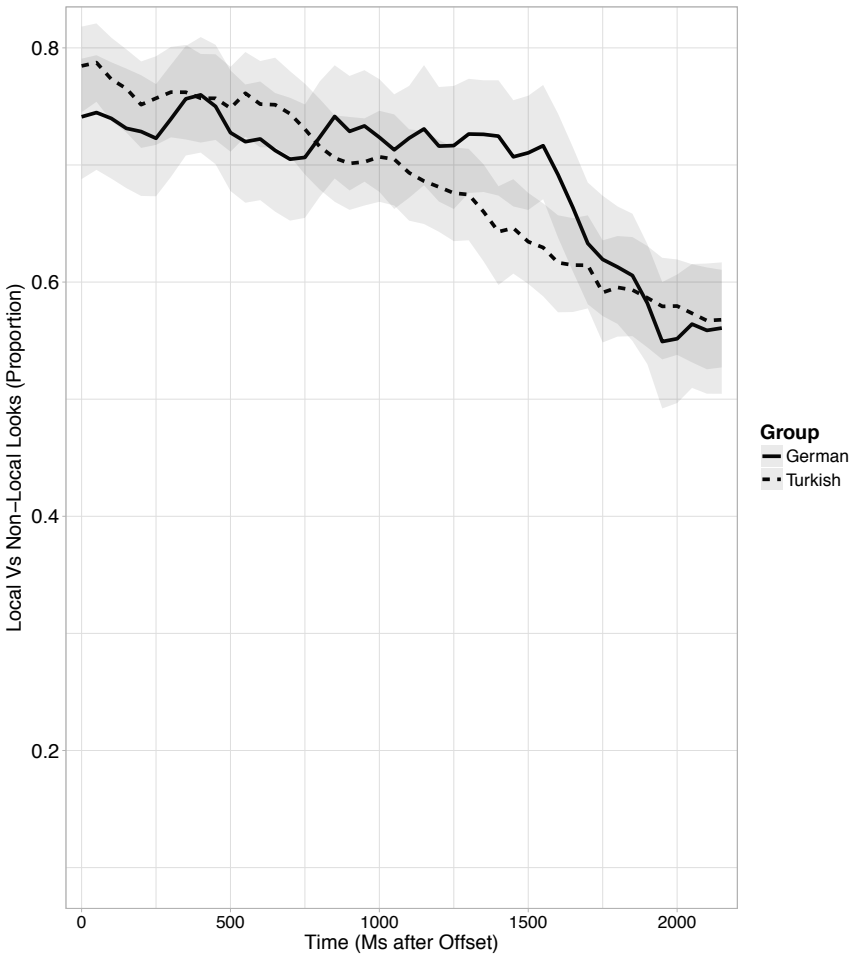

Figure 5.4. Looks to the local vs. the non-local antecedent for the reflexive condition in Exp. 5a, for both groups.

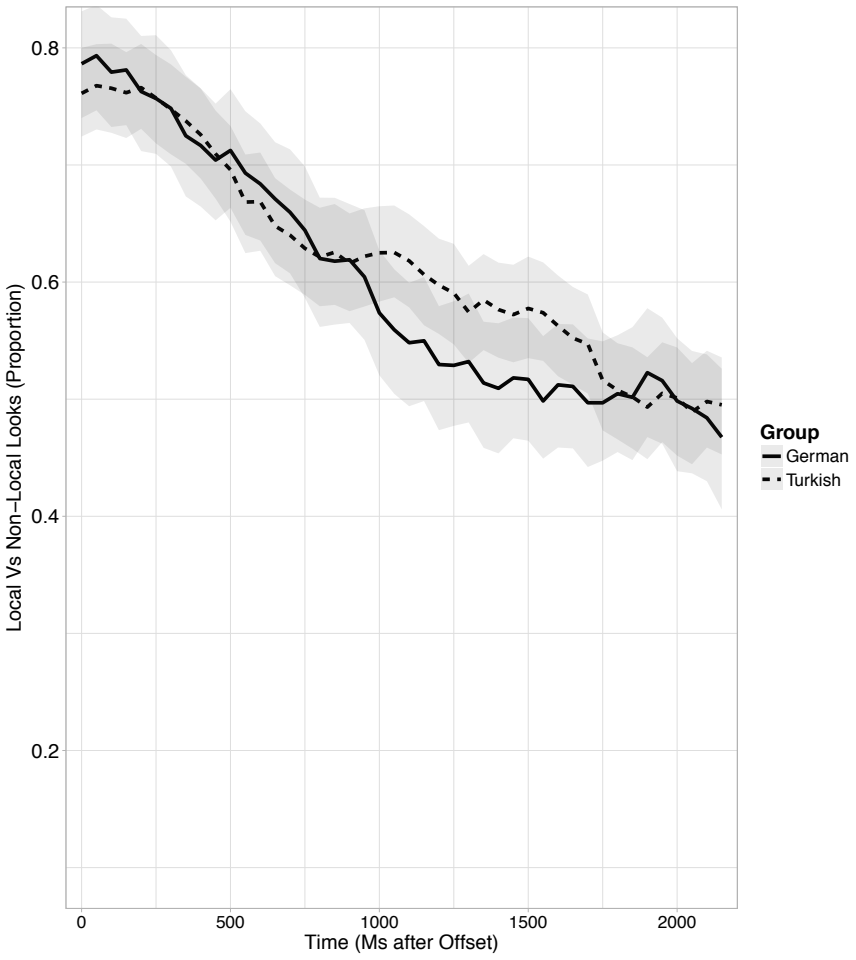

Figure 5.5. Looks to the local vs. the non-local antecedent for the pronoun condition in Exp. 5a, for both groups.

antecedent over the full time window (t=5.66). Furthermore, there was a significant decrease in looks to the local antecedent over the course of the time window (t=-3.39), which also took an inverse quadratic shape (t=-2.70). No group differences reached statistical significance. Splitting up the time window revealed a strong gaze preference for the local antecedent in the first second after hearing the reflexive (t=6.67), and no decline in this preference. In the second time window, the local antecedent again received more looks than the non-local antecedent (t=4.16), and an inverse quadratic effect was observed (t=-3.76). In both time windows, the two groups did not significantly differ from each other.

In the pronoun condition, there was again a significant gaze preference for the local over the non-local antecedent over the full time window (t=2.28). The gaze shift from the local to the non-local antecedent was highly significant for the L1 group (t=-4.68), and took a quadratic shape (t=2.21). Again, no statistical differences between the L1 and the L2 group appeared. The smaller time windows revealed an increase in looks to the non-local antecedent in the first (t=2.44) but not the second time window, indicating that the gaze shift appeared early. As in the reflexive condition, none of the group differences reached statistical significance.

Table 5.4 *Results from the analysis of the eye-movement data over the full time window, reflexive condition of Exp. 5a*

Effect	Estimate (SE)	t-value
Intercept	0.70(0.12)	**5.66**
$\text{Group}_{\text{L2ers}}$	-0.05(0.15)	-0.35
Linear	-1.38(0.41)	**-3.39**
Quadratic	-0.77(0.29)	**-2.70**
Cubic	-0.19(0.19)	-0.97
$\text{Group}_{\text{L2ers}}$ * Linear	-0.17(0.48)	-0.35
$\text{Group}_{\text{L2ers}}$ * Quadratic	0.58(0.36)	1.62
$\text{Group}_{\text{L2ers}}$ * Cubic	0.32(0.24)	1.33

Note. Treatment contrasts, baseline was the L1 Group. Marginal or significant effects are boldfaced.

Table 5.5 *Results from the analysis of the eye-movement data over the full time window, pronoun condition of Exp. 5a*

Effect	Estimate (SE)	t-value
Intercept	0.29(0.13)	**2.28**
$\text{Group}_{\text{L2ers}}$	0.08(0.16)	0.51
Linear	-1.79(0.43)	**-4.63**
Quadratic	0.67(0.30)	**2.21**
$\text{Group}_{\text{L2ers}}$ * Linear	0.15(0.54)	0.27
$\text{Group}_{\text{L2ers}}$ * Quadratic	-0.44(0.38)	-1.14

Note. Treatment contrasts, baseline was the L1 Group. Marginal or significant effects are boldfaced.

Table 5.6 *Results from the analysis of the eye-movement data over the early time window, reflexive condition of Exp. 5a*

Effect	Estimate (SE)	t-value
Intercept	0.87(0.13)	**6.67**
$\text{Group}_{\text{L2ers}}$	-0.01(0.16)	-0.04
Linear	-0.09(0.23)	-0.40
$\text{Group}_{\text{L2ers}}$ * Linear	-0.28(0.30)	-0.93

Note. Treatment contrasts, baseline was the L1 Group. Marginal or significant effects are boldfaced.

Table 5.7 *Results from the analysis of the eye-movement data over the early time window, pronoun condition of Exp. 5a*

Effect	Estimate (SE)	t-value
Intercept	-0.16(-0.15)	-1.06
$\text{Group}_{\text{L2ers}}$	-0.07(0.18)	-0.40
Linear	0.70(0.29)	**2.44**
$\text{Group}_{\text{L2ers}}$ * Linear	-0.54(0.37)	-1.46

Note. Treatment contrasts, baseline was the L1 Group. Marginal or significant effects are boldfaced.

Table 5.8 *Results from the analysis of the eye-movement data over the late time window, reflexive condition of Exp. 5a*

Effect	Estimate (SE)	t-value
Intercept	0.58(0.14)	**4.16**
$\text{Group}_{\text{L2ers}}$	-0.26(0.17)	-1.52
Linear	0.07(0.25)	0.30
Quadratic	-0.53(0.14)	**-3.76**
$\text{Group}_{\text{L2ers}}$ * Linear	0.20(0.32)	0.62
$\text{Group}_{\text{L2ers}}$ * Quadratic	0.25(0.17)	1.49

Note. Treatment contrasts, baseline was the L1 Group. Marginal or significant effects are boldfaced.

Table 5.9 *Results from the analysis of the eye-movement data over the late time window, pronoun condition of Exp. 5a*

Effect	Estimate (SE)	t-value
Intercept	0.02(0.15)	0.11
$\text{Group}_{\text{L2ers}}$	0.12(0.19)	0.66
Linear	-0.15(0.25)	-0.59
$\text{Group}_{\text{L2ers}}$ * Linear	-0.46(0.29)	-1.55

Note. Treatment contrasts, baseline was the L1 Group. Marginal or significant effects are boldfaced.

5.2.2.3 Individual differences

Comprehension questions The distributions of click accuracy across the levels of the three individual differences variables are displayed in Figs. 5.6 to 5.11.

For reflexives, the AoA graph shows a negative correlation between AoA and response accuracy: Participants who had started learning German as adults (18 or above) had a maximum accuracy of 70%, while participants with an AoA below 5 all reached around 90% correct responses. For L2 proficiency, a positive correlation with response accuracy was observed: From 18 to 30 points on the Goethe Score, the response accuracy for reflexive interpretation seems to increase linearly. For L1 proficiency, the graph shows a slight downward trend in accuracy as Turkish proficiency increases.

For pronouns, the same trends can be observed in the graphs. However, as proficiency was overall higher in the pronoun condition, the correlations appear smaller for AoA and L2 proficiency, and non-existent for L1 proficiency.

Results from the statistical analysis of these effects are reported in Tables 5.10 and 5.11. L2 proficiency as measured by the Goethe test was the only significant predictor of response accuracy, both in the pronoun ($p<0.01$) and reflexive condition ($p<0.001$). In both cases, higher-proficiency participants had a higher response accuracy.

Table 5.10 *Results from the analysis of individual differences in the comprehension question data, reflexive condition of Exp. 5a*

Effect	Estimate (SE)	z-value
Intercept	2.51(0.30)	**8.45**
AoA	-0.19(0.29)	-0.64
Goethe	-0.93(0.27)	**3.45**
TELC	-0.23(-0.26)	-0.89

Note. Marginal or significant effects are boldfaced.

Eye movements The effects of GermanAoA, GoetheScore and TELCScore are plotted in Figs. 5.12 to 5.17. Overall, the high- and low-proficiency group visually showed very similar eye-movement patterns. The clearest group difference appeared for the reflexive condition, where participants with a later AoA showed a slight increase in looks to the local antecedent at around 800

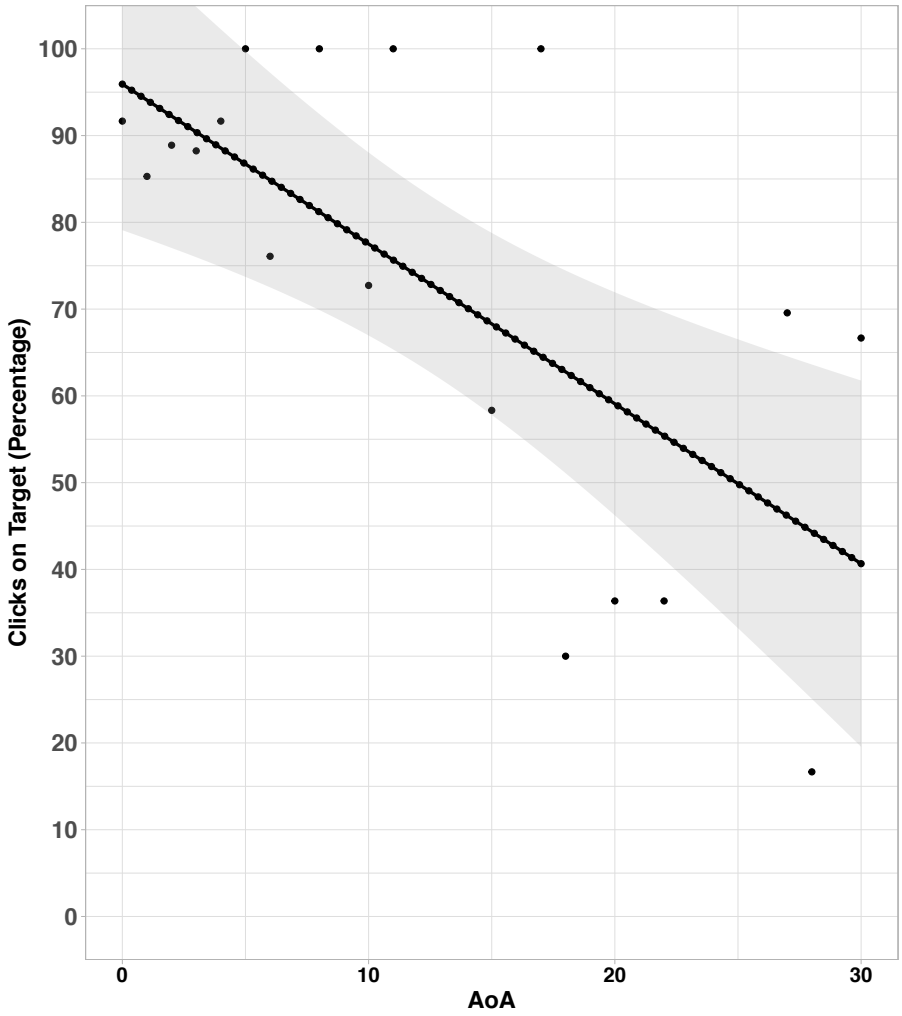

Figure 5.6. Click accuracy in the reflexive condition for the L2 group of Exp. 5a, by German AoA.

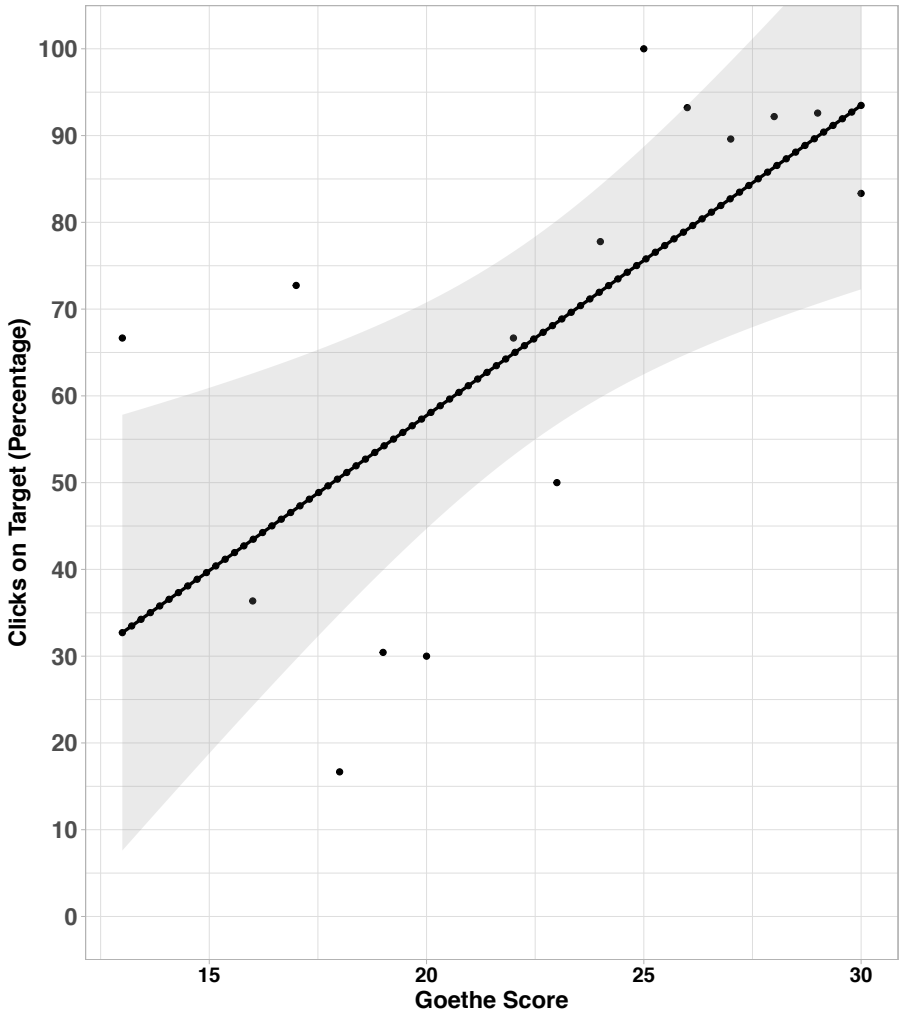

Figure 5.7. Click accuracy in the reflexive condition for the L2 group of Exp. 5a, by Goethe score.

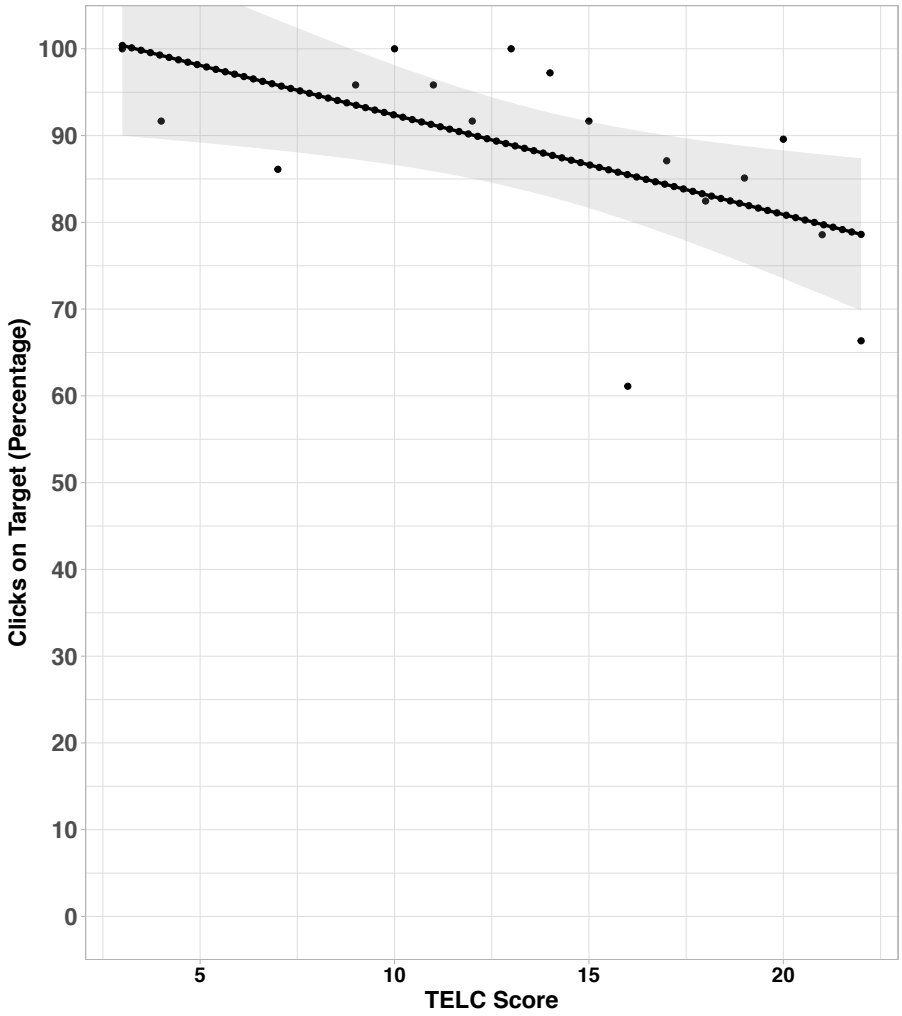

Figure 5.8. Click accuracy in the reflexive condition for the L2 group of Exp. 5a, by TELC score.

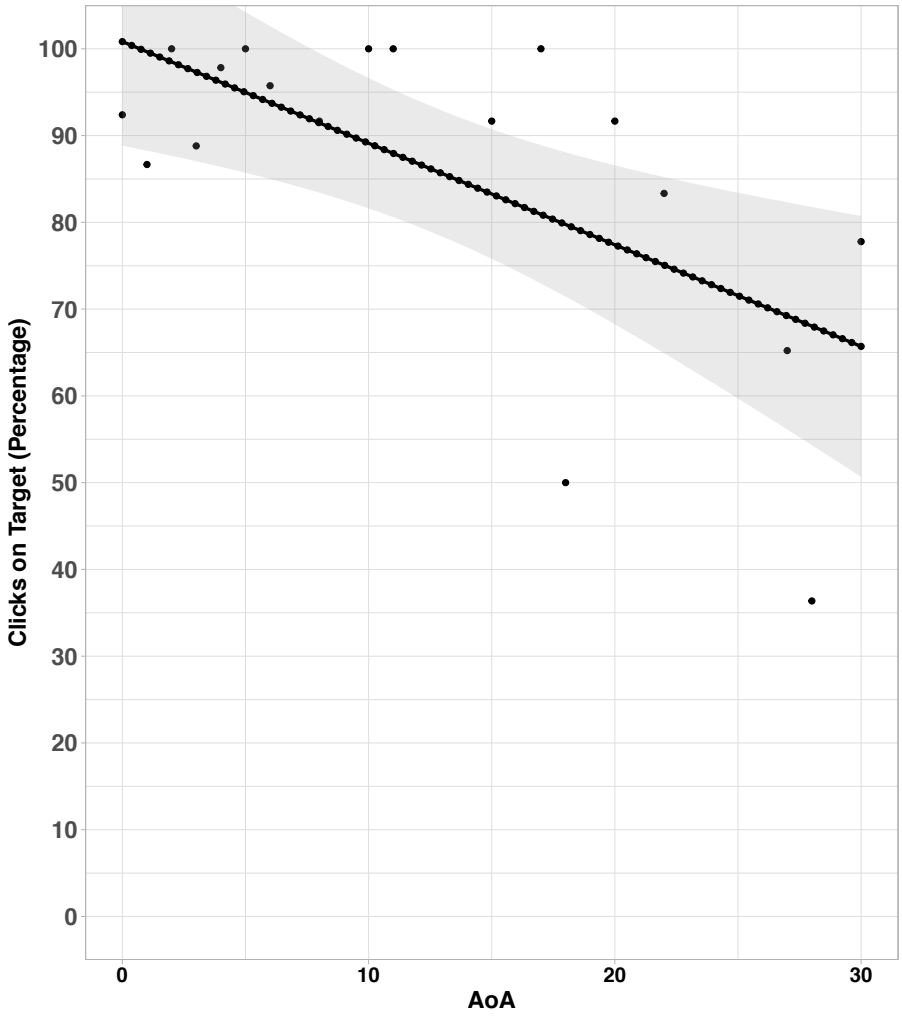

Figure 5.9. Click accuracy in the pronoun condition for the L2 group of Exp. 5a, by German AoA.

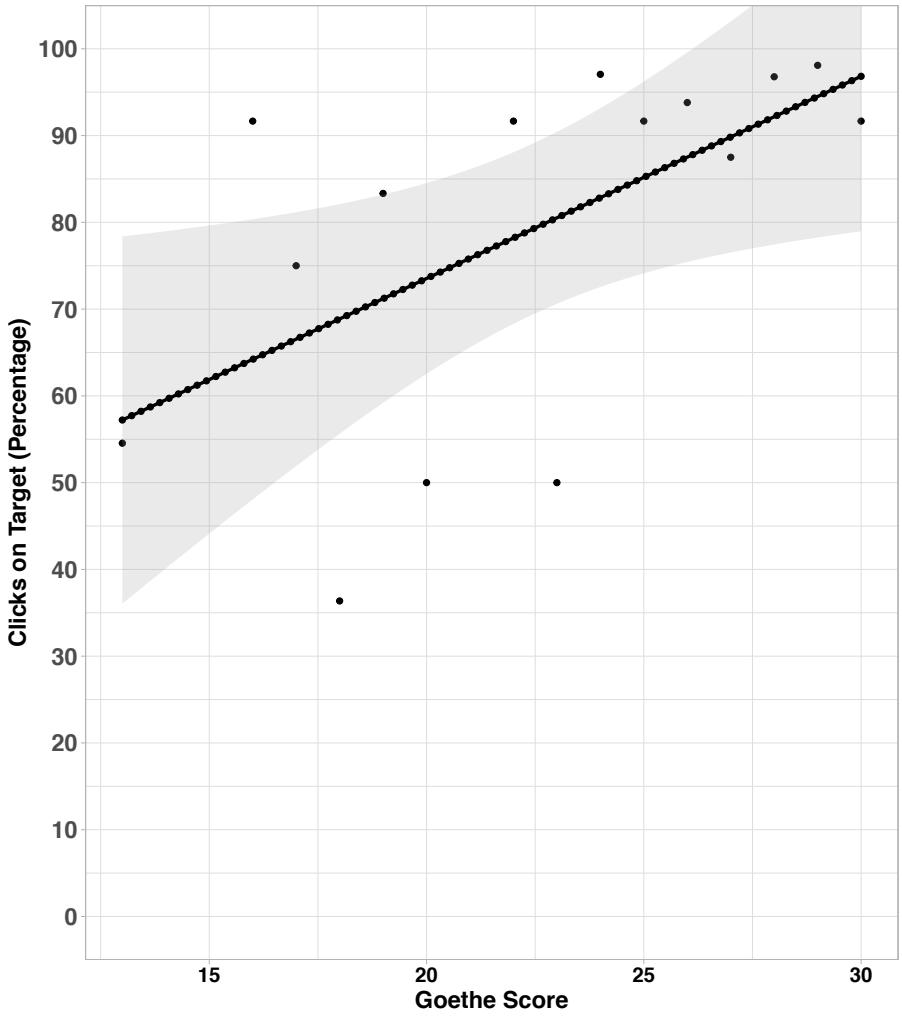

Figure 5.10. Click accuracy in the pronoun condition for the L2 group of Exp. 5a, by Goethe score.

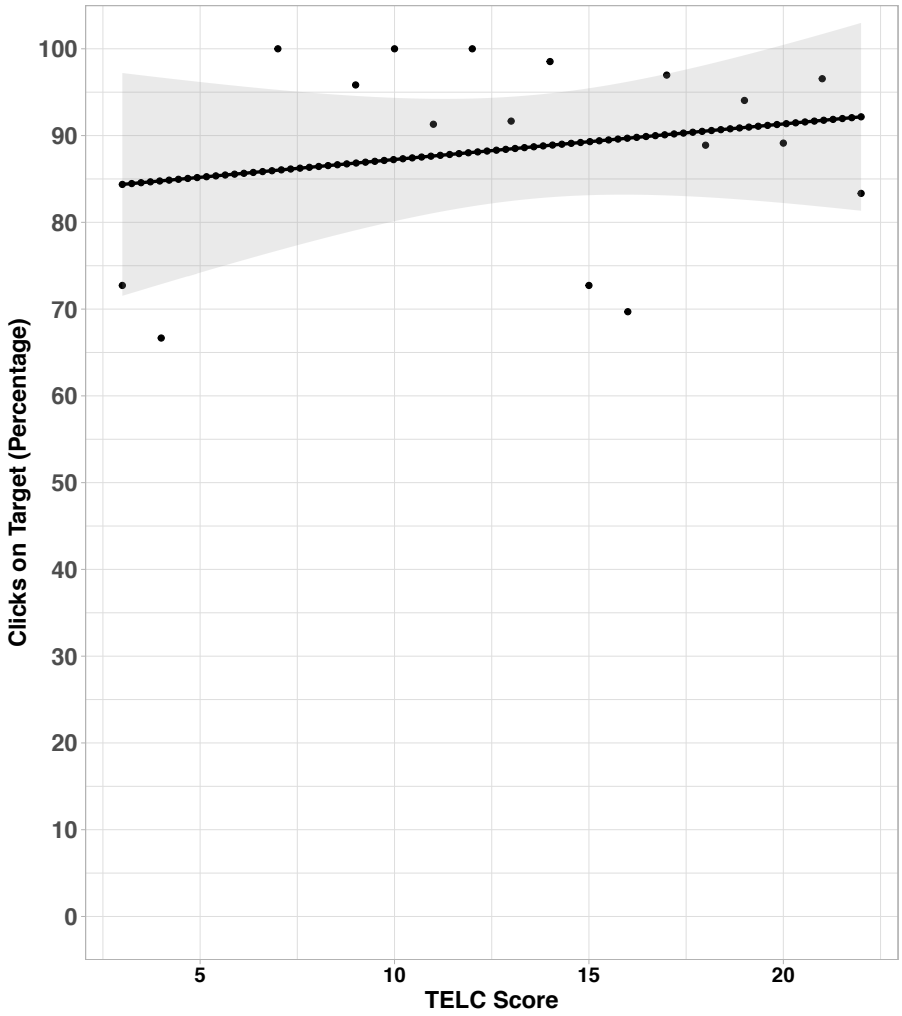

Figure 5.11. Click accuracy in the pronoun condition for the L2 group of Exp. 5a, by TELC score.

Table 5.11 *Results from the analysis of individual differences in the comprehension question data, pronoun condition of Exp. 5a*

Effect	Estimate (SE)	z-value
Intercept	3.74(0.49)	**7.66**
AoA	-0.38(0.34)	-1.11
Goethe	-0.91(0.33)	**2.72**
TELC	0.45(0.29)	0.12

Note. Marginal or significant effects are boldfaced.

ms after hearing the reflexive, and then shifted their gaze towards the non-local antecedent, while the early-AoA group's curve steadily declined in looks to the local antecedent from about 700 ms. Also in the reflexive condition, the low-L2-proficiency group had a slightly higher percentage of looks to the local antecedent than the high-proficiency group.

The results of the inferential analysis can be found in Tables 5.12 to 5.17. Effects of GermanAoA were found for the reflexive condition in the full time window: Participants who had started learning German at a later age shifted their gaze away from the correct local antecedent more strongly (t=1.96), and were more likely to show a cubic shape (t=-3.14). The effect of cubic time is in line with the above description of the two groups' curves, meaning participants with a later AoA were more likely to show two bends in their curve (here, a bend towards an increase in looks to the local antecedent, and a later bend towards a decrease in looks to the local antecedent). No other effects of GermanAoA, GoetheScore, or TELCScore on participants' looks at the antecedent pictures reached significance or marginal significance.

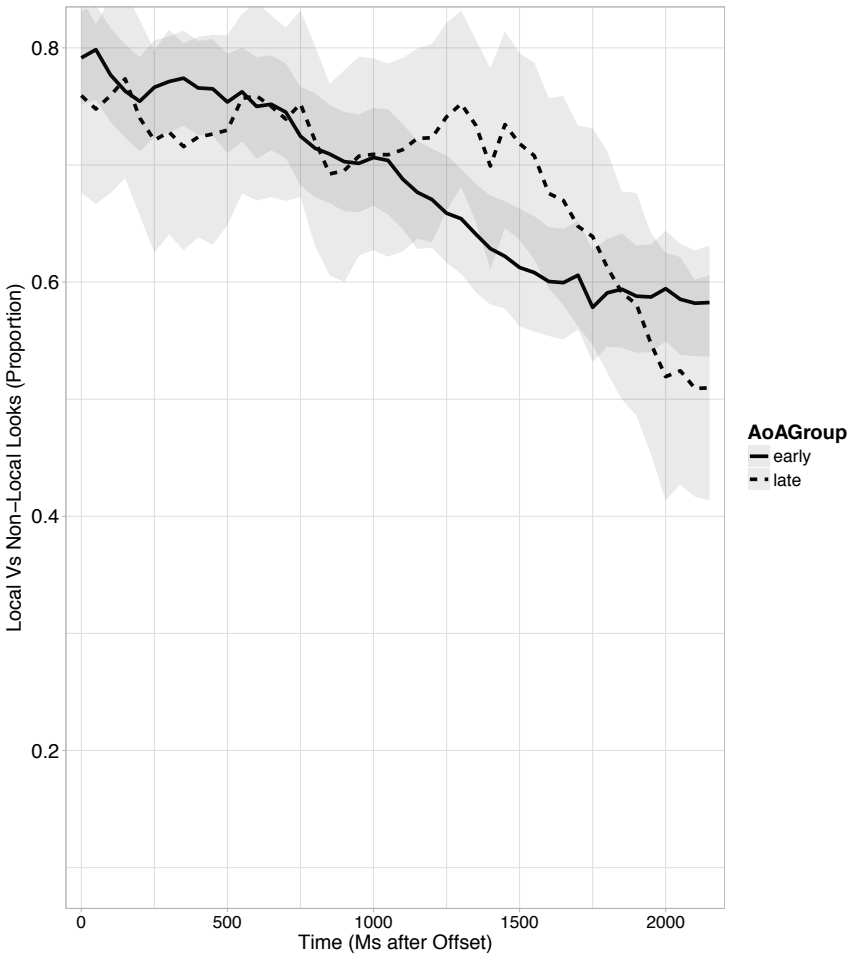

Figure 5.12. Looks to the local vs. the non-local antecedent in the reflexive condition for the L2 group of Exp. 5a, by German AoA.

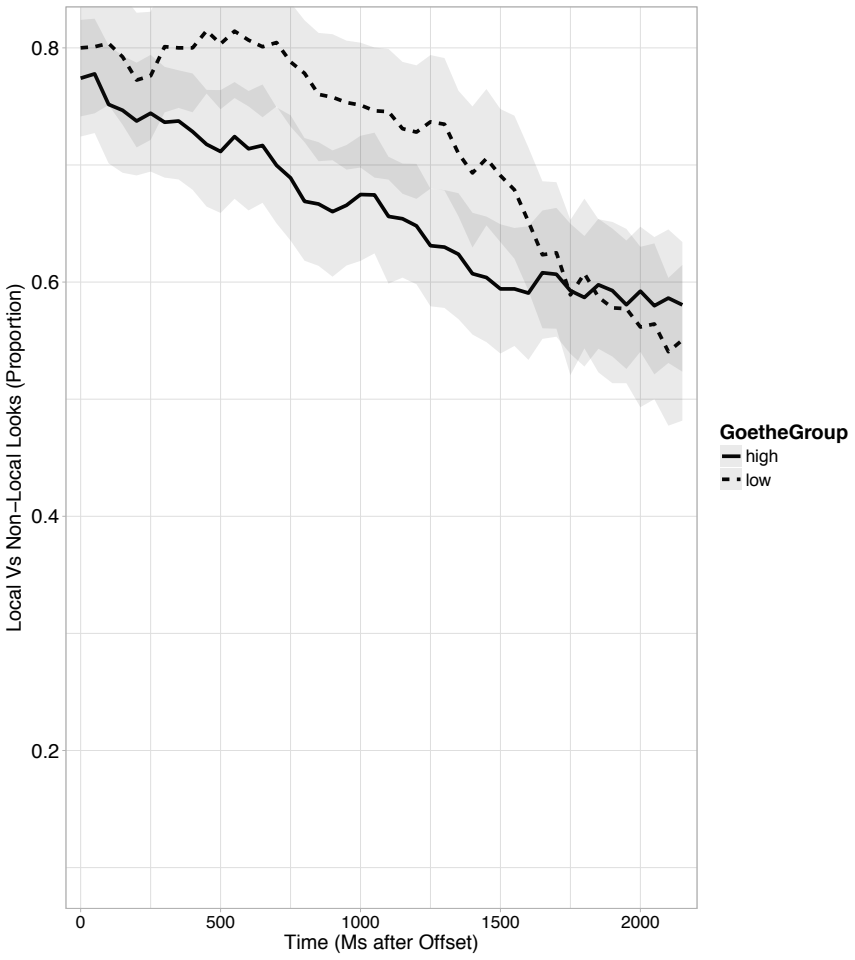

Figure 5.13. Looks to the local vs. the non-local antecedent in the reflexive condition for the L2 group of Exp. 5a, by Goethe score.

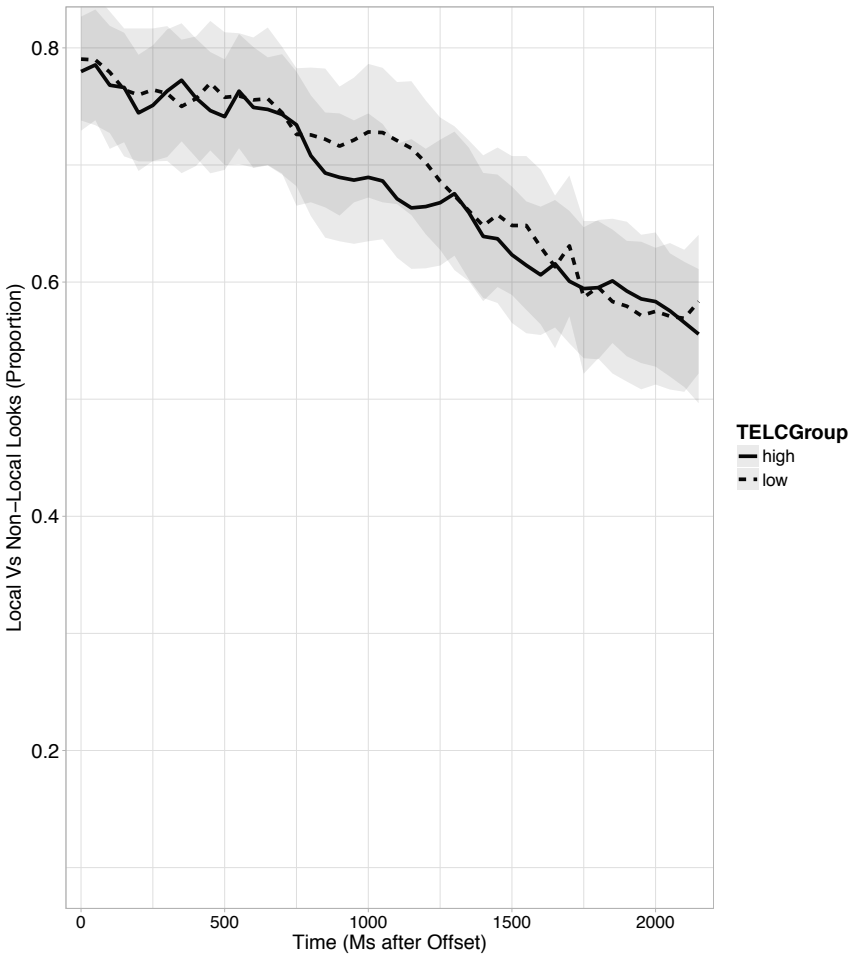

Figure 5.14. Looks to the local vs. the non-local antecedent in the reflexive condition for the L2 group of Exp. 5b, by TELC score.

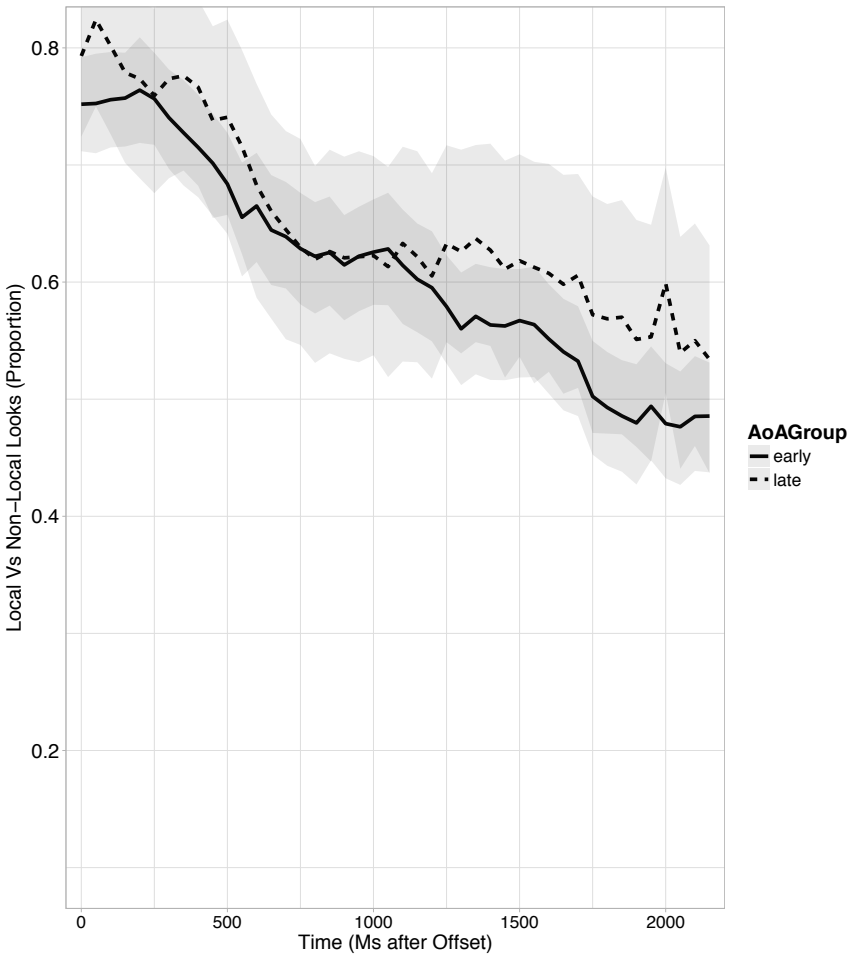

Figure 5.15. Looks to the local vs. the non-local antecedent in the pronoun condition for the L2 group of Exp. 5b, by German AoA.

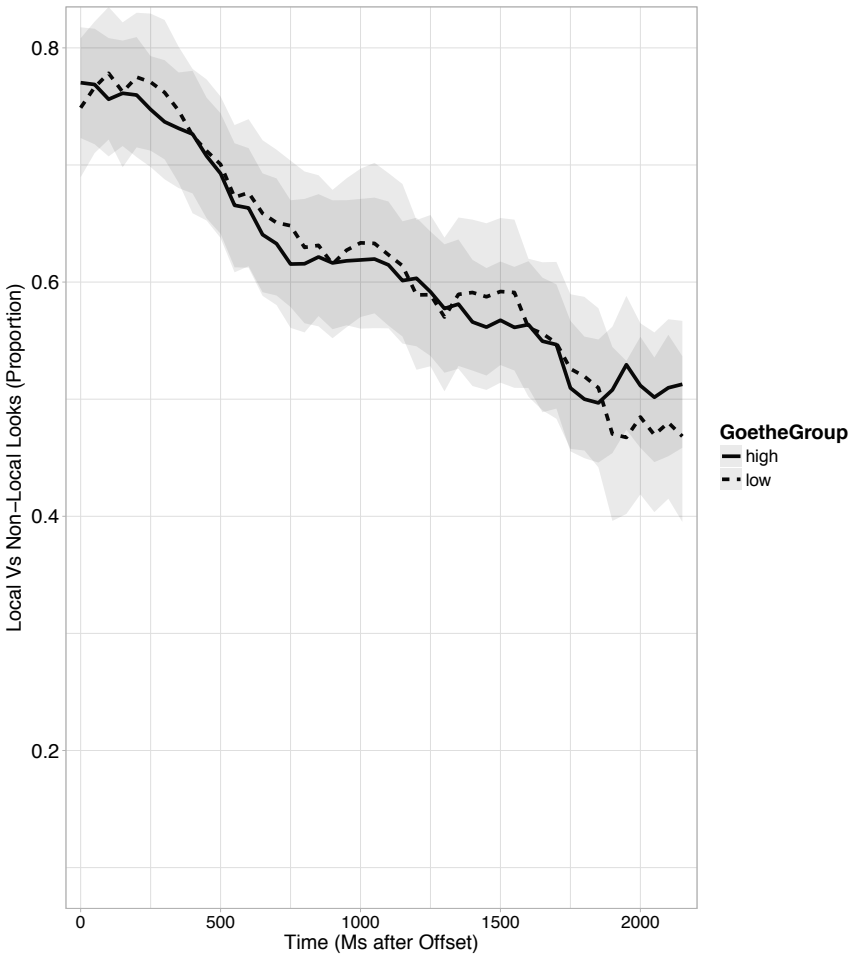

Figure 5.16. Looks to the local vs. the non-local antecedent in the pronoun condition for the L2 group of Exp. 5b, by Goethe score.

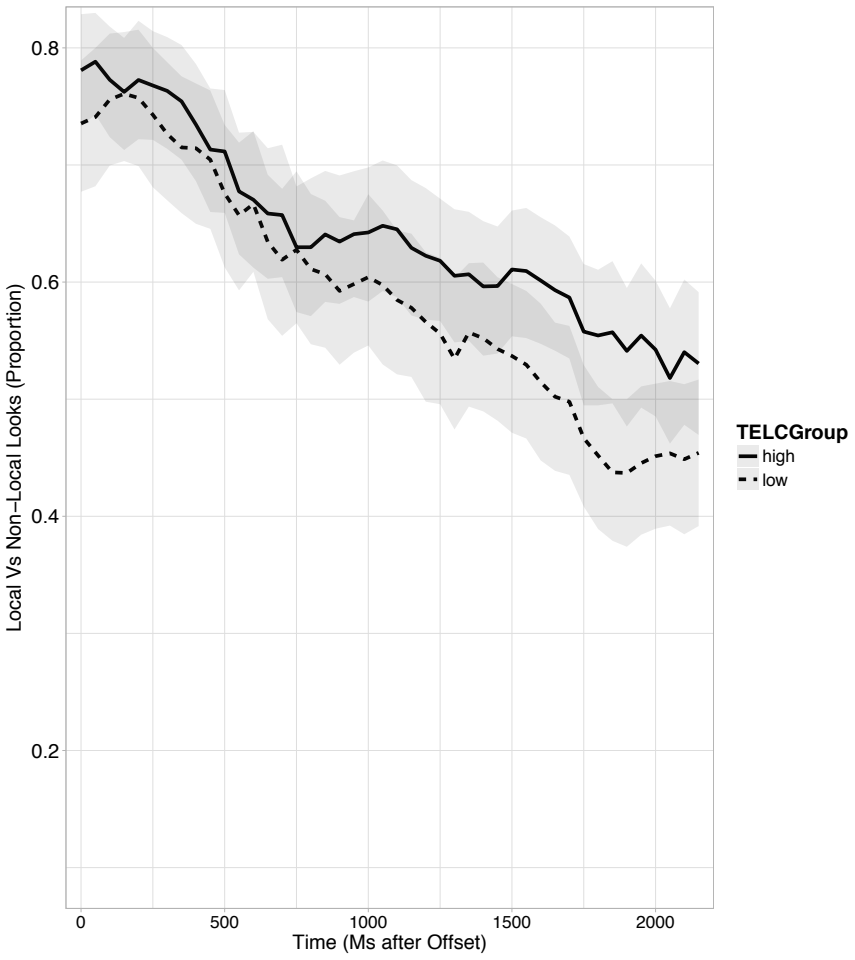

Figure 5.17. Looks to the local vs. the non-local antecedent in the pronoun condition for the L2 group of Exp. 5b, by TELC score.

Table 5.12 *Results from the individual differences analysis of the eye-movement data over the full time window, reflexive condition of Exp. 5a*

Effect	Estimate (SE)	t-value
Intercept	0.65(0.10)	**6.45**
AoA	-0.00(0.02)	-0.02
Goethe	0.00(0.04)	0.03
TELC	-0.01(0.02)	-0.45
Linear	-1.72(0.34)	**-5.01**
Quadratic	-0.22(0.23)	-0.94
Cubic	0.07(0.17)	0.38
AoA * Linear	0.09(0.05)	**1.96**
AoA * Quadratic	-0.04(0.03)	-1.21
AoA * Cubic	-0.07(0.02)	**-3.14**
Goethe * Linear	0.17(0.11)	1.50
Goethe * Quadratic	0.01(0.07)	0.13
Goethe * Cubic	-0.05(0.04)	-1.24
TELC * Linear	-0.09(0.06)	-1.58
TELC * Quadratic	0.06(0.04)	1.55
TELC * Cubic	0.04(0.03)	1.47

Note. Marginal or significant effects are boldfaced.

Table 5.13 *Results from the individual differences analysis of the eye-movement data over the full time window, pronoun condition of Exp. 5a*

Effect	Estimate (SE)	t-value
Intercept	0.44(0.11)	4.19
AoA	0.03(0.02)	1.25
Goethe	0.01(0.04)	0.31
TELC	0.00(0.02)	0.15
Linear	-2.14(0.38)	**-5.64**
Quadratic	0.29(0.24)	1.22
Cubic	-0.11(0.17)	-0.62
AoA * Linear	0.04(0.06)	0.77
AoA * Quadratic	0.02(0.04)	0.41
AoA * Cubic	-0.01(0.03)	-0.56
Goethe * Linear	0.15(0.11)	1.33
Goethe * Quadratic	0.06(0.07)	0.79
Goethe * Cubic	-0.07(0.05)	-1.27
TELC * Linear	0.02(0.09)	0.20
TELC * Quadratic	0.01(0.05)	0.18
TELC * Cubic	-0.03(0.03)	-0.81

Note. Marginal or significant effects are boldfaced.

Table 5.14 *Results from the individual differences analysis of the eye-movement data over the early time window, reflexive condition of Exp. 5a*

Effect	Estimate (SE)	t-value
Intercept	0.84(0.11)	**7.76**
AoA	-0.02(0.04)	0.81
Goethe	-0.03(0.04)	-0.78
TELC	0.00(0.02)	0.00
Linear	0.39(0.22)	**-1.78**
Quadratic	-0.06(0.12)	-0.50
AoA * Linear	0.04(0.05)	0.72
AoA * Quadratic	0.04(0.03)	1.55
Goethe * Linear	0.04(0.08)	0.46
Goethe * Quadratic	0.05(0.05)	1.02
TELC * Linear	-0.07(0.05)	-1.31
TELC * Quadratic	-0.04(0.03)	-1.53

Note. Marginal or significant effects are boldfaced.

Table 5.15 *Results from the individual differences analysis of the eye-movement data over the early time window, pronoun condition of Exp. 5a*

Effect	Estimate (SE)	t-value
Intercept	0.62(0.12)	**5.03**
AoA	0.12(0.21)	0.59
Goethe	-0.01(0.17)	-0.06
TELC	0.03(0.14)	0.19
Linear	-0.92(0.22)	-4.10
Quadratic	0.23(0.11)	**2.09**
AoA * Linear	-0.06(0.45)	-0.13
Goethe * Linear	0.25(0.34)	0.75
TELC * Linear	0.14(0.27)	0.53
TELC * Quadratic	0.12(0.12)	1.02

Note. Marginal or significant effects are boldfaced.

Table 5.16 *Results from the individual differences analysis of the eye-movement data over the late time window, reflexive condition of Exp. 5a*

Effect	Estimate (SE)	t-value
Intercept	0.40(0.12)	**3.42**
AoA	0.15(0.18)	0.86
Goethe	0.11(0.14)	0.77
TELC	-0.14(0.13)	-1.03
Linear	-0.68(0.21)	**-3.33**
Quadratic	0.07(0.13)	0.57
AoA * Linear	-0.41(0.32)	-1.29
AoA * Quadratic	-0.20(0.15)	-1.33
Goethe * Linear	0.03(0.27)	0.11
TELC * Linear	-0.20(0.15)	-1.33

Note. Marginal or significant effects are boldfaced.

Table 5.17 *Results from the individual differences analysis of the eye-movement data over the late time window, pronoun condition of Exp. 5a*

Effect	Estimate (SE)	t-value
Intercept	0.16(0.12)	1.37
AoA	0.30(0.19)	1.58
Goethe	0.14(0.15)	0.92
TELC	0.01(0.14)	0.06
Linear	-0.43(0.19)	**-2.27**
AoA * Linear	0.32(0.33)	0.98
Goethe * Linear	0.03(0.17)	0.10
TELC * Linear	0.01(0.23)	0.05

Note. Marginal or significant effects are boldfaced.

5.2.3 Discussion

5.2.3.1 Comprehension questions

As predicted, German L1ers showed very high response accuracies for both reflexives and pronouns. L2ers were less accurate than L1ers in choosing the correct antecedent for the reflexive, but native-like for the pronoun.

Recall that Exp. 1 only tested reflexives, and found that Turkish-speaking L2ers were significantly more likely to choose a non-local antecedent for *sich* than German L1ers. The present experiment tested both reflexives and pronouns, and found the same differences as in Exp. 1 in the reflexive condition, but a native-like preference for the non-local antecedent in L2ers in the pronoun condition. This pattern is in line with the prediction based on the SSH (Clahsen & Felser, 2006, 2017) and the memory interference hypothesis (Cunnings, 2016, 2017): L2ers were expected to show a stronger preference for the discourse-prominent non-local antecedent compared to L1ers, due to relying more strongly on discourse cues in anaphor resolution.

To determine whether a non-native-like preference for a discourse-prominent antecedent in L2ers can also be found for object pronouns in Condition B environments, Exp. 6a tests the same participants with modified materials: The order and syntactic position of the two antecedents is reversed, such that the first-mentioned and matrix subject antecedent will be the accessible antecedent for the reflexive, but not the pronoun.

It is also possible that the Turkish-speaking group's responses were influenced by their native language: They sometimes incorrectly chose a long-distance antecedent for reflexives, and Exp. 3 of this thesis found that Turkish L1ers frequently chose a long-distance antecedent for reflexives in similar constructions. To determine whether the L2 group's L1 played a role, Exp. 5b compares Turkish-speaking L2ers of German with a proficiency-matched group of Russian-speaking L2ers.

5.2.3.2 Eye movements

For reflexives, L1ers' looks to the local antecedent did not decrease in the first time window after hearing *sich*. In the second time window, participants showed consideration of the non-local antecedent, as illustrated by a significant decrease in the local vs. non-local gaze preference. No effects of or interactions with Group were found. For pronouns, there was a strong shift in gaze towards the

non-local antecedent in the early time window, after which the gaze preference did not change. The L2 group again did not differ from the L1 group.

The L1ers' eye movements overall indicate adherence to Conditions A and B. However, looks to the accessible antecedent increased only in the pronoun condition, while in the reflexive condition, a slight shift towards the inaccessible antecedent is observed around 1500 ms after hearing the reflexive. The lack of the predicted increase in looks to the accessible local antecedent can be explained by the fact that participants were already looking at the local antecedent at a high proportion upon hearing the reflexive. The late shift towards the inaccessible antecedent for the reflexive resembles Sturt's (2003) result that adult L1ers considered a logophoric binder (an antecedent whose feelings or thoughts are described in the discourse) at a late stage of processing. However, as described in Ch. 3, later studies of reflexive processing found no such interference, or interference at earlier stages of processing. Furthermore, the inaccessible antecedent in the present experiment was not a very strong antecedent for logophoric reference, and the gaze shift towards the inaccessible antecedent was relatively small and appeared quite late.

A more general explanation of the effect for reflexives could be that Conditions A and B do not fully rule out inaccessible antecedents in L1 online processing, at least not at later stages of processing. If this is the case, L1 data on pronoun processing should also show consideration of a discourse-prominent inaccessible antecedent. Exp. 6a tests this hypothesis by reversing the discourse prominence of accessible and inaccessible antecedents for pronouns and reflexives compared to the present experiment. Evidence for the consideration of syntactically illicit but prominent antecedents during processing would support cue-based retrieval models of sentence processing (e.g. R. L. Lewis & Vasishth, 2005; Van Dyke & McElree, 2011).

Turning to the L2ers, the lack of any L1-L2 differences in the eye-movement data is surprising given the significant differences for reflexives in the comprehension question data. The L2ers' eye-movement results do not support the hypothesis that L2ers rely on non-syntactic information more strongly than L1ers (Clahsen & Felser, 2006, 2017; Cunnings, 2016, 2017). However, one should be cautious not to overinterpret null results. It is possible that the experimental setup was not sensitive enough to measure differences between groups, as participants were already directing 75% of their looks at the correct antecedent. Thus, there was not much potential for an increase in looks to the local antecedent.

Another potential explanation for the lack of L1-L2 differences in eye movements is the high average L2 proficiency (86% correct, CEFR level 'advanced'), despite

the L2 group covering a broad range of L2 proficiency and AoA. This explanation will be considered in the discussion on individual differences below.

5.2.3.3 Individual differences

In the comprehension questions, L2 proficiency was the only significant predictor of response accuracy. As predicted, lower-proficiency L2ers were significantly more likely than higher-proficiency L2ers to choose the inaccessible non-local antecedent in the reflexive condition, and were also more likely than higher-proficiency L2ers to choose the inaccessible local antecedent in the pronoun condition. Neither German AoA nor Turkish proficiency had a significant effect on participants' response accuracy.

For German AoA, there were visible correlations in the graphs for both conditions. The absence of significant effects of this predictor can be explained by the correlation between German proficiency and AoA, which was above 0.60 for both conditions. Turkish proficiency had only a very small correlation with German proficiency. Including all three predictors in one model made it possible to test their respective predictive values while also accounting for potential correlation between variables. The results revealed that L2 proficiency is a better predictor of L2 anaphor interpretation than L1 proficiency or L2 AoA, which is in line with previous descriptions of the high importance of proficiency in L2 sentence comprehension (e.g. Herschensohn, 2009).

In the eye movements, only German AoA was a significant predictor of participants' behavior, and only in the reflexive condition: Later-AoA L2ers showed a stronger, but also later shift towards the non-local antecedent than earlier-AoA participants. No effects of the other two predictor variables were found in either condition. This result stands in contrast with the claim that L2 proficiency is a more important predictor of online anaphor resolution than AoA, and does not align with the comprehension question results.

The stronger shift towards the incorrect non-local antecedent in participants with a later AoA is line with the numerical pattern in the comprehension questions, where the non-local antecedent was chosen more often by later-AoA L2ers than earlier-AoA L2ers. The later shift towards the non-local antecedent in later-AoA participants could be interpreted as a slower reaction time, considering that both L1ers in Exp. 5a and earlier-AoA participants shifted their gaze towards the non-local antecedent earlier, despite it being inaccessible. However, no general delay was observed for late-AoA L2ers, as in the pronoun condition they shifted their gaze to the non-local antecedent as quickly as the early-AoA

participants. An interpretation of the AoA effects will be provided in the General Discussion after reviewing the results of Exp. 6a.

In the between-group analysis discussed above, it was assumed that the relatively high average proficiency in L2ers may have caused their native-like pattern. The present results do not support this explanation, as no significant effects of proficiency on eye movements were observed. Instead, AoA influenced participants' eye movements such that later-AoA L2ers were less native-like than earlier-AoA L2ers. As described in section 5.2.1.1, the Turkish-speaking group consisted mainly of simultaneous and early bilinguals (40 of 56 participants). Thus, the lack of L1-L2 differences in eye movements may be due to L2ers' early AoA rather than their high proficiency.

5.3 Experiment 5b: The role of L1 background in L2 processing of German pronouns and reflexives

Exp. 5b sought to investigate the role of L1 background in the online processing and interpretation of Conditions A and B. In Exps. 1 and 5a, Turkish-speaking L2ers of German showed a stronger preference for a non-local antecedent for a reflexive in their interpretations, compared to German L1ers. As Turkish allows for long-distance binding of reflexives, it is not clear whether these effects represent an influence from Turkish, or rather a more general effect of L2 language processing, such as a stronger preference for discourse-prominent antecedents.

Russian does not have a long-distance binding option for reflexives, as Russian reflexives align with Condition A (Bailyn, 2012). If Russian-speaking L2ers of German differ from Turkish-speaking L2ers of German in the processing of reflexives, this supports the hypothesis that L1 background influences L2 anaphor processing. To keep the present experiment parallel to Exp. 5a, the pronoun condition was included as well.

5.3.1 Method

5.3.1.1 Participants

32 L1ers of Russian (27 female, 5 male, see Table 5.18) were recruited from the PRIM database. The age of acquisition for German ranged between 6 and

Table 5.18 *Participant information for the Russian-speaking L2 group in Exps. 5b and 6b*

Variable	mean	range	sd
Age	25.59	19-36	3.46
German proficiency (%)	86.98	66.67-100.00	7.73
German AoA	12.78	6-25	5.86
Length of exposure to German (years)	12.81	5.00-25.00	5.82

25. The level of German proficiency was tested using the Goethe test, with the average score being 26.09 (86.98%). Hence, the Russian speakers had an average CEFR level of C1, with individual scores ranging from B2 to C2.

Table 5.19 *Participant information for the Turkish-speaking L2 group in Exps. 5b and 6b.*

Variable	mean	range	sd
Age	24.62	19-38	4.84
German proficiency (%)	88.96	73.33-100.00	6.07
Turkish proficiency (%)	66.05	13.64-100.00	22.71
German AoA	2.00	0-6	1.68
Length of exposure to German (years)	22.62	16.00-18.00	5.05

For the Turkish-speaking group (see Table 5.19), a subset of the Turkish-speaking participants in Exp. 5a (see section 5.2.1.1) was created. This subset consisted of 32 L1ers of Turkish (23 female, 9 male). The group was matched in overall proficiency with the Russian-speaking L2 group, with the average score corresponding to the C1 level, and individual scores ranging from C1 to C2. However, the Turkish-speaking group consisted only of early bilinguals.[19] Thus, the average AoA of German for Turkish-speaking participants was 2.00.

As in Exp. 5a, all participants had normal or corrected-to-normal vision and normal hearing and received either 8€ or class credit for participation.

[19]There were not enough high-proficiency late bilinguals in the Turkish-speaking group from Exp. 5a to create a subgroup that was matched to the Russian-speaking L2ers both in German proficiency and German AoA. Therefore, I opted to include only early bilinguals in the Turkish-speaking group for this experiment, so that both groups were homogeneous regarding German AoA.

5.3.1.2 Design and Materials

The design and materials were identical to Exp. 5a (see section 5.2.1.2).

5.3.1.3 Procedure

The procedure was identical to Exp. 5a (see section 5.2.1.3).

5.3.1.4 Analysis

The data cleaning procedure was identical to Exp. 5a (see section 5.2.1.4).

Comprehension questions Overall, 3.41% of data was removed due to data cleaning (3.08% for clicks on other parts of the screen, and 0.33% for clicks that appeared too early or too late). Model building and selection was also carried out as in Exp. 5a, but with the fixed effect predictor Group having the two levels Turkish and Russian, with Turkish as the baseline.

Eye movements Data cleaning lead to the removal of 24 trials (1.58%). The analysis was identical to Exp. 5a, except for the fixed effect predictor Group, which had the two levels Turkish and Russian, with Turkish as the baseline.

5.3.1.5 Predictions

If L1-L2 differences in the online application of Conditions A and B are due to L2ers' L1 background, I predict:

1. In comprehension questions,
    - Turkish-speaking L2ers of German should show a stronger preference for the non-local antecedent in the reflexive condition than Russian-speaking L2ers.
    - no group difference should appear for the pronoun condition, as the Turkish-speaking participants performed native-like in Exp. 5a.
2. In eye movements,
    - no group difference should appear in either condition, as the Turkish-speaking participants performed native-like in Exp. 5a.

5.3.2 Results

5.3.2.1 Comprehension questions

The click accuracy data is displayed in Fig. 5.18. Both groups showed slightly higher accuracies in the pronoun condition (Turkish-speaking: 92.01%, Russian-speaking: 88.77%) compared to the reflexive condition (Turkish-speaking: 89.10%, Russian-speaking: 82.93%). The Turkish-speaking group had higher accuracies in both conditions.

Results from the inferential analysis of these effects are reported in Tables 5.20 and 5.21. Response accuracies were significantly above chance level in the Turkish-speaking group for both the reflexive and the pronoun ($p<0.001$), and no group differences were found in either of the two conditions ($p>0.1$).

Table 5.20 *Results from the analysis of the comprehension question data, reflexive condition of Exp. 5b*

Effect	Estimate (SE)	z-value
Intercept	2.92(0.40)	**7.29**
$\text{Group}_{\text{Russian}}$	-0.65(0.47)	-1.40

Note. Treatment contrasts, baseline was the Turkish-speaking group. Marginal or significant effects are boldfaced.

Table 5.21 *Results from the analysis of the comprehension question data, pronoun condition of Exp. 5b*

Effect	Estimate (SE)	z-value
Intercept	3.58(0.48)	**7.50**
$\text{Group}_{\text{Russian}}$	-0.64(0.47)	-1.38

Note. Treatment contrasts, baseline was the Turkish-speaking group. Marginal or significant effects are boldfaced.

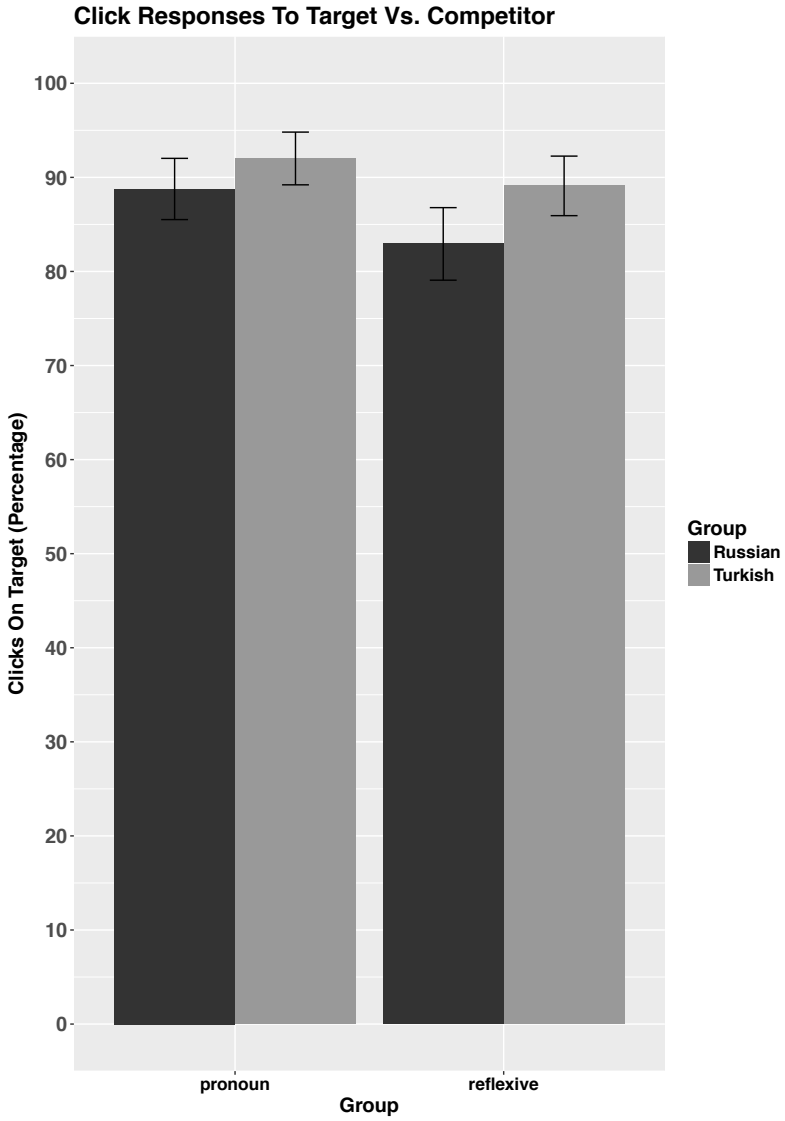

Figure 5.18. Click accuracy in Exp. 5b, by Group and Condition.

5.3.2.2 Eye movements

The eye-movement data are plotted in Figs. 5.19 and 5.20. In both conditions, the shift towards the non-local antecedent seems to appear slightly later in the Russian speakers compared to the Turkish-speaking group. While the gaze preference for the local antecedent decreases linearly in the Turkish-speaking group (from 1000 ms onwards in the reflexive condition, and from 200 ms onwards in the pronoun condition), the Russian-speaking group's curve shows an inverse quadratic shape. While the confidence bands overlap for the entire time window in the reflexive condition, there are periods of no overlap in the pronoun condition.

The results of the inferential analysis can be found in Tables 5.22 to 5.27. For the analysis of the full time window, a group difference was observed in the pronoun condition: The Russian-speaking group showed a marginally more inverse quadratic shape than the Turkish-speaking group (t=-1.81). Thus, their gaze started shifting towards the non-local antecedent later than in the Turkish-speaking group. In the early time window, Russian speakers also showed a weaker shift towards the non-local antecedent (t=1.81), and in the late time window, they had a higher proportion of looks to the local antecedent than the Turkish speakers (t=-2.08). In the reflexive condition, no group differences were observed.

Table 5.22 *Results from the analysis of the eye-movement data over the full time window, reflexive condition of Exp. 5b*

Effect	Estimate (SE)	t-value
Intercept	0.61(0.12)	**4.95**
$\text{Group}_{\text{Russian}}$	0.18(0.17)	1.07
Linear	-1.77(0.44)	**-4.04**
Quadratic	-0.12(0.28)	-0.42
Cubic	0.22(0.19)	1.12
$\text{Group}_{\text{Russian}}$ * Linear	0.55(0.62)	0.90
$\text{Group}_{\text{Russian}}$ * Quadratic	-0.46(0.40)	-1.16
$\text{Group}_{\text{Russian}}$ * Cubic	-0.29(0.24)	-1.21

Note. Treatment contrasts, baseline was the Turkish-speaking group. Marginal or significant effects are boldfaced.

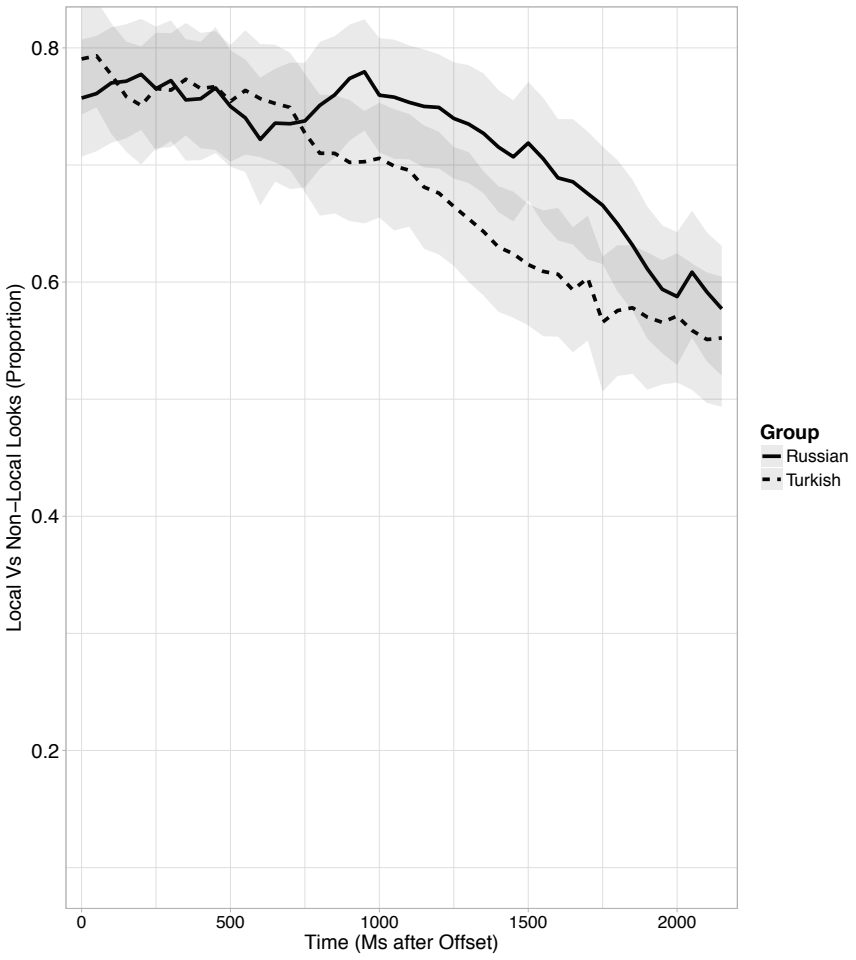

Figure 5.19. Looks to the local vs. the non-local antecedent in the reflexive condition of Exp. 5b, by Group.

Figure 5.20. Looks to the local vs. the non-local antecedent in the pronoun condition of Exp. 5b, by Group.

Table 5.23 *Results from the analysis of the eye-movement data over the full time window, pronoun condition of Exp. 5b*

Effect	Estimate (SE)	t-value
Intercept	0.23(0.13)	**1.79**
$\text{Group}_{\text{Russian}}$	0.31(0.18)	**1.77**
Linear	-2.37(0.45)	**-5.27**
Quadratic	0.40(0.32)	1.24
Cubic	0.01(0.22)	0.03
$\text{Group}_{\text{Russian}}$ * Linear	0.80(0.57)	1.41
$\text{Group}_{\text{Russian}}$ * Quadratic	-0.80(0.44)	**-1.81**
$\text{Group}_{\text{Russian}}$ * Cubic	-0.00(0.29)	0.00

Note. Treatment contrasts, baseline was the Turkish-speaking group. Marginal or significant effects are boldfaced.

Table 5.24 *Results from the analysis of the eye-movement data over the early time window, reflexive condition of Exp. 5b*

Effect	Estimate (SE)	t-value
Intercept	0.87(0.13)	**6.43**
$\text{Group}_{\text{Russian}}$	0.09(0.19)	0.47
Linear	-0.44(0.27)	-1.65
$\text{Group}_{\text{Russian}}$ * Linear	0.47(0.38)	1.23

Note. Treatment contrasts, baseline was the Turkish-speaking group. Marginal or significant effects are boldfaced.

Table 5.25 *Results from the analysis of the eye-movement data over the early time window, pronoun condition of Exp. 5b*

Effect	Estimate (SE)	t-value
Intercept	0.56(0.14)	**4.13**
$\text{Group}_{\text{Russian}}$	0.20(0.19)	1.04
Linear	-1.05(0.33)	**-3.15**
Quadratic	0.17(0.13)	1.27
$\text{Group}_{\text{Russian}}$ * Linear	0.74(0.41)	**-1.81**
$\text{Group}_{\text{Russian}}$ * Quadratic	-0.26(0.19)	-1.37

Note. Treatment contrasts, baseline was the Turkish-speaking group. Marginal or significant effects are boldfaced.

Table 5.26 *Results from the analysis of the eye-movement data over the late time window, reflexive condition of Exp. 5b*

Effect	Estimate (SE)	t-value
Intercept	0.35(0.14)	**2.49**
$\text{Group}_{\text{Russian}}$	0.27(0.19)	1.43
Linear	-0.60(0.26)	**-2.27**
$\text{Group}_{\text{Russian}}$ * Linear	-0.27(0.39)	-0.70

Note. Treatment contrasts, baseline was the Turkish-speaking group. Marginal or significant effects are boldfaced.

Table 5.27 *Results from the analysis of the eye-movement data over the late time window, pronoun condition of Exp. 5b*

Effect	Estimate (SE)	t-value
Intercept	-0.10(0.15)	-0.66
$\text{Group}_{\text{Russian}}$	0.43(0.21)	**2.09**
Linear	-0.54(0.26)	**-2.08**
$\text{Group}_{\text{Russian}}$ * Linear	-0.32(0.34)	-0.95

Note. Treatment contrasts, baseline was the Turkish-speaking group. Marginal or significant effects are boldfaced.

5.3.3 Discussion

5.3.3.1 Comprehension questions

To summarize, no difference in response accuracies in the comprehension questions was found for proficiency-matched Russian-speaking and Turkish-speaking L2ers of German. Thus, no evidence for an L1 background effect was found in the comprehension questions. This also means that no evidence was found for the hypothesis that the L1-L2 difference observed for reflexives in Exp. 5a and Exp. 1 was due to an influence from Turkish.

The alternative hypothesis is therefore more attractive, namely a stronger preference for the discourse-prominent non-local antecedent in L2ers compared to L1ers due to a stronger influence of non-syntactic information in L2 compared to L1 anaphor resolution, irrespective of L2ers' L1 (Clahsen & Felser, 2006, 2017; Cunnings, 2016, 2017). This hypothesis will be tested further in Exp. 6.

5.3.3.2 Eye movements

In the eye-movement data, significant group differences were observed only for the pronoun: Russian-speaking L2ers showed a later shift towards the non-local antecedent, indicated by a weaker increase in looks to the non-local antecedent in the first time window, which resulted in a higher proportion of looks to the local antecedent in the second time window, compared to Turkish-speaking L2ers.

As mentioned above, Turkish-speaking L2ers' eye movements were native-like in Exp. 5a. Therefore, the L1 influence hypothesis did not predict the observed differences between Russian and Turkish speakers. As previously described, Russian and German align in their binding properties for anaphors (i.e., a reflexive must refer to the local antecedent for these materials, and a pronoun cannot). Turkish, on the other hand, has less clear constraints: *kendisi*, a phrasal anaphor which has many properties of pronouns, can take local antecedents in sentences like the ones used in this experiment. Furthermore, long-distance binding of reflexives is possible in Turkish.

If an L1 influence occurred despite the absence of L1-L2 differences in Exp. 5a, Russian speakers should show a more native-like pattern of processing than Turkish speakers, i.e. they should have a stronger gaze preference for the local antecedent for the reflexive and a stronger gaze preference for the non-local

antecedent for the pronoun. However, the observed effects had the opposite direction. Thus, in this case, L1 influence is an unlikely explanation.

Another potential cause of differences between Russian L1ers and Turkish L1ers is the group difference in German AoA, as the Russian-speaking group consisted only of late bilinguals, while the Turkish-speaking group consisted only of early bilinguals. Exp. 5a also tested for AoA effects, and found that later-AoA L2ers shifted their gaze toward the non-local antecedent slightly later than earlier-AoA L2ers in the reflexive condition. In the pronoun condition, later-AoA participants were numerically more likely than earlier-AoA participants to look at the local antecedent in the second time window. While the effect in the pronoun condition of Exp. 5a did not reach significance, the overall pattern regarding the lateAoA-earlyAoA-comparison in Exp. 5a resembles the results of the Russian-Turkish comparison in the present experiment.

Based on the present pattern of results, the explanation that group differences were due to AoA effects is more compelling. Exps. 6a and 6b will provide further evidence regarding this question, as they test the same participant groups with slightly altered materials.

5.4 Experiment 6a: The role of antecedent prominence in L1 and L2 processing of German reflexives and pronouns

Exp. 6a served to answer an open question from two previous experiments: In the comprehension questions of Exp. 5a and the questionnaire data of Exp. 1, L2ers of German showed a stronger preference for a non-local antecedent for the reflexive compared to L1ers. This was interpreted as a stronger preference for a discourse-prominent antecedent in L2ers, as predicted by the SSH (Clahsen & Felser, 2006, 2017) and the memory interference hypothesis (Cunnings, 2016, 2017).

Based on this interpretation, the question was raised of whether a similar effect can be observed for pronouns as well. With the materials in Exp. 5a, this question could not be addressed, as the most discourse-prominent antecedent was also the correct antecedent for the pronoun, and thus highly preferred by the L1 group. The L2 group showed the same strong preference for the discourse-prominent accessible antecedent as the L1ers.

In the present experiment, the order and relative discourse prominence of acces-

sible and inaccessible antecedents for the pronoun and reflexive were reversed. Therefore, L1ers should show a strong preference for the accessible antecedent of the pronoun, despite its strongly reduced discourse prominence compared to the previous experiments. This makes it possible for L1-L2 differences to appear, if L2ers prefer a discourse-prominent antecedent more strongly than L1ers also for the pronoun.

Exp. 6a also sought to investigate the role of individual differences in L2 processing and interpretation of pronouns and reflexives in Condition B and A environments, respectively.

5.4.1 Method

Design, task, procedure, participants and analysis were identical to Exp. 5a (see section 5.2.1). The experiment only differed from Exp. 5a in the materials, the amount of data excluded during data cleaning, and the predictions, described below.

5.4.1.1 Materials

(5.3) Example stimulus set, Exp. 6

a. Der Bauarbeiter$_{i}$, den der Wanderer$_{k}$ mochte,
the construction worker who$_{Acc}$ the wanderer$_{Nom}$
wollte sich$_{i/*k}$ sorgfältig bürsten.
like$_{3^{rd}SingPast}$ want$_{3^{rd}SingPast}$ himself carefully brush$_{inf}$
'The construction worker who the wanderer liked wanted to brush himself carefully.'

b. Der Bauarbeiter$_{i}$, den der Wanderer$_{k}$ mochte,
the construction worker who$_{acc}$ the wanderer$_{Nom}$
wollte ihn$_{*i/k}$ sorgfältig bürsten.“
like$_{3^{rd}SingPast}$ want$_{3^{rd}SingPast}$ him carefully brush$_{inf}$
'The construction worker who the wanderer liked wanted to brush him carefully.'

The materials consisted of 24 experimental sentences and 96 filler sentences, listed in Appendices A.1.8 and A.1.9, respectively. The fillers contained 24 experimental sentences for Exp. 5 (see (5.1)), and 72 filler items as described in section 5.2.1.2 (see (5.2)). As in Exp. 5, two different versions of each experimental sentence were constructed by manipulating the type of anaphor used (reflexive vs. pronoun). An example of this can be found in (5.3). Unlike in Exp. 5, the first-mentioned antecedent was within the anaphor's governing category,

while the second-mentioned antecedent appeared as the subject of an object relative clause which was inserted after the first-mentioned antecedent.

I defined the terms local and non-local antecedents as antecedents within and outside the anaphor's governing category, respectively (see section 2.2.1.1). Therefore, the first-mentioned antecedent is labelled as the local antecedent in this experiment despite being linearly further away from the anaphor. In the same manner, the second-mentioned antecedent, which is embedded and therefore outside the anaphor's governing category, is labelled the non-local antecedent despite being linearly closer to the anaphor. The terms local and non-local thus describe syntactic rather than linear locality.

To achieve this reversal of local and non-local antecedent, sentences were created from the materials of Exp. 5a in the following manner: First, the phrase which was inserted as an auditory buffer after the local antecedent and before the anaphor (*aus Wuppertal* in (5.1)) was removed. Then, the local antecedent became the matrix subject, while the non-local antecedent (which was the matrix subject in Exp. 5a) was embedded in an object relative clause. The correct antecedents and the corresponding pictures remained the same as in Exp. 5a, so the two experiments are directly comparable. For illustration, compare (5.1) and (5.3).

The changes in syntactic structure resulted in differences in the predicted accessibility of the potential antecedents. Specifically, unlike in Exp. 5a, the non-local antecedent was non-c-commanding, thus binding between an anaphor and this antecedent is ruled out (unlike Exp. 5a, where the non-local antecedent was a potential long-distance binder). The local antecedent, on the other hand, was an accessible antecedent for the reflexive, as in Exp. 5a.

5.4.1.2 Analysis

The analysis was identical to Exp. 5a (see section 5.2.1.4). Data cleaning for the between-group analysis led to the exclusion of 2.40% of data for the comprehension questions (1.82% due to clicks on other parts of the screen, and 0.58% due to clicks which did not appear within the expected time frame). For the eye-movement data, 1.77% of the data (37 trials) was excluded.

In the individual differences analysis within the Turkish-speaking L2 group, 5.88% of data from the comprehension questions was excluded (2.72% for clicks on other parts of the screen, and 3.17% for clicks that appeared too early or too late), as well as 2.43 % of data from eye movements.

5.4.1.3 Predictions

Native speakers Native speakers were expected to follow Conditions A and B in the the processing and interpretation of anaphors. The following predictions were made:

1. In comprehension questions,
    - L1ers should unambiguously choose the local antecedent for reflexives.
    - L1ers should unambiguously choose the non-local antecedent for the pronoun.
2. In the eye movements, participants are expected to be looking at the last-mentioned antecedent at the beginning of the critical time window, which is the non-local antecedent. Therefore,
    - a strong shift towards the local antecedent is expected for the reflexive condition.
    - participants are expected to continue to look at the non-local antecedent in the pronoun condition.

L2 speakers Assuming that L2ers are drawn to discourse-prominent antecedents during anaphor resolution, the following predictions were made:

1. In comprehension questions,
    - L2ers should perform native-like in the reflexive condition, exhibiting a strong preference for the discourse-prominent local antecedent.
    - L2ers should choose the incorrect local antecedent for the pronoun more frequently than L1ers.
2. In the eye movements
    - No L1-L2 differences are predicted for the reflexive condition, as both groups should strongly prefer the local antecedent.
    - The L2 group is expected to show a stronger gaze preference for the local antecedent for the pronoun, compared to L1ers.

5.4.2 Results

5.4.2.1 Comprehension questions

Results for the comprehension questions are plotted in Fig. 5.21. The overall accuracy across conditions was lower than in Exp. 5a for both groups (82.97% for L1ers, 72.16% for L2ers), which was mainly due to both groups' low accuracy in the pronoun condition.

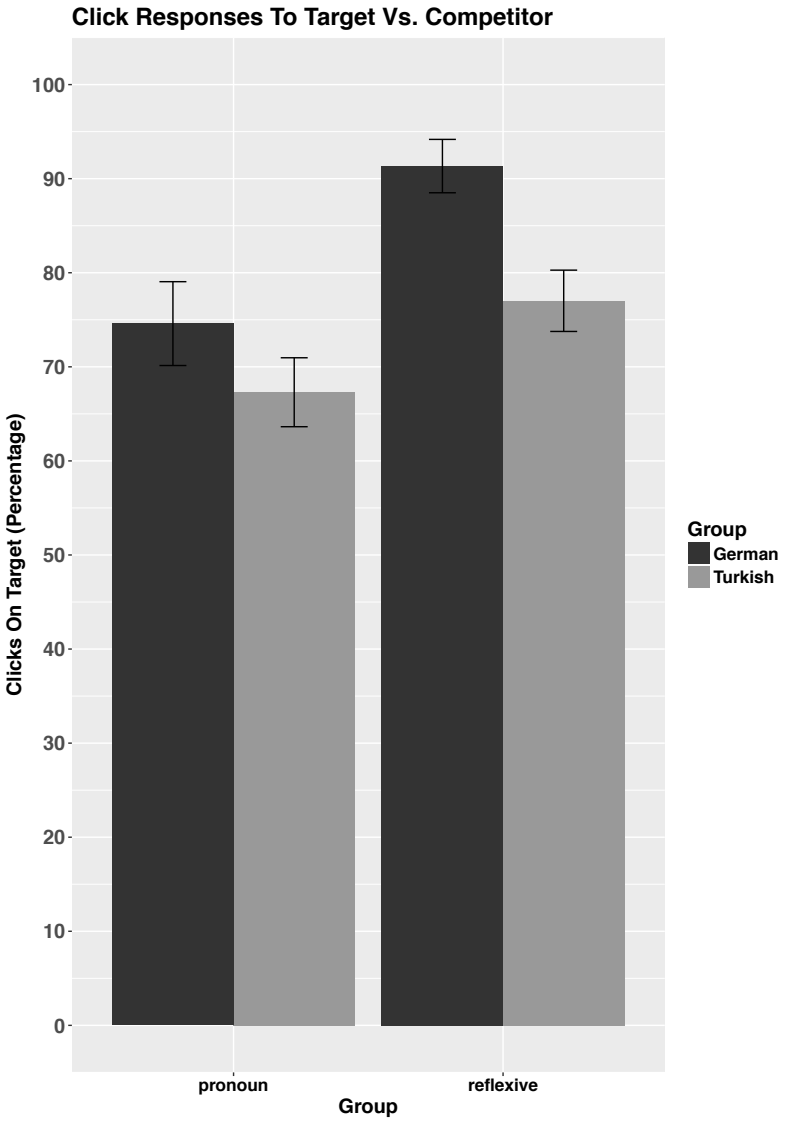

Figure 5.21. Results from the comprehension questions by condition and group, Exp. 6a (Graph).

Results from the inferential analysis of the comprehension question data are displayed in Tables 5.28 and 5.29. L2ers were significantly less accurate than L1ers in their antecedent choices in the reflexive condition: they chose the non-local antecedent for the reflexive at a higher rate than L1ers ($p<0.001$). In the pronoun condition, L2ers chose the local antecedent at a significantly higher rate for the pronoun, compared to L1ers ($p<0.05$).

Table 5.28 *Results from the analysis of the comprehension questions in the reflexive condition of Exp. 6a*

Fixed Effect	Estimate (SE)	z-value
Intercept	3.93 (0.59)	**6.70**
$\text{Group}_{\text{L2ers}}$	-2.13 (0.58)	**-3.67**

Note. Treatment contrasts, baseline was the L1 group. Marginal or significant effects are boldfaced.

Table 5.29 *Results from the analysis of the comprehension questions in the pronoun condition of Exp. 6a*

Fixed Effect	Estimate (SE)	z-value
Intercept	1.44 (0.25)	**5.69**
$\text{Group}_{\text{L2ers}}$	-0.43 (0.22)	**-1.98**

Note. Treatment contrasts, baseline was the L1 group. Marginal or significant effects are boldfaced.

5.4.2.2 Eye movements

The eye-movement data are plotted separately for each condition in Figs. 5.22 and 5.23, respectively.

For reflexives, participants from both groups were slightly more likely to look at the non-local antecedent than at the local antecedent at the beginning of the critical time window (proportion of looks to the local antecedent around 0.35). In the L1 group, a strong increase in looks to the local antecedent is observed starting at approximately 200 ms post-offset. The increase takes an inverse quadratic shape and flattens out before another quadratic increase is observed after 1200 ms post-offset, followed by a decrease after approximately 1700ms. In the L2 group, the overall increase in looks to the local vs. non-local antecedent is comparable to the native group, but the overall shape is more linear than for the German L1ers.

For the pronouns, the proportions of looks to the local vs. non-local antecedent was again slightly below 0.5 (around 0.4) for both groups. In the L1ers, looks to the local antecedent increase slightly between 500 and 1200 ms post-offset. In the L2 group, the increase takes place somewhat later, between 1000 and 1700ms. Nonetheless, the curves remain quite close to each other throughout the time window.

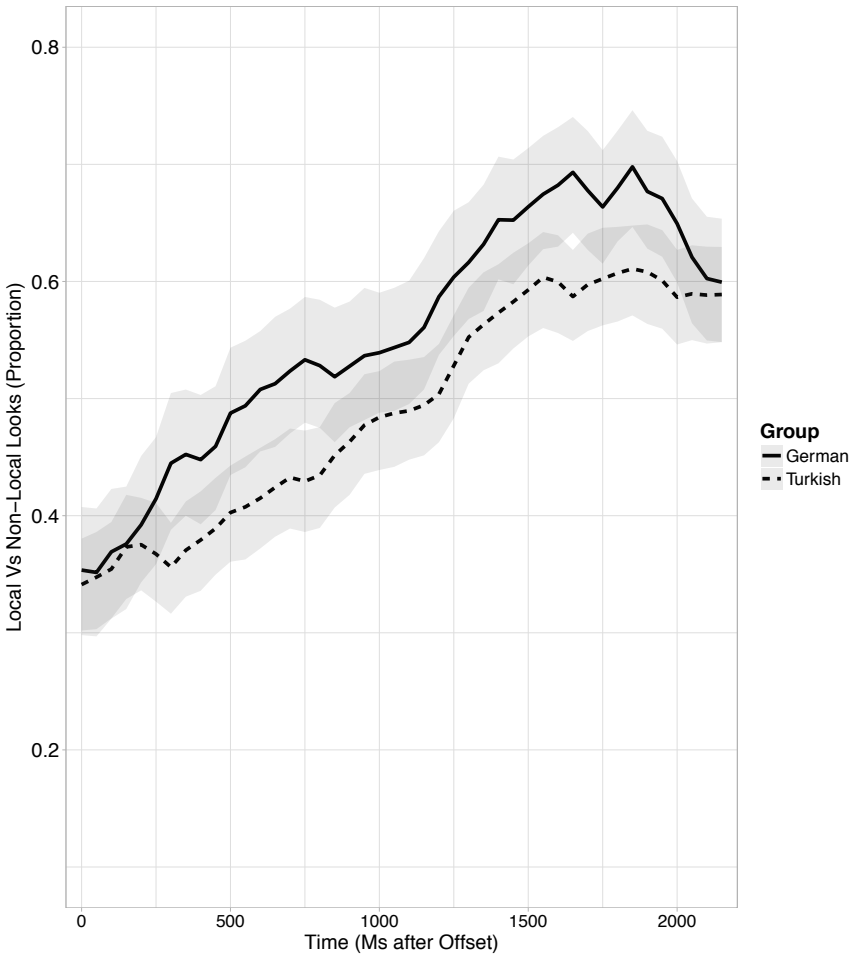

Figure 5.22. Looks to the local vs. the non-local antecedent in the reflexive condition of Exp. 6a, for both groups.

Results from the mixed-effect logit regression can be found in Tables 5.30 to 5.35.

The inferential analysis of the reflexive condition revealed effects of linear, quadratic, cubic, and quartic time in the L1 group over the full time window. Furthermore, there was a marginal effect of Group (t=-1.70), suggesting marginally fewer looks to the local antecedent in the L2 group, and a marginal

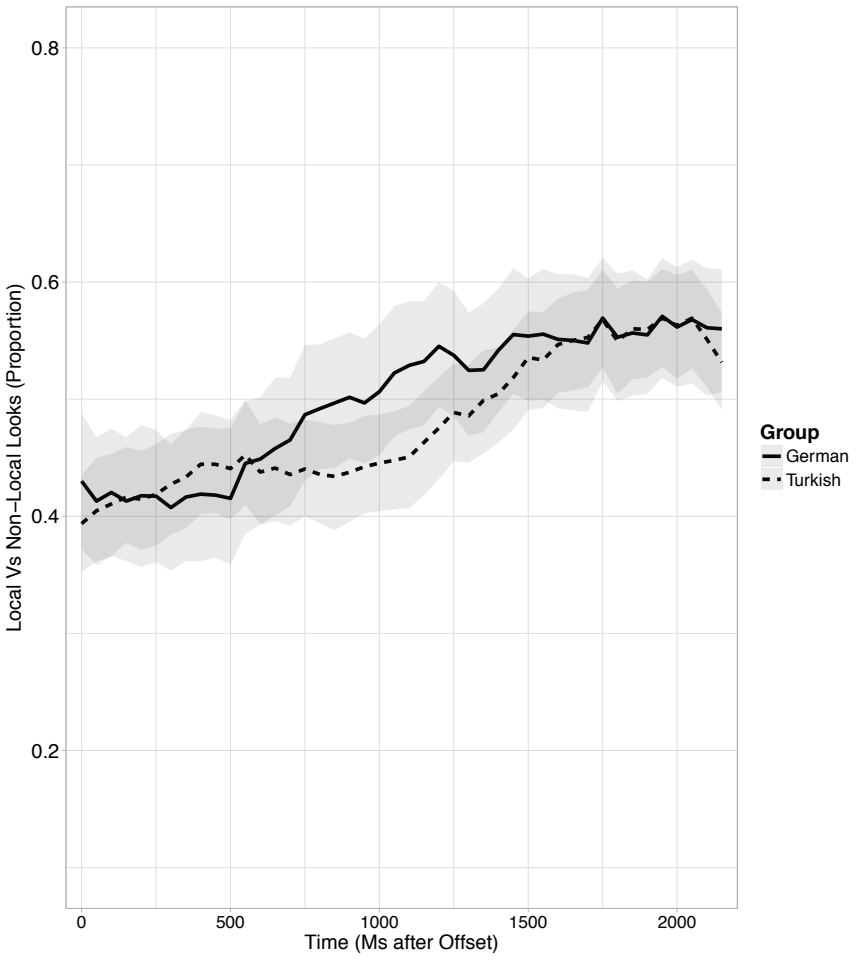

Figure 5.23. Looks to the local vs. the non-local antecedent in the pronoun condition of Exp. 6a, for both groups.

interaction of Group and quartic time (t=1.92), suggesting the change in looks over time was less quartic in the L2 group than in the L1 group. The one-second time window analysis showed a marginal interaction of Group and quadratic time in the first time window (t=1.81), and the same tendency, but no statistical trend or effect, in the late time window. The marginal quadratic effect indicates that the L1 group shows an earlier and steeper increase than the L2 group in the first time window, but the L2 group catches up at around 1 s after hearing the reflexive.

The inferential analysis of the pronoun condition revealed a significant increase in looks to the local antecedent in the L1 group over the full time window (t=3.13). The same effect was found in the early time window (t=2.44). No other effects were found for the L1ers, and no group differences reached marginal or full significance. There were no significant interactions with Group, so no separate analysis of each group was conducted.

Table 5.30 *Results from the analysis of the eye-movement data over the full time window, reflexive condition of Exp. 6a*

Effect	Estimate (SE)	t-value
Intercept	0.29(0.12)	2.37
$\text{Group}_{\text{L2ers}}$	-0.27(0.16)	**-1.70**
Linear	1.88(0.41)	**4.54**
Quadratic	-0.64(0.30)	**-2.16**
Cubic	-0.41(0.20)	**-2.03**
Quartic	-0.37(0.15)	**-2.40**
$\text{Group}_{\text{L2ers}}$ * Linear	0.08(0.45)	0.17
$\text{Group}_{\text{L2ers}}$ * Quadratic	0.26(0.40)	0.67
$\text{Group}_{\text{L2ers}}$ * Cubic	0.05(0.27)	0.18
$\text{Group}_{\text{L2ers}}$ * Quartic	0.35(0.18)	**1.92**

Note. Treatment contrasts, baseline was the L1 group. Marginal or significant effects are boldfaced.

Table 5.31 *Results from the analysis of the eye-movement data over the full time window, pronoun condition of Exp. 6a*

Effect	Estimate (SE)	t-value
Intercept	0.02(0.13)	0.17
$\text{Group}_{\text{L2ers}}$	-0.07(0.17)	-0.41
Linear	1.30(0.42)	**3.13**
Quadratic	-0.38(0.34)	-1.10
Cubic	-0.14(0.25)	-0.56
$\text{Group}_{\text{L2ers}}$ * Linear	-0.06(0.51)	-0.11
$\text{Group}_{\text{L2ers}}$ * Quadratic	0.49(0.42)	1.16
$\text{Group}_{\text{L2ers}}$ * Cubic	-0.16(0.34)	-0.46

Note. Treatment contrasts, baseline was the L1 group. Marginal or significant effects are boldfaced.

Table 5.32 *Results from the analysis of the eye-movement data over the early time window, reflexive condition of Exp. 6a*

Effect	Estimate (SE)	t-value
Intercept	0.01(0.14)	0.05
$\text{Group}_{\text{L2ers}}$	-0.27(0.18)	-1.50
Linear	0.80(0.27)	**2.95**
Quadratic	-0.23(0.13)	**-1.73**
$\text{Group}_{\text{L2ers}}$ * Linear	-0.05(0.38)	-0.14
$\text{Group}_{\text{L2ers}}$ * Quadratic	0.28(0.16)	**1.81**

Note. Treatment contrasts, baseline was the L1 group. Marginal or significant effects are boldfaced.

Table 5.33 *Results from the analysis of the eye-movement data over the early time window, pronoun condition of Exp. 6a*

Effect	Estimate (SE)	t-value
Intercept	-0.16(0.15)	-1.06
$\text{Group}_{\text{L2ers}}$	-0.07(0.18)	-0.40
Linear	0.70(0.29)	**2.44**
$\text{Group}_{\text{L2ers}}$ * Linear	-0.54(0.37)	-1.46

Note. Treatment contrasts, baseline was the L1 group. Marginal or significant effects are boldfaced.

Table 5.34 *Results from the analysis of the eye-movement data over the late time window, reflexive condition of Exp. 6a*

Effect	Estimate (SE)	t-value
Intercept	0.58(0.14)	4.16
$\text{Group}_{\text{L2ers}}$	-0.26(0.17)	-1.52
Linear	0.07(0.15)	0.30
Quadratic	-0.53(0.14)	**-3.76**
$\text{Group}_{\text{L2ers}}$ * Linear	0.20(0.32)	0.62
$\text{Group}_{\text{L2ers}}$ * Quadratic	0.25(0.17)	1.49

Note. Treatment contrasts, baseline was the L1 group. Marginal or significant effects are boldfaced.

Table 5.35 *Results from the analysis of the eye-movement data over the late time window, pronoun condition of Exp. 6a*

Effect	Estimate (SE)	t-value
Intercept	0.21(0.14)	1.45
$\text{Group}_{\text{L2ers}}$	-0.06(0.19)	-0.32
Linear	0.14(0.29)	0.47
Quadratic	-0.07(0.16)	-0.42
$\text{Group}_{\text{L2ers}}$ * Linear	0.27(0.35)	0.79
$\text{Group}_{\text{L2ers}}$ * Quadratic	-0.22(0.21)	-1.04

Note. Treatment contrasts, baseline was the L1 group. Marginal or significant effects are boldfaced.

5.4.2.3 Individual differences

Comprehension questions The distribution of response accuracy across the three individual differences predictors is displayed in Figs. 5.24 to 5.29. In the reflexive condition, earlier-AoA and higher-proficiency L2ers seem to have higher response accuracies than later-AoA and lower-proficiency L2ers, respectively. No clear effect was visible for TELCScore. In the pronoun condition, no clear effects appeared for any of the three variables.

Results from the inferential analysis are reported in Tables 5.36 and 5.37. Participants with a higher GoetheScore had higher average response accuracies for reflexives than participants with a lower GoetheScore ($p<0.001$). GermanAoA and TELCScore had no significant effect on participants' responses in the reflexive condition. No significant effects of GermanAoA, German proficiency or Turkish proficiency were found for the pronoun condition.

Table 5.36 *Results from the analysis of individual differences in the comprehension question data, reflexive condition of Exp. 6a*

Effect	Estimate (SE)	z-value
Intercept	1.79(0.25)	**7.16**
AoA	-0.32(0.26)	-1.21
Goethe	1.01(0.24)	**4.17**
TELC	0.09(0.21)	0.42

Note. Marginal or significant effects are boldfaced.

Table 5.37 *Results from the analysis of individual differences in the comprehension question data, pronoun condition of Exp. 6a*

Effect	Estimate (SE)	z-value
Intercept	1.00(0.23)	**4.42**
AoA	0.26(0.19)	1.35
Goethe	0.14(0.18)	0.81
TELC	0.05(0.14)	0.32

Note. Marginal or significant effects are boldfaced.

Eye movements The effects of GermanAoA, German proficiency (GoetheScore), and Turkish proficiency (TELCScore) are plotted in Figs. 5.30 to 5.35.

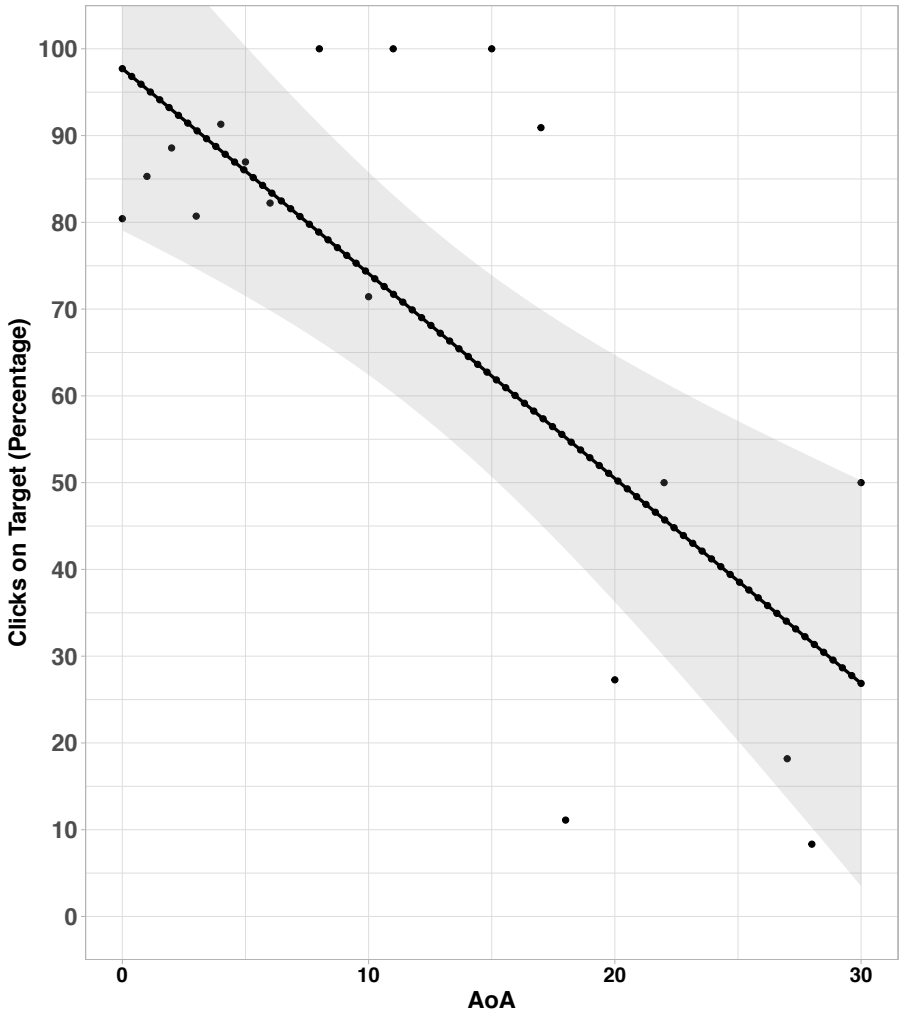

Figure 5.24. Click accuracy in the reflexive condition for the L2 group of Exp. 6a, by German AoA.

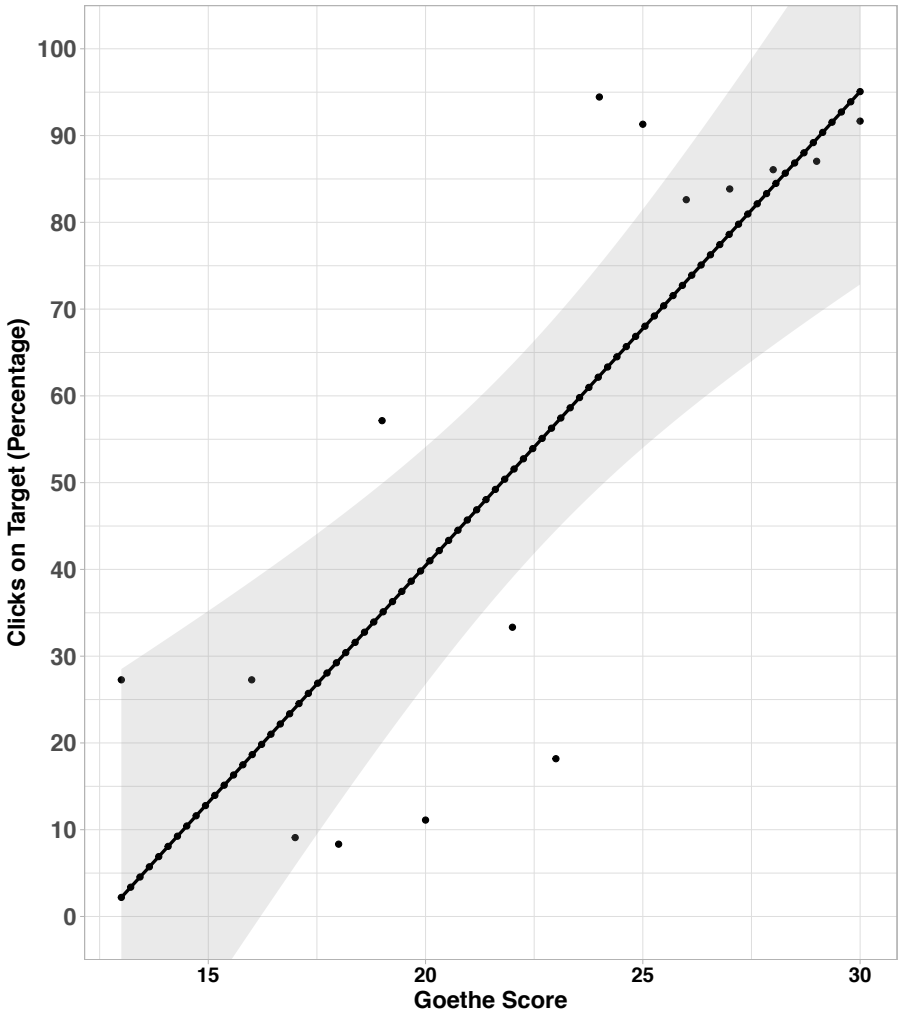

Figure 5.25. Click accuracy in the reflexive condition for the L2 group of Exp. 6a, by Goethe score.

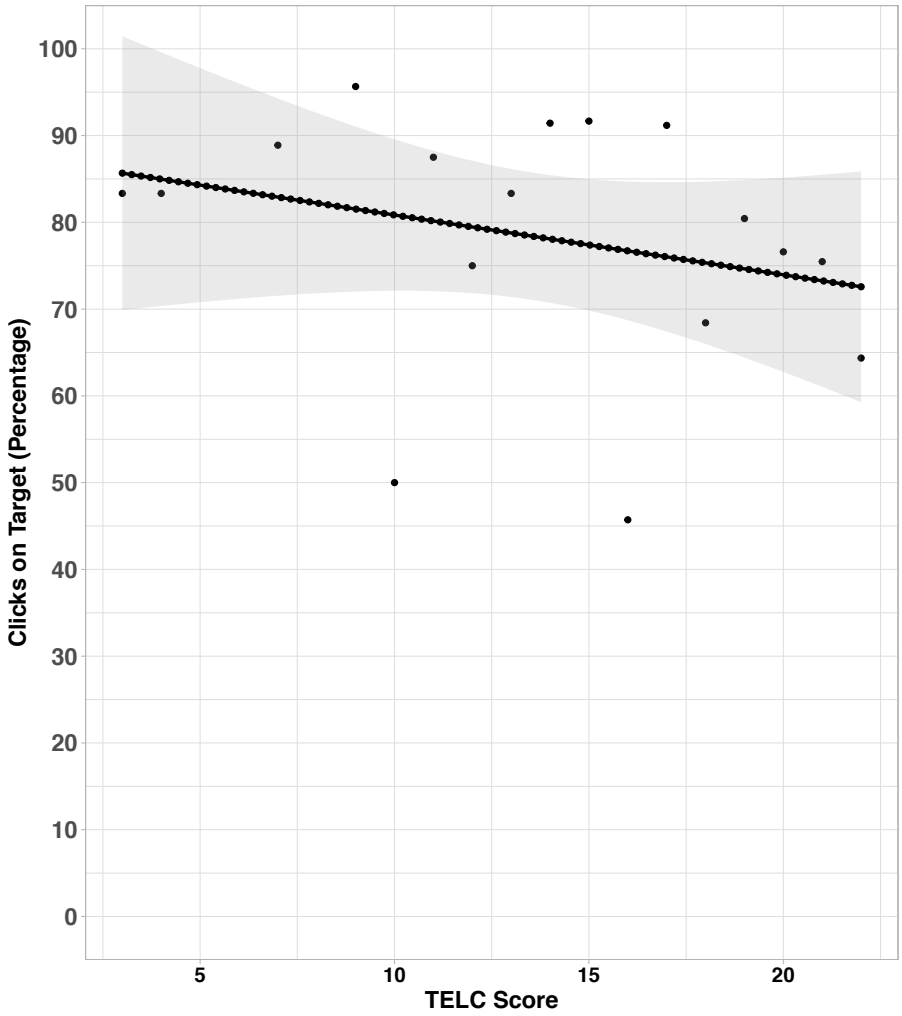

Figure 5.26. Click accuracy in the reflexive condition for the L2 group of Exp. 6a, by TELC score.

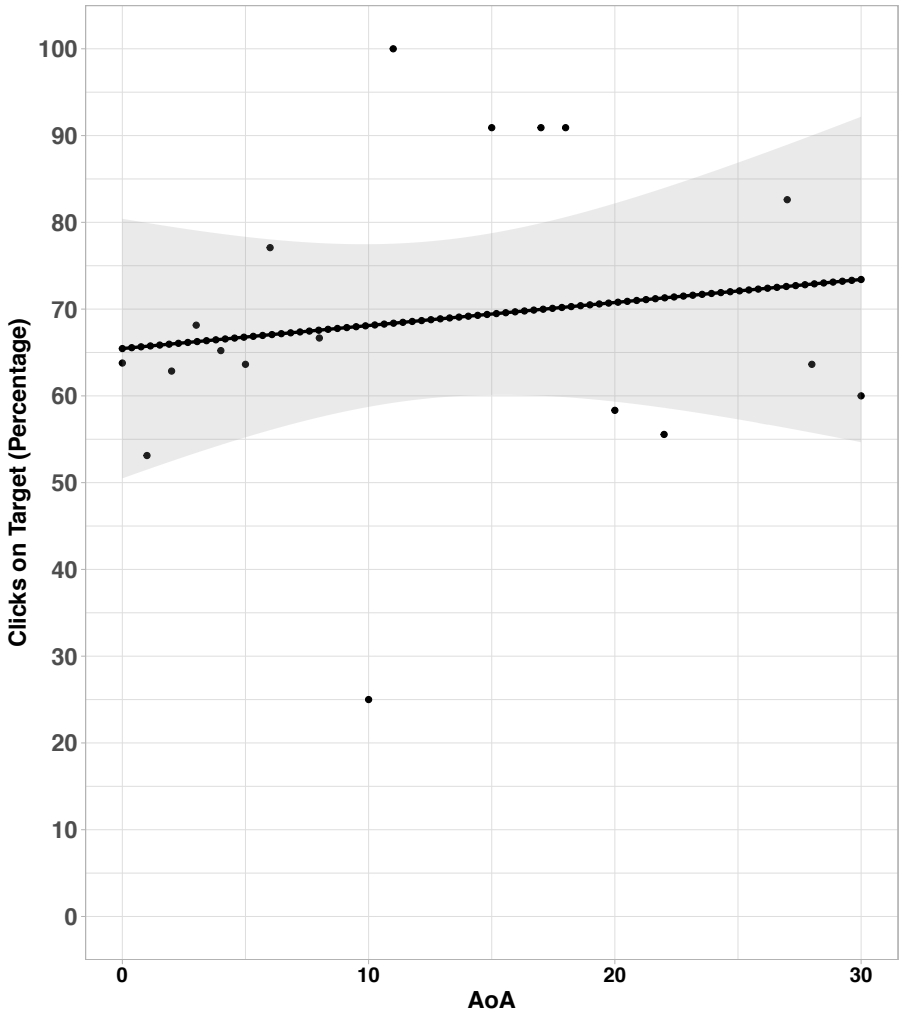

Figure 5.27. Click accuracy in the pronoun condition for the L2 group of Exp. 6a, by German AoA.

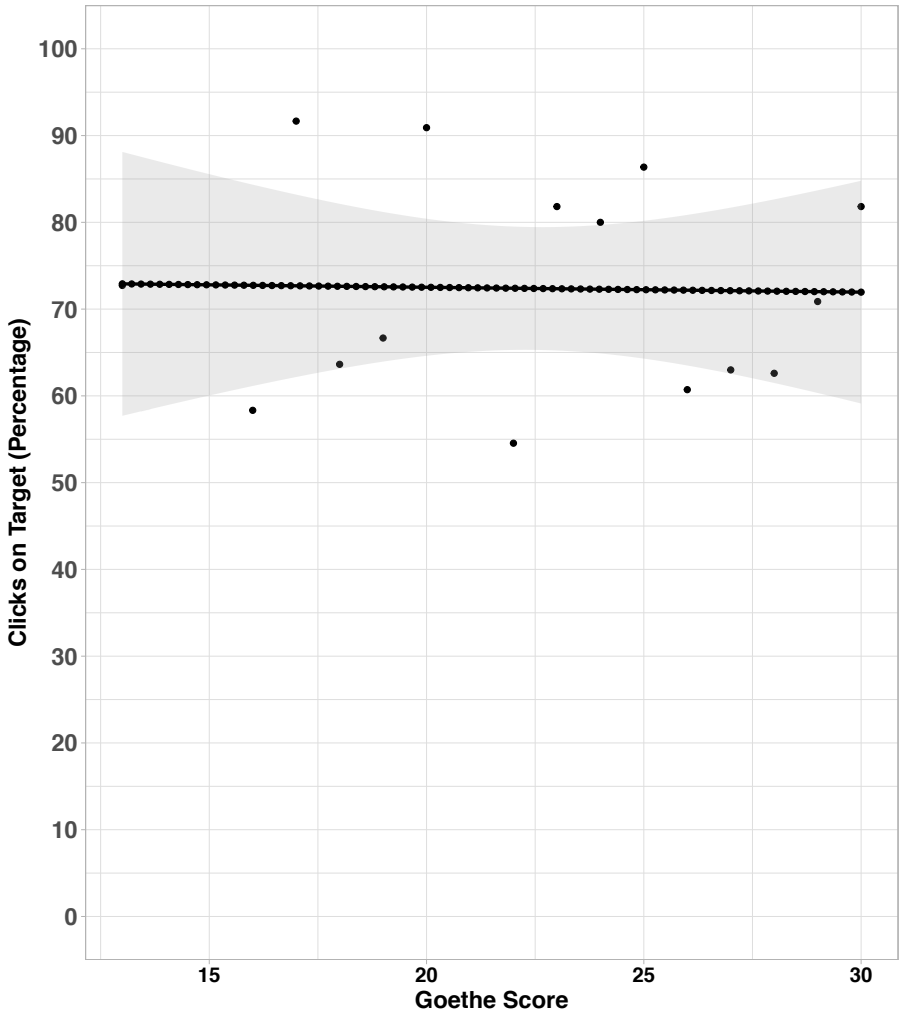

Figure 5.28. Click accuracy in the pronoun condition for the L2 group of Exp. 6a, by Goethe score.

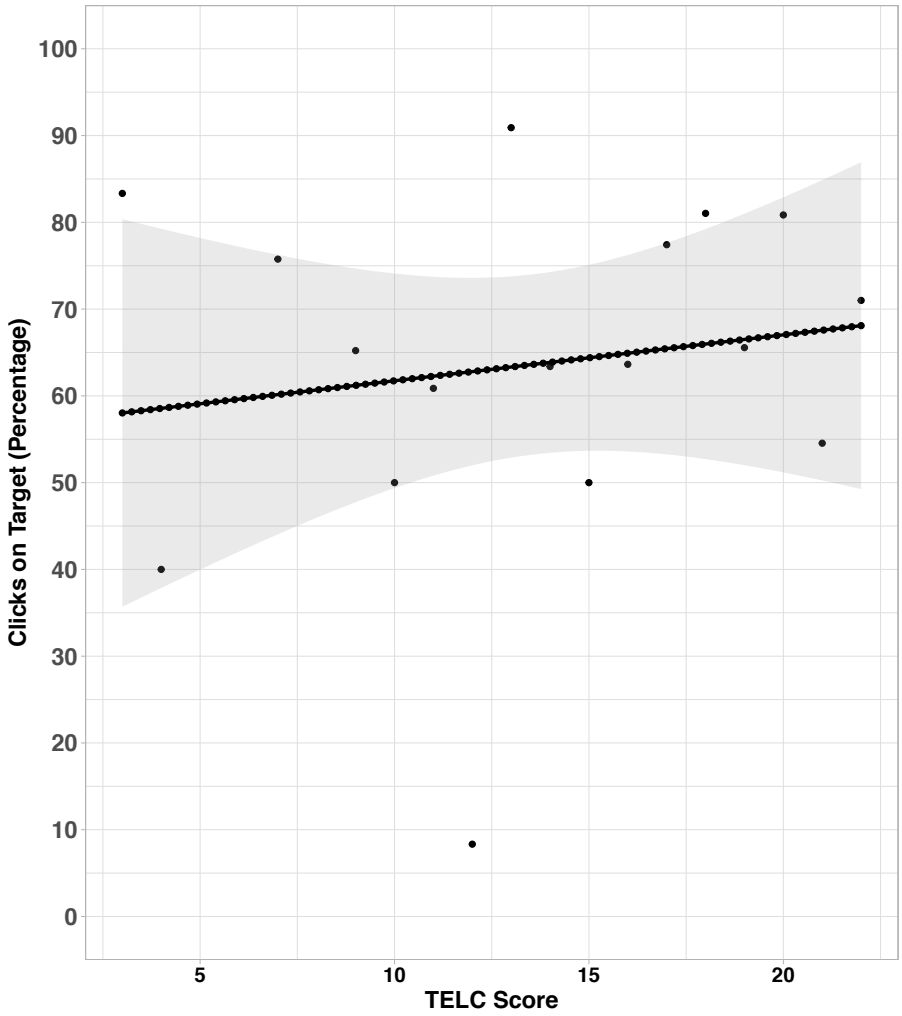

Figure 5.29. Click accuracy in the pronoun condition for the L2 group of Exp. 6a, by TELC score.

In the reflexive condition, later-AoA participants seem to have a more quadratic shape in their increase in looks to the local antecedent over the course of the whole time window: While the earlier-AoA group shows a relatively linear increase, which only flattens around 1500 ms after hearing the reflexive, the later-AoA group shows a steep increase until 1250 ms post-offset, and then shows a slow shift towards the non-local antecedent. For GoetheScore and TELCScore, no group differences are observed in the graph, except for a slightly weaker gaze preference for the local antecedent towards the end of the time window in the high-TELC group.

In the pronoun condition, the curves for early- and late-AoA participants fully overlap. For GoetheScore, lower-proficiency L2ers seem to show a stronger increase in looks to the local antecedent from about 1000 ms after pronoun offset, before beginning a shift back towards the non-local antecedent shortly before 2000 ms post-offset. The higher-proficiency group shows a slower linear increase within the same time frame. For TELCScore, the high-TELC group starts with a slightly stronger gaze preference for the local antecedent, but shows no increase in looks to the local antecedent until 750 ms post-offset, while a linear increase in looks to the local antecedent is observed from the beginning of the time window in low-TELC L2ers.

Results from the inferential analysis are reported in Tables 5.38 to 5.43.

In the reflexive condition, a significant interaction of AoA and quadratic time was observed, indicating that later-AoA L2ers showed a more pronounced quadratic shape in their gaze shift towards the local antecedent than earlier-AoA L2ers (t=-2.07). No significant effects were observed for the other two variables, and no effects of the three variables reached significance in the one-second time window analysis.

In the pronoun condition, there was a marginal interaction of TELCScore and linear time, indicating that participants with a higher TELC score showed a smaller increase in looks to the local antecedent (t=-1.80). When splitting up the time windows, the same effect was observed in the early time window (t=-2.06). Furthermore, in the late time window, L2ers with a lower German proficiency showed a significantly more inverse quadratic increase in looks to the local antecedent compared to higher-proficiency L2ers (t=2.05).

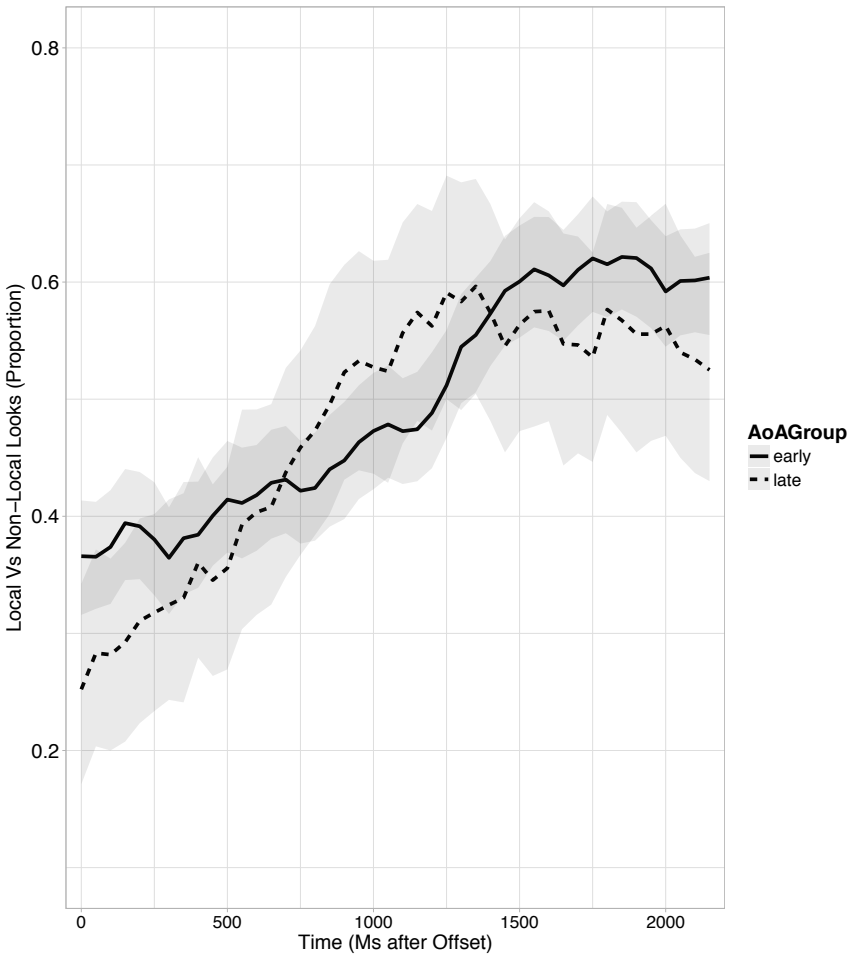

Figure 5.30. Looks to the local vs. the non-local antecedent in the reflexive condition for the L2 group of Exp. 6a, by German AoA.

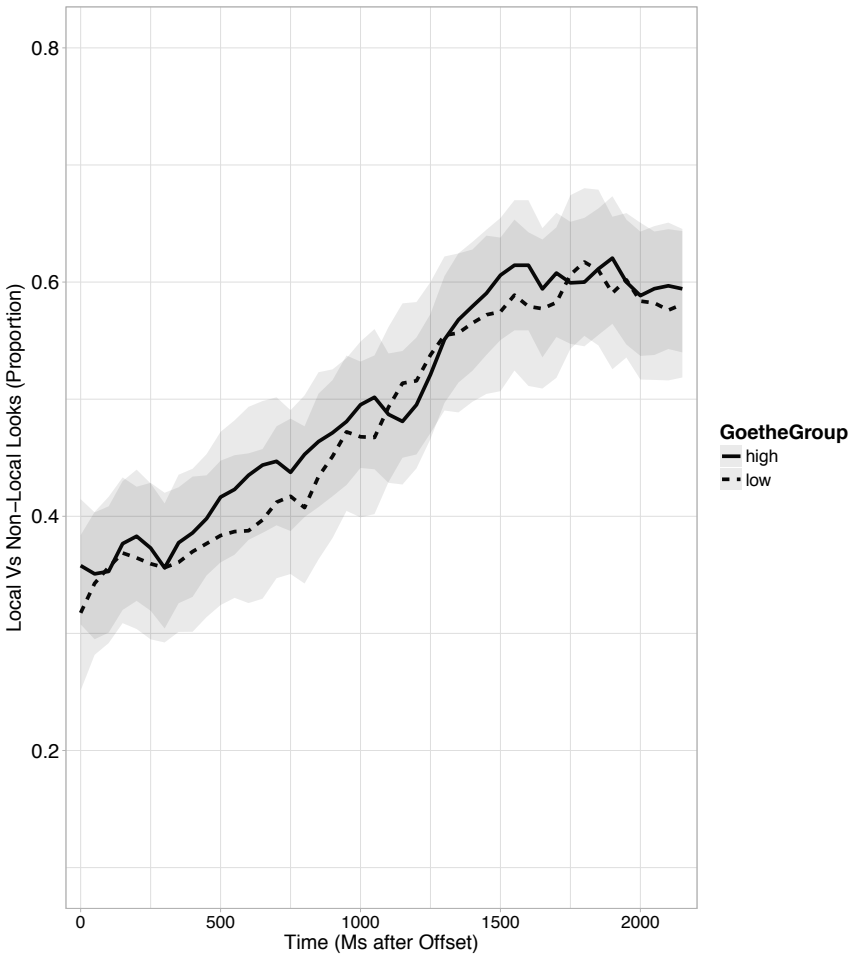

Figure 5.31. Looks to the local vs. the non-local antecedent in the reflexive condition for the L2 group of Exp. 6a, by Goethe score.

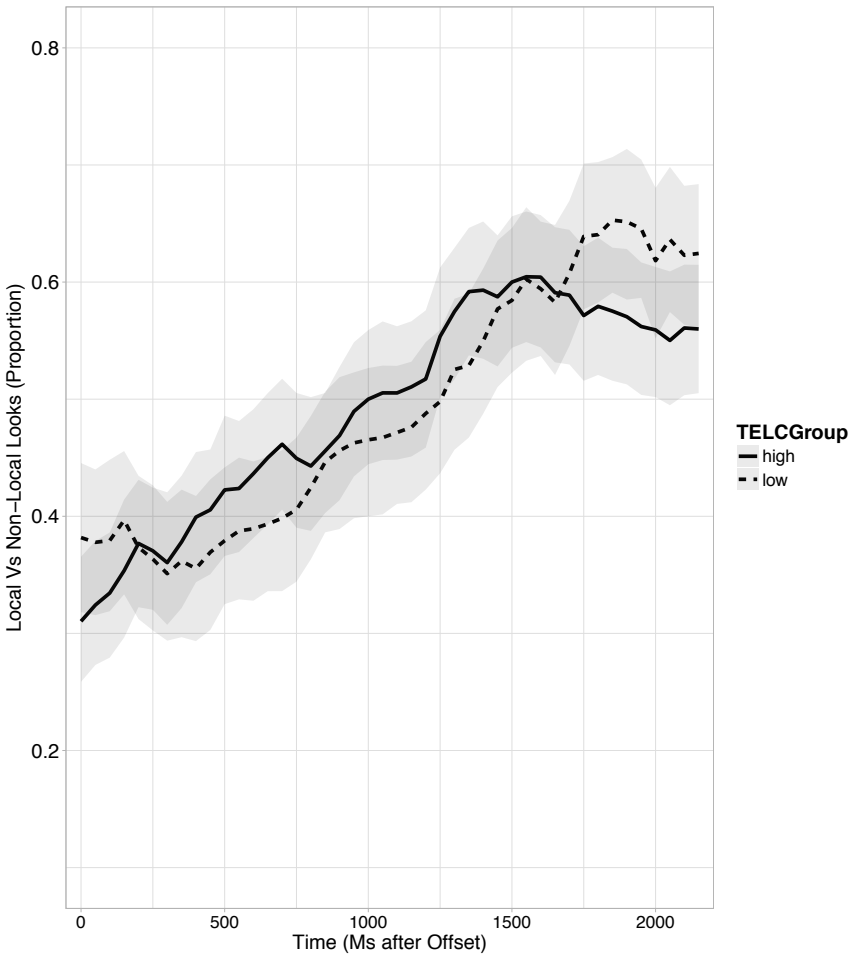

Figure 5.32. Looks to the local vs. the non-local antecedent in the reflexive condition for the L2 group of Exp. 6a, by TELC score.

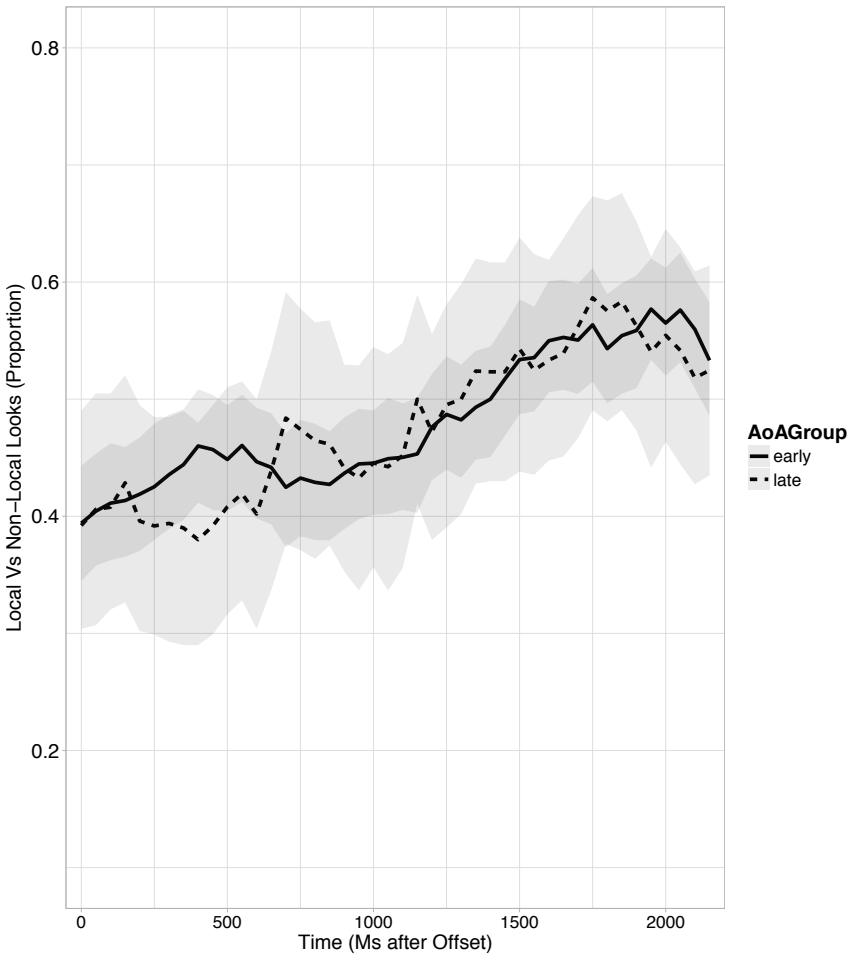

Figure 5.33. Looks to the local vs. the non-local antecedent in the pronoun condition for the L2 group of Exp. 6a, by German AoA.

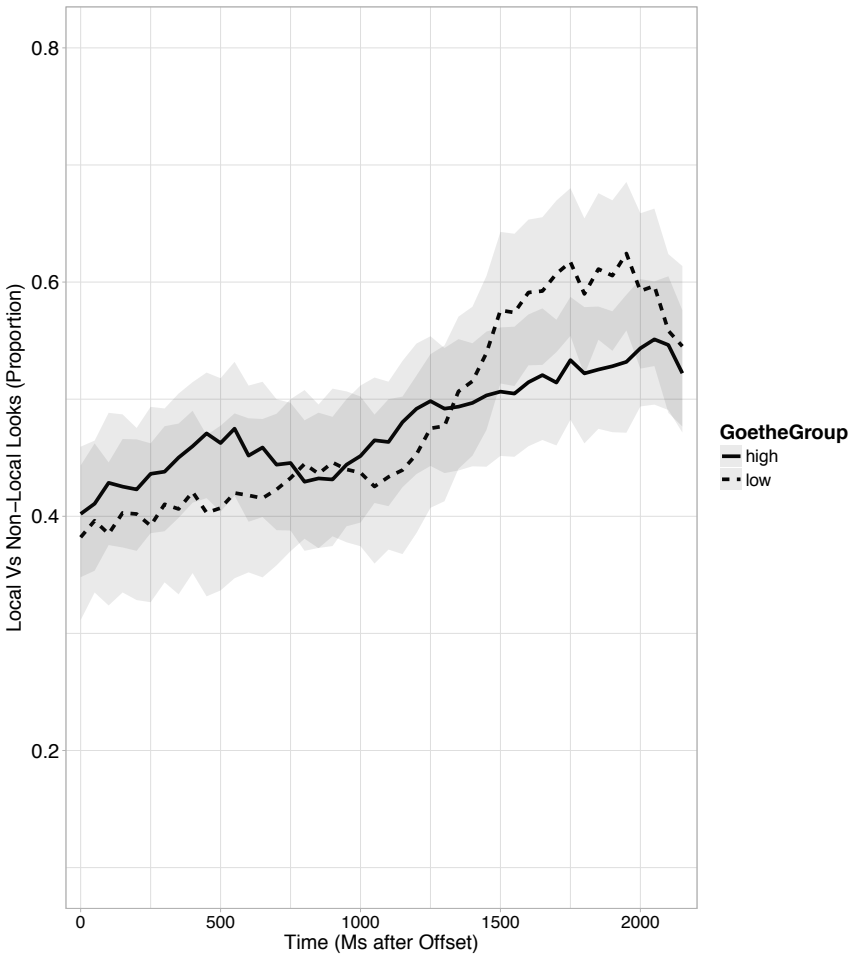

Figure 5.34. Looks to the local vs. the non-local antecedent in the pronoun condition for the L2 group of Exp. 6a, by Goethe score.

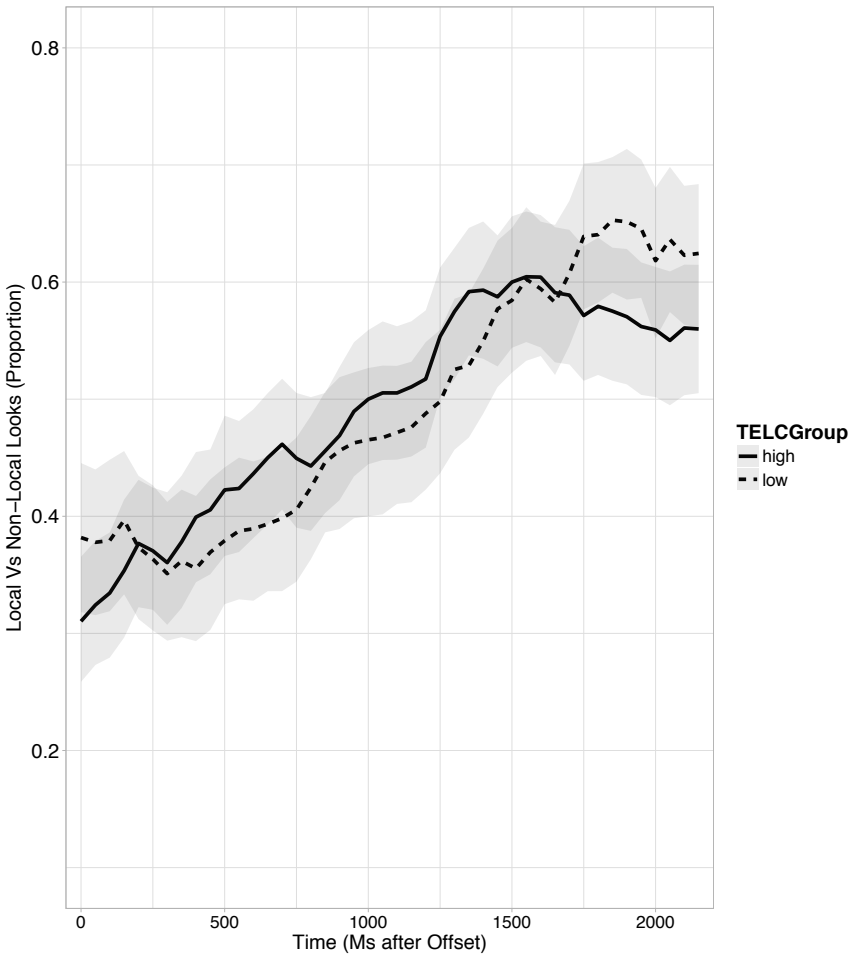

Figure 5.35. Looks to the local vs. the non-local antecedent in the pronoun condition for the L2 group of Exp. 6a, by TELC score.

Table 5.38 *Results from the individual differences analysis of the eye-movement data over the full time window, reflexive condition of Exp. 6a*

Effect	Estimate (SE)	t-value
Intercept	0.01(0.10)	0.07
AoA	-0.01(0.02)	-0.38
Goethe	0.01(0.04)	0.32
TELC	0.01(0.02)	0.42
Linear	2.17(0.35)	**6.14**
Quadratic	-0.31(0.27)	-1.17
Cubic	-0.48(0.20)	**0.49**
Quartic	-0.05(0.12)	-0.46
AoA * Linear	-0.04(0.05)	-0.87
AoA * Quadratic	-0.08(0.04)	**-2.07**
AoA * Cubic	0.01(0.03)	0.49
AoA * Quartic	0.04(0.02)	1.72
Goethe * Linear	-0.07(0.10)	-0.77
Goethe * Quadratic	-0.11(0.08)	-1.44
Goethe * Cubic	0.09(0.06)	1.55
Goethe * Quartic	0.02(0.04)	0.47
TELC * Linear	0.06(0.06)	1.01
TELC * Quadratic	-0.06(0.05)	-1.36
TELC * Cubic	0.02(0.03)	0.61
TELC * Quartic	-0.02(0.03)	-0.58

Note. Marginal or significant effects are boldfaced.

Table 5.39 *Results from the individual differences analysis of the eye-movement data over the full time window, pronoun condition of Exp. 6a*

Effect	Estimate (SE)	t-value
Intercept	-0.06(0.10)	-0.64
AoA	-0.02(0.02)	-0.93
Goethe	-0.02(0.04)	-0.40
TELC	0.03(0.02)	1.48
Linear	1.38(0.37)	**3.75**
Quadratic	0.14(0.25)	0.56
Cubic	-0.17(0.20)	-0.82
AoA * Linear	0.01(0.05)	0.11
AoA * Quadratic	-0.03(0.03)	-0.88
AoA * Cubic	0.01(0.03)	0.42
Goethe * Linear	-0.17(0.13)	-1.36
Goethe * Quadratic	-0.06(0.06)	-0.91
Goethe * Cubic	0.08(0.06)	1.42
TELC * Linear	-0.10(0.06)	**-1.80**
TELC * Quadratic	0.00(0.03)	0.07
TELC * Cubic	-0.02(0.04)	-0.52

Note. Marginal or significant effects are boldfaced.

Table 5.40 *Results from the individual differences analysis of the eye-movement data over the early time window, reflexive condition of Exp. 6a*

Effect	Estimate (SE)	t-value
Intercept	-0.22(0.12)	**-1.91**
AoA	0.01(0.20)	0.06
Goethe	0.13(0.16)	0.84
TELC	0.05(0.14)	0.39
Linear	0.82(0.24)	**3.47**
AoA * Linear	0.71(0.44)	1.60
Goethe * Linear	0.38(0.33)	1.15
TELC * Linear	0.10(0.31)	0.32

Note. Marginal or significant effects are boldfaced.

Table 5.41 *Results from the individual differences analysis of the eye-movement data over the early time window, pronoun condition of Exp. 6a*

Effect	Estimate (SE)	t-value
Intercept	-0.20(0.11)	**-1.85**
AoA	-0.14(0.21)	-0.68
Goethe	0.03(0.17)	0.18
TELC	0.19(0.13)	1.49
Linear	0.21(0.26)	0.80
AoA * Linear	0.62(0.39)	1.58
Goethe * Linear	0.09(0.34)	0.27
TELC * Linear	-0.49(0.24)	**-2.06**

Note. Marginal or significant effects are boldfaced.

Table 5.42 *Results from the individual differences analysis of the eye-movement data over the late time window, reflexive condition of Exp. 6a*

Effect	Estimate (SE)	t-value
Intercept	0.34(0.12)	**2.95**
AoA	-0.10(0.19)	-0.56
Goethe	-0.00(0.15)	-0.02
TELC	0.09(0.12)	0.72
Linear	0.22(0.20)	1.10
Quadratic	-0.28(0.10)	**-2.84**
AoA * Linear	-0.51(0.40)	-1.28
Goethe * Linear	-0.26(0.32)	-0.82
TELC * Linear	-0.13(0.27)	-0.50

Note. Marginal or significant effects are boldfaced.

Table 5.43 *Results from the analysis of the eye-movement data over the late time window, pronoun condition of Exp. 6a*

Effect	Estimate (SE)	t-value
Intercept	0.14(0.12)	1.18
AoA	-0.13(0.20)	-0.66
Goethe	-0.10(0.16)	-0.62
TELC	0.10(0.13)	0.77
Linear	0.45(0.22)	**2.09**
Quadratic	-0.27(0.14)	**-1.93**
AoA * Linear	-0.06(0.42)	-0.15
Goethe * Linear	-0.23(0.32)	-0.73
Goethe * Quadratic	-0.26(0.13)	**2.05**
TELC * Linear	-0.18(0.21)	-0.87

Note. Marginal or significant effects are boldfaced.

5.4.3 Discussion

5.4.3.1 Comprehension questions

The results from the comprehension questions revealed relatively low comprehension accuracies in both L1ers and L2ers, compared to Exp. 5a. Furthermore, Turkish-speaking L2ers were less accurate than L1ers for both pronouns and reflexives.

For L1ers, the relatively low response accuracy, especially in the pronoun condition, was unexpected. Note that the materials in the present experiment featured a non-canonical word order and relatively complex sentence structure compared to Exp. 5a due to the addition of an embedded object relative clause (OSV word order). This may have made the task more taxing, even for L1ers, leading to a lower response accuracy.

The large difference in L1ers' response accuracy between pronouns and reflexives in the present experiment is another difference from Exp. 5a. In the present experiment, the pronoun's only syntactically accessible antecedent was embedded in an object relative clause and thus had a very low discourse prominence. Participants might have preferred a discourse-prominent sentence-external antecedent over the accessible antecedent for the pronoun in this condition, if this was an available response option. For referentially ambiguous pronouns, L1ers tend to strongly prefer discourse-prominent antecedents (for example in the results of Exp. 2, see section 4.3). The relatively low preference for the only syntactically licit antecedent for a pronoun shows that even L1ers can be influenced by discourse prominence during the application of binding conditions.

For L2ers, the results also did not align with the predictions, as L2ers were less accurate than L1ers in both reflexive and pronoun conditions. Thus, no overall preference for the discourse-prominent local antecedent was observed. While L2ers chose the local antecedent more often than L1ers in the pronoun condition, they chose the non-local antecedent more often than L1ers in the reflexive condition. It is possible that L2ers struggle more with the interpretation of complex sentences than L1ers. This may have led to a low accuracy for some L2ers, irrespective of anaphor type, reducing the overall performance of the group. The discussion of individual differences in section 5.4.3.3 will further explore what caused the observed L1-L2 differences.

5.4.3.2 Eye movements

To summarize, the L1 group showed two strong gaze shifts towards the local antecedent in the reflexive condition, the first starting immediately after hearing the reflexive, and the second starting one second later. The L2 group showed a linear and slower increase in looks to the local antecedent compared to L1ers in the first second after hearing the reflexive. In the pronoun condition, L1ers showed a linear increase in looks to the local antecedent, which appeared in the first second after hearing the pronoun. No L1-L2 differences were observed.

For L1ers, the results in the reflexive condition are in line with predictions: A clear increase in looks to the correct local antecedent is observed. In the pronoun condition, the gaze shift towards the local antecedent was not expected. While L1ers also considered a prominent inaccessible antecedent in the reflexive condition of Exp. 5a, this effect appeared only at the end of the two-second time window after hearing the anaphor. In the present experiment, participants showed a shift towards the inaccessible local antecedent early on. This aligns with the comprehension question data, where the local antecedent was chosen around 25% of the time by L1ers.

These results suggest that an inaccessible antecedent may be considered during processing by L1ers in circumstances that make the accessible antecedent unattractive and/or the inaccessible antecedent very attractive. As mentioned above, in this experiment, the causes of the L1ers' processing difficulty may have been the non-canonical word order and complex sentence structure combined with a highly discourse-prominent inaccessible antecedent and the lack of a prominent accessible antecedent (e.g. sentence-external). Despite these factors, this is the first study to report German L1ers' difficulty with Condition B both during processing and in interpretation. Therefore, it would be valuable to further explore whether this pattern can be replicated cross-linguistically.

Turning to the L2ers' results, these are not in line with the prediction that L2ers would show a stronger gaze preference than L1ers for the local antecedent of the pronoun. While L2ers did show an increase in looks to the local antecedent over the course of the time window in both conditions, this increase did not differ from L1ers in the pronoun condition, and was (marginally) slower in the reflexive condition.

The results may be interpreted as L2ers being slower to shift their gaze away from the last-mentioned antecedent. While no such effects were observed in Exp. 5a, this effect may have emerged in the present experiment due to the materials' syntactic complexity resulting in a higher processing load.

Note that the L1-L2 effect found in this experiment (i.e., the slower shift away from the last-mentioned antecedent in L2ers compared to L1ers) was only marginal. Further research is necessary to determine whether a significant effect may be found in future studies with different participant characteristics or experimental design.

5.4.3.3 Individual differences

The only significant effect that emerged in the comprehension question data was an effect of German proficiency: Participants with higher Goethe scores were more likely to choose the local antecedent for the reflexive, and were thus more accurate.

This result is in line with Exp. 5a and Exp. 1, where higher-proficiency L2ers had higher response accuracies for reflexives. Again, the result suggests that L2 proficiency is a better predictor of L2 anaphor interpretation than AoA. In the present experiment, the correlation of the fixed effects for AoA and Goethe score was 0.60 for the reflexive condition, and 0.65 in the pronoun condition, which indicates that the predictive powers of the the two variables overlap. As in previous experiments, this explains why an effect of AoA is observed in the graph, but does not reach significance in the statistical analysis.

In the between-group comparison discussed above, L2ers were less accurate than L1ers in the interpretation of both pronouns and reflexives. Individual differences were only observed in the reflexive condition. The individual differences pattern in the reflexive condition was the same as in Exp. 5a: with increasing proficiency, participants become more native-like in their interpretation. However, in the pronoun condition of the present experiment, even higher-proficiency L2ers did not reach a native-like accuracy-level. Thus, in a taxing task with complex syntactic structures, the advantage of higher-proficiency L2ers may be attenuated. Even L1ers showed remarkably low accuracy rates for this construction, and it seems that the increased complexity affects high-proficiency L2ers' pronoun interpretation even more than that of L1ers.

For the eye movements, significant effects of AoA were observed in the reflexive condition, while in the pronoun condition, Turkish and German proficiency had effects on the eye movements. Specifically, participants with a later AoA were more likely to show a large increase in looks to the local antecedent for the reflexive early on, and then show a decrease, while earlier-AoA L2ers were more likely to show a linear increase. A higher TELC score led to a smaller increase in looks to the local antecedent for the pronoun, and a higher Goethe score led

to a smaller but more consistent increase in looks to the local antecedent from around 1000 ms after hearing the pronoun.

In the reflexive condition, AoA was the most important predictor of L2 processing, as in Exp. 5a. While in Exp. 5a later-AoA participants showed a larger but later shift towards the first-mentioned non-local antecedent than earlier-AoA participants, in the present experiment later-AoA participants started out with a larger increase in looks to the local antecedent compared to earlier-AoA participants, and only showed a stronger gaze preference for the non-local antecedent towards the end of the time window. Section 5.6.3 in the General Discussion of this chapter will discuss potential causes of the observed effect.

In the pronoun condition, no effects of AoA were observed. Instead, both Turkish and German proficiency had an effect on participants' eye movements.

The significant effect of TELC score is surprising, given that no previous effects of Turkish proficiency on the processing of German anaphors have been reported. To understand the effect, let us look at the timeline more closely: At the beginning of the time window, participants with high Turkish proficiency were more likely to already be looking at the (inaccessible) local antecedent. For the first 1000 ms after hearing the pronoun, they were also less likely to show an increase in looks to the local antecedent. What is remarkable about this result is that L1ers showed an earlier increase to the inaccessible local antecedent than the high-TELC group (compare Figs. 5.23 and 5.35).

In Turkish, an overt pronoun such a *o* usually does not refer to a prominent antecedent. In Exp. 8, a Turkish translation of the present materials is tested with Turkish native speakers and Turkish-German bilinguals. If their processing of the pronoun *o*, which is also subject to Condition B, shows a stronger preference for the non-local antecedent than in German L1ers, this might explain the effect of TELC score, and would suggest that the observed effect is a form of cross-linguistic influence.

The effect of German proficiency is less surprising, as a lower Goethe Score led to a temporarily stronger gaze preference for the inaccessible local antecedent. Therefore, higher-proficiency L2ers were more similar to L1ers in eye movements than lower-proficiency L2ers. This result shows that proficiency can also be a significant predictor of L2 online processing.

Taking together the results from Exps. 5a and 6a, a pattern emerges: Both effects of AoA appeared in the first time window, while the only effect of GoetheScore appeared in the late time window. At the same time, GoetheScore was the strongest predictor of participants' antecedent choices in the comprehen-

sion questions. Thus, AoA seems to play a role in the more immediate processes that take place after hearing a pronoun or reflexive, while German proficiency may have an effect on late stages of processing which are more conscious.

5.5 Experiment 6b: Further evidence on the role of L1 background in L2 processing of German pronouns and reflexives

In Exp. 6a, Turkish-speaking L2ers of German showed significant differences from German L1ers in their interpretation of both pronouns and reflexives, and marginal differences from L1ers in their eye movements. Exp. 6a sought to investigate the role of L1 background on the processing of Conditions A and B with the materials used in Exp. 6a. For this, a subset of the Turkish-speaking L2ers from Exp. 6a containing only early L2ers was compared with a proficiency-matched group of Russian-speaking late L2ers of German.

Exp. 5b tested the same participants regarding the role of L1 background in the processing of the materials from Exp. 5a, and found no significant effects in anaphor interpretation. In eye movements, differences between Russian-speaking and Turkish-speaking L2ers were observed. However, the pattern of results suggested that these group differences were due to differences in AoA rather than an influence of participants' L1.

The present experiment aimed to further investigate whether an L1 background effect can be observed for the online application of Conditions A and B. In contrast to Exp. 5b, the non-local antecedent in the present experiment was non-c-commanding, and therefore not a potential long-distance binder (see section 5.4.1.1).

5.5.1 Method

5.5.1.1 Participants

The participants were identical to Exp. 5b (see section 5.3.1.1).

5.5.1.2 Design and Materials

The design and materials were identical to Exp. 6a (see section 5.4.1.1).

5.5.1.3 Procedure

The procedure was identical to Exps. 5a, 5b, and 6a (see section 5.2.1.3).

5.5.1.4 Analysis

The data cleaning procedure was identical to Exps. 5a, 5b and 6a (see section 5.2.1.4). Overall, 4.51% of data from the comprehension questions (3.27% for clicks on other parts of the screen, and 1.24% for clicks that appeared too early or too late) and 1.83% of data (31 trials) from the eye movements were removed after data cleaning. The statistical analysis was identical to Exp. 5b (see section 5.3.1.4).

5.5.1.5 Predictions

In Exp. 6a, Turkish-speaking L2ers of German had a stronger preference for the non-local antecedent for the reflexive and a stronger preference for the local antecedent for the pronoun, compared to L1ers. Furthermore, they were marginally slower to shift their gaze towards the local antecedent after hearing the reflexive.

The above group differences may be explained either by a general difference between L2ers and L1ers in the resolution of Conditions A and B, or by a specific influence of the L2ers' L1. If the group differences observed in Exp. 6a were due to Turkish-speaking L2ers' L1 background rather than the fact that they were L2ers,

1. in comprehension questions,
    - Turkish-speaking L2ers of German should choose the non-local antecedent more often than Russian-speaking L2ers for the reflexive.
    - Turkish-speaking L2ers should choose the local antecedent more often than Russian-speaking L2ers for the pronoun.
2. in eye movements,
    - Turkish-speaking L2ers of German should show a slower shift to the local antecedent than Russian-speaking L2ers for the reflexive.
    - no L1 background effect should emerge for the pronoun condition, as Turkish-speaking L2ers performed native-like for this condition in Exp. 6a.

5.5.2 Results

5.5.2.1 Comprehension questions

The click accuracy data are displayed in Fig. 5.36. The groups reached similar levels of average accuracy across conditions, namely 74.66% (Russian L1ers) and 73.89% (Turkish L1ers). However, the Russian-speaking group had a slightly higher accuracy in the pronoun condition compared to the reflexive condition, while the Turkish-speaking group showed the opposite pattern. The difference between the two participant groups was slightly larger in the pronoun condition (11.14%) compared to the reflexive condition (9.61%).

Results from the inferential analysis of the click responses are reported in Tables 5.44 and 5.45. The Turkish-speaking group's accuracy was significantly above chance level for both conditions (both p*s*<0.001). In the reflexive condition, the Turkish-speaking group was marginally more likely to choose the correct antecedent for the reflexive than the Russian-speaking group (p<0.1). In the pronoun condition, Russian-speaking L2ers had a significantly higher accuracy than Turkish-speaking L2ers (p<0.01).

Table 5.44 *Results from the analysis of the comprehension question data, reflexive condition of Exp. 6b*

Effect	Estimate (SE)	z-value
Intercept	2.24(0.37)	**6.13**
$\text{Group}_{\text{Russian}}$	-0.79(0.43)	**-1.85**

Note. Treatment contrasts, baseline was the Turkish-speaking group. Marginal or significant effects are boldfaced.

Table 5.45 *Results from the analysis of the comprehension question data, pronoun condition of Exp. 6b*

Effect	Estimate (SE)	z-value
Intercept	0.91(0.24)	**3.80**
$\text{Group}_{\text{Russian}}$	0.70(0.25)	**2.82**

Next. Treatment contrasts, baseline was the Turkish-speaking group. Marginal or significant effects are boldfaced.

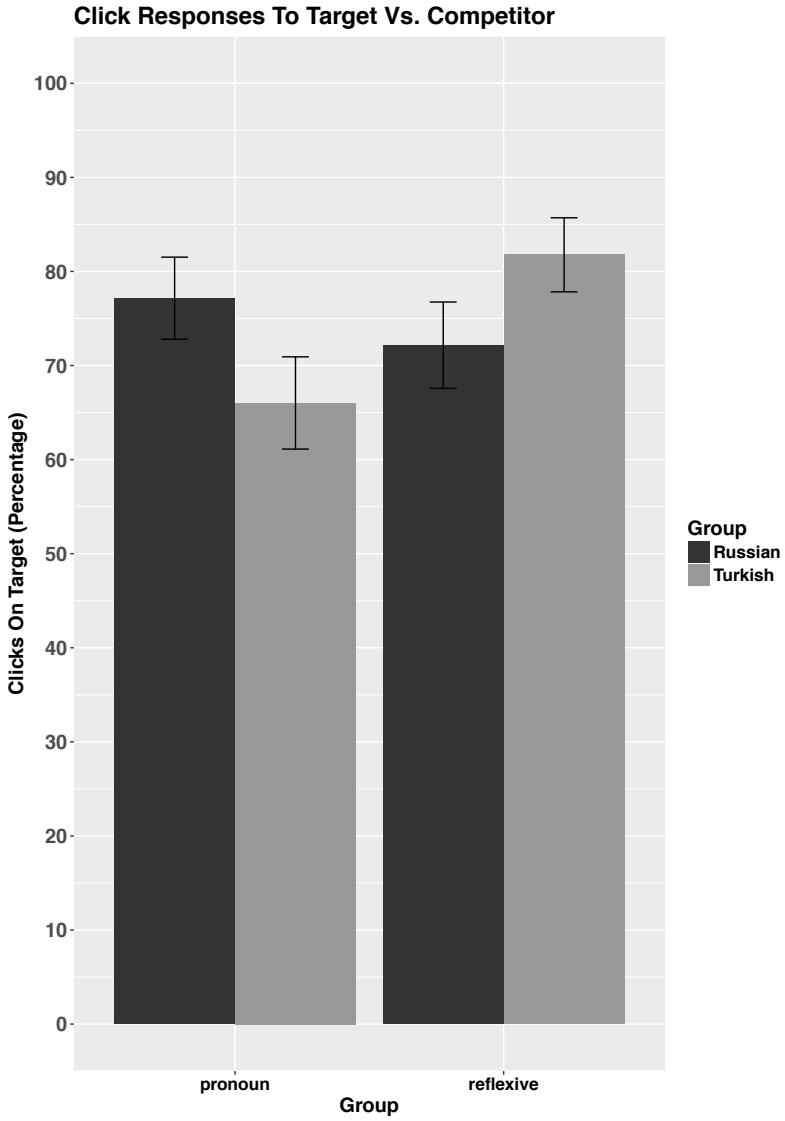

Figure 5.36. Click accuracy in Exp. 6b, by Condition and Group.

5.5.2.2 Eye movements

The eye-movement data are plotted in Figs. 5.37 and 5.38. In the reflexive condition, the two groups' curves were very similar, and showed a large increase in looks to the local antecedent over time. In the pronoun condition, the two curves were again very similar, and an increase in looks to the (inaccessible) local antecedent was only observed from about 1000 ms after hearing the pronoun.

The results of the inferential analysis of eye movements can be found in Tables 5.46 to 5.51. No group contrasts produced marginal or significant effects. An increase in looks to the local antecedent was found in the reflexive condition (linear: t=4.41, cubic: t=-1.87), as well as the pronoun condition (linear: t=3.02). When splitting up the time windows, an increase again appeared for the reflexive in the first (t=2.18) and second time windows (quadratic: -2.26). In the pronoun condition, a significant linear increase was observed in the late time window (t=2.16).

Table 5.46 *Results from the analysis of the eye-movement data over the full time window, reflexive condition of Exp. 6b*

Effect	Estimate (SE)	t-value
Intercept	0.07(0.13)	0.58
$\text{Group}_{\text{Russian}}$	-0.02(0.18)	-0.11
Linear	1.98(0.45)	**4.41**
Quadratic	-0.17(0.27)	-0.64
Cubic	-0.41(0.22)	**-1.87**
Quartic	-0.10(0.14)	-0.72
$\text{Group}_{\text{Russian}}$ * Linear	-0.10(0.65)	-0.15
$\text{Group}_{\text{Russian}}$ * Quadratic	-0.08(0.31)	-0.28
$\text{Group}_{\text{Russian}}$ * Cubic	0.26(0.32)	0.81
$\text{Group}_{\text{Russian}}$ * Quartic	-0.08(0.18)	0.43

Note. Treatment contrasts, baseline was the Turkish-speaking group. Marginal or significant effects are boldfaced.

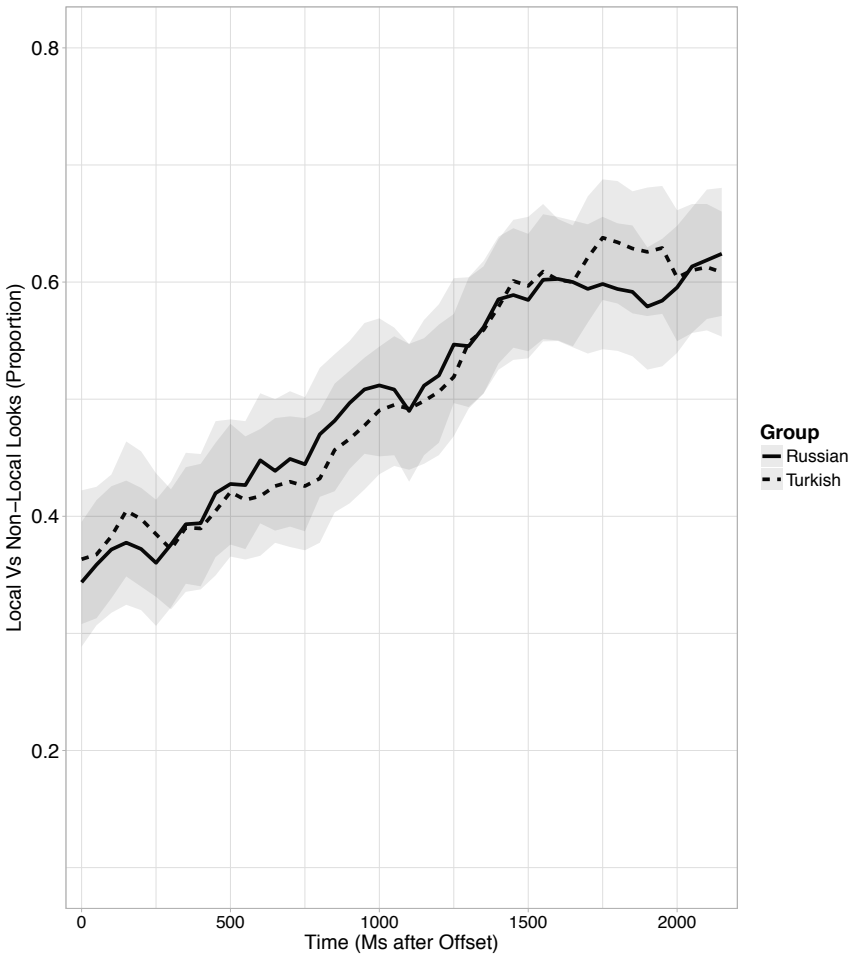

Figure 5.37. Looks to the local vs. the non-local antecedent in the reflexive condition of Exp. 6b, by Group.

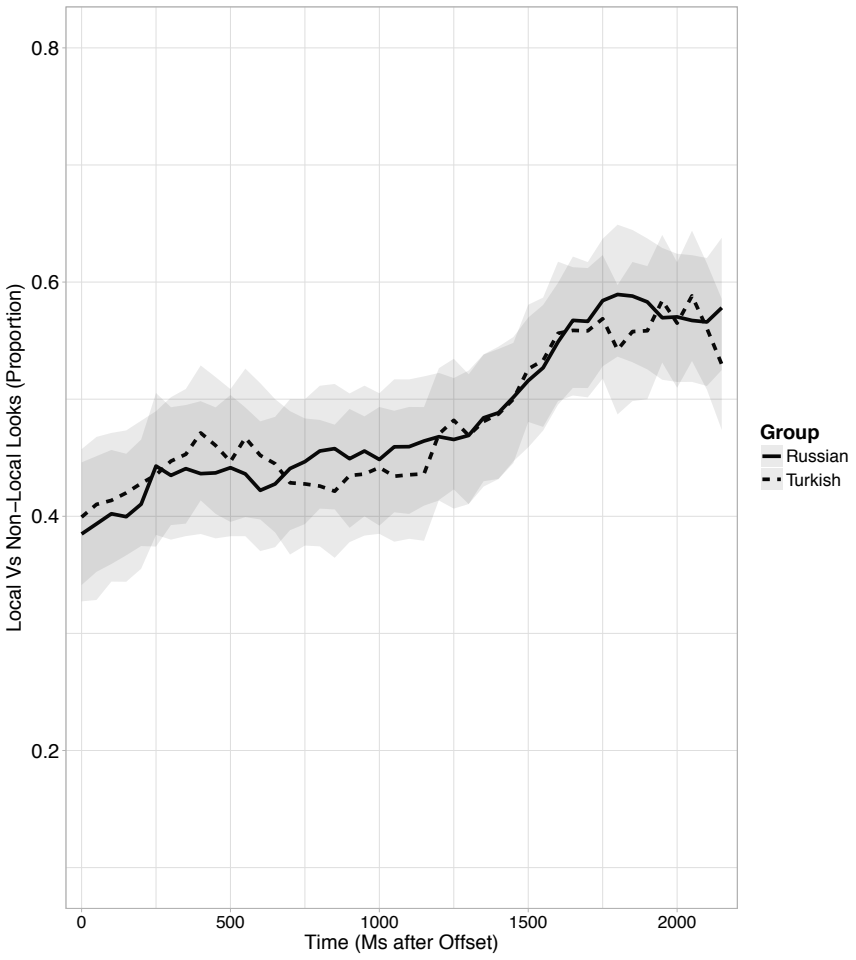

Figure 5.38. Looks to the local vs. the non-local antecedent in the pronoun condition of Exp. 6b, by Group.

Table 5.47 *Results from the analysis of the eye-movement data over the full time window, pronoun condition of Exp. 6b*

Effect	Estimate (SE)	t-value
Intercept	-0.03(0.13)	-0.26
$\text{Group}_{\text{Russian}}$	-0.00(0.18)	-0.02
Linear	1.17(0.39)	**3.02**
Quadratic	0.37(0.34)	1.08
Cubic	-0.29(0.26)	-1.11
$\text{Group}_{\text{Russian}}$ * Linear	0.11(0.51)	0.22
$\text{Group}_{\text{Russian}}$ * Quadratic	0.01(0.48)	0.03
$\text{Group}_{\text{Russian}}$ * Cubic	0.04(0.33)	0.13

Note. Treatment contrasts, baseline was the Turkish-speaking group. Marginal or significant effects are boldfaced.

Table 5.48 *Results from the analysis of the eye-movement data over the early time window, reflexive condition of Exp. 6b*

Effect	Estimate (SE)	t-value
Intercept	-0.22(0.15)	-1.48
$\text{Group}_{\text{Russian}}$	0.00(0.22)	0.00
Linear	0.62(0.28)	**2.18**
$\text{Group}_{\text{Russian}}$ * Linear	0.10(0.37)	0.26

Note. Treatment contrasts, baseline was the Turkish-speaking group. Marginal or significant effects are boldfaced.

Table 5.49 *Results from the analysis of the eye-movement data over the early time window, pronoun condition of Exp. 6b*

Effect	Estimate (SE)	t-value
Intercept	-0.22(0.13)	-1.59
$\text{Group}_{\text{Russian}}$	0.00(0.19)	0.00
Linear	-0.04(0.31)	-0.14
$\text{Group}_{\text{Russian}}$ * Linear	0.16(0.46)	0.34

Note. Treatment contrasts, baseline was the Turkish-speaking group. Marginal or significant effects are boldfaced.

Table 5.50 *Results from the analysis of the eye-movement data over the late time window, reflexive condition of Exp. 6b*

Effect	Estimate (SE)	t-value
Intercept	0.37(0.15)	**2.54**
$\text{Group}_{\text{Russian}}$	-0.04(0.20)	-0.22
Linear	0.45(0.27)	1.67
Quadratic	-0.33(0.14)	**-2.26**
$\text{Group}_{\text{Russian}}$ * Linear	-0.07(0.39)	-0.17
$\text{Group}_{\text{Russian}}$ * Quadratic	-0.16(0.22)	0.72

Note. Treatment contrasts, baseline was the Turkish-speaking group. Marginal or significant effects are boldfaced.

Table 5.51 *Results from the analysis of the eye-movement data over the late time window, pronoun condition of Exp. 6b*

Effect	Estimate (SE)	t-value
Intercept	0.14(0.15)	0.97
$\text{Group}_{\text{Russian}}$	-0.00(0.21)	-0.03
Linear	0.58(0.27)	**2.16**
Quadratic	-0.28(0.17)	-1.62
$\text{Group}_{\text{Russian}}$ * Linear	0.15(0.36)	0.41
$\text{Group}_{\text{Russian}}$ * Quadratic	-0.03(0.22)	-0.14

Note. Treatment contrasts, baseline was the Turkish-speaking group. Marginal or significant effects are boldfaced.

5.5.3 Discussion

5.5.3.1 Comprehension questions

In comprehension questions, Russian-speaking L2ers of German were significantly more likely to assign the pronoun to the correct non-local antecedent, compared to proficiency-matched Turkish-speaking L2ers of German. At the same time, Turkish-speaking L2ers of German were marginally more likely to assign the reflexive to the correct local antecedent, compared to proficiency-matched Russian-speaking L2ers of German.

Overall, these results suggest that Turkish-speaking L2ers of German have a stronger preference for the local antecedent than Russian-speaking L2ers of German. There were no significant effects of AoA for the comprehension questions of Exp. 6a that could explain the stronger preference for the local antecedent in early-AoA Turkish L2ers of German than in late-AoA Russian L2ers of German. While a null effect does not imply that AoA had no effect (the null effect may be due to a lack of statistical power), an alternative explanation for the observed group difference in this experiment may be an influence of participants' L1 background.

However, attributing the observed difference between Russian and Turkish speakers to participants' L1 background does not help explain the pattern of L1-L2 differences in Exp. 6a. In Exp. 6a, Turkish-speaking L2ers of German showed lower accuracies than L1ers for both conditions. If this L1-L2 difference was caused by the difference in binding constraints for anaphors between German and Turkish, Turkish-speaking L2ers of German should also have lower accuracies than proficiency-matched Russian-speaking L2ers of German, as Russian and German align in their binding constraints of anaphors. However, Turkish speakers had a higher accuracy than Russian speakers in the reflexive condition, and a lower accuracy than Russian speakers in the pronoun condition. The Turkish-speaking group resembled the L1 group in terms of their overall response pattern more closely than the Russian speakers, which suggests that the L1 background effect cannot be reduced to a direct influence of L1 binding constraints.

There are several alternative explanations for this L1 background effect. For example, it is possible that the Turkish-speaking group had more difficulties than the Russian-speaking group with the object relative clause structure used in the present materials. Turkish relative clauses, as well as many other subordinate clauses, are nominalized and preposed. Russian relative clauses, on the

other hand, are finite embedded clauses which appear after the respective NP, just like in German and in the materials of the present experiment. Therefore, Russian L1ers may take the content of the object relative clause into account more strongly during anaphor resolution, and show a stronger overall preference for the embedded non-local antecedent, compared to the Turkish L1ers.

Another potential explanation is a different learning experience between the two groups. The Turkish-speaking participants all started learning German in their early childhood, and it is very likely that they never explicitly learned about the structural constraints on German anaphors. As late learners, the Russian-speaking group may have taken a more explicit approach to language learning and may therefore be more familiar with more complex grammatical questions in German than the Turkish-speaking group.

These explanations both suggest that the Turkish-speaking group may have struggled more with processing the embedded clause, and therefore showed a stronger preference for the more prominent local antecedent, compared to the Russian-speaking group.

5.5.3.2 Eye movements

In the eye-movement data, there were no significant differences between Russian- and Turkish-speaking L2ers of German. Thus, there was no evidence that the L1-L2 difference in the online processing of Condition A in Exp. 6a was due to an L1 background effect.

In Exp. 5b, differences between Russian speakers and Turkish speakers were observed in the eye-movement data both for pronouns and reflexives. The effects resembled the differences between early- and late-AoA L2ers' eye movements in Exp. 5a. Based on this, the group difference in AoA was deemed to be the cause of the differences between Russian and Turkish speakers in Exp. 5b.

Accepting this explanation, AoA effects in the Turkish-speaking group in Exp. 6a should lead to group differences in the present experiment. In Exp. 6a, an AoA effect was observed in the reflexive condition: later-AoA participants showed a steep increase in looks towards the local antecedent early on, which later flattened out, while early-AoA participants showed a more moderate and more stable increase. However, in the present experiment, no such group difference was observed in the reflexive condition.

While it is possible that AoA did influence participants' online processing behavior, it is not the only potential influencing factor. As described above, Russian

speakers showed a stronger preference for the non-local antecedent, which was embedded in the object relative clauses, compared to Turkish speakers in comprehension questions. This may be caused by their higher familiarity with this type of subordinate structure, or a different learning experience between the two groups. At the same time, later-AoA participants in Exp. 6a showed a large gaze shift towards the local antecedent very early on, even earlier than L1ers. This might indicate that the Turkish-speaking late L2ers were more likely than early L2ers to ignore the content of the object relative clause when searching for an antecedent of the reflexive.

Russian-speaking L2ers may have a stronger tendency than Turkish speakers to consider the non-local antecedent despite their later AoA. Thus, the influence of AoA and the influence of L1 background may have canceled each other out, leading to an absence of a group difference.

5.6 General Discussion

This study sought to investigate how L2ers of German apply Conditions A and B online. For this, Turkish-speaking L2ers of German were first compared with German L1ers to determine how native-like their online resolution is. In a second step, the role of individual variables AoA and proficiency was investigated. Lastly, Turkish-speaking L2ers were directly compared to Russian-speaking L2ers to determine whether observed effects were influenced by participants' L1 background. These three steps were carried out for two main experiments, Exp. 5 and Exp. 6. Exp. 5 tested classical Condition A and B environments, while Exp. 6 used non-canonical sentences in which the order and discourse prominence of antecedents was reversed.

5.6.1 L1ers' online application of Conditions A and B

Exps. 5a and 6a provided some interesting results regarding the processing and interpretation of Condition A and B in German L1ers. Overall, L1ers had high average accuracy scores (90% or higher). However, in Exp. 6a, where the pronoun could only refer to an embedded antecedent with low discourse prominence, their accuracy dropped to an average of 74.59%.

Similar results were observed in eye movements, where L1ers generally shifted their gaze towards the accessible antecedent soon after hearing the pronoun or reflexive. However, when participants were already looking at the accessible

antecedent upon hearing the anaphor, a shift towards the inaccessible antecedent was observed. In Exp. 6a, this suggested that L1ers considered the inaccessible antecedent for the pronoun during processing, in line the with a relatively low comprehension accuracy. In Exp. 5a, a similar but later effect was observed for the reflexive. However, consideration of the inaccessible antecedent for the reflexive in eye movements did not result in a low response accuracy.

Overall, the results from Exps. 5a and 6a support models which propose a strong weighting of syntactic cues during memory retrieval in sentence processing (Patterson, 2013; Sturt, 2003; Van Dyke & McElree, 2011), as the syntactically accessible antecedent was preferred over the inaccessible antecedent both in eye movements and end-of-trial interpretation. Nonetheless, the observation that L1ers chose an inaccessible antecedent 25% of the time is remarkable, and shows that syntactic cues may be ignored in online processing tasks in which the only syntactically accessible antecedent is embedded in an object relative clause. I am not aware of any study which has found a similar effect for L1 pronoun interpretation. Further studies may determine which factors influence the occurrence of a strong interference effect in L1ers like the one observed in Exp. 6a, by further manipulating the relative prominence and availability of the potential antecedent for the pronoun.

The observation that more interference from an inaccessible antecedent was found in pronoun conditions compared to reflexive conditions is in line with previous studies which tested both types of anaphor in the same experiment (Clackson et al., 2011; Kaiser et al., 2009; Runner & Head, 2014). However, in this study, the interference effect for the pronoun appeared in a different experiment, which seemed to have been more taxing for participants overall. Therefore, based on the present results it is difficult to determine whether interference from an illicit antecedent is more likely in Condition B than in Condition A.

5.6.2 L2ers' online application of Conditions A and B

Exps. 5a and 6a also found that Turkish-speaking L2ers of German showed significant differences from German L1ers in the interpretation of anaphors: L2ers had a stronger preference for a prominent first-mentioned antecedent than L1ers when this antecedent was not licensed by Conditions A and B. This is in line with the predictions based on the SSH (Clahsen & Felser, 2006, 2017) and memory interference hypothesis (Cunnings, 2016, 2017), which state that L2ers will consider non-syntactic information in sentence processing more than L1ers

do.

The first effect of this type appeared for the reflexive in Exp. 5a, where L2ers considered the non-local antecedent more strongly than L1ers. The same pattern was observed in the offline questionnaire data in Exp. 1. However, comparing effect sizes for the *sich* condition in Exp. 1 and Exp. 5a revealed that the effect in Exp. 1 is very small, while the effect in Exp. 5a is of medium size. As mentioned before, L1-L2 differences may be stronger in online experiments compared to offline experiments (Badecker & Straub, 2002; Felser & Cunnings, 2012; Felser et al., 2009; Roberts & Siyanova-Chanturia, 2013; Sturt, 2003). Thus, it is not surprising that stronger L1-L2 differences appeared for Exp. 5a compared to Exp. 1.

The online-offline difference can be explained by the different task demands: In the present experiment, there was a time constraint, as the materials were auditorily presented and could not be replayed by the participant. In Exp. 1, materials were presented in written form and participants could take as long as they needed to answer the comprehension questions. Another difference between experiments was the materials: Exp. 5a featured an adnominal clause after the second-mentioned antecedent, while Exp. 1 did not (cf. (4.1) and (5.1)). While this may have contributed to L2ers' difficulty in Exp. 5a, the results illustrate that eye-tracking experiments may help detect L1-L2 differences that do not appear in offline experiments, even when tracking end-of-trial responses.

In Exp. 6a, L2ers also had a lower accuracy in comprehension questions for the pronoun condition, where the inaccessible antecedent was first-mentioned, compared to the reflexive condition, where the inaccessible antecedent was second-mentioned and much less prominent. However, L2ers had a lower response accuracy than L1ers for both conditions, while they were native-like when the accessible antecedent was the prominent first-mentioned antecedent in the pronoun condition of Exp. 5a. The reduced overall accuracy may be explained by the increased complexity of the materials in Exp. 6 compared to Exp. 5.

Exp. 6a also found an effect of German proficiency in the reflexive condition, with higher-proficiency L2ers correctly identifying the prominent non-local antecedent as the accessible antecedent of the reflexive. In the pronoun condition of Exp. 6a, both lower- and higher-proficiency L2ers showed only a weak preference for the correct antecedent. Thus, in Exp. 6a only higher-proficiency L2ers showed the same preference for the prominent first-mentioned antecedent that was observed in Exp. 5a. This may also be due to the higher complexity of the materials in Exp. 6 compared to Exp. 5, as described above.

In contrast with the comprehension question data, L2ers performed almost native-like in eye movements after hearing the anaphors. No L1-L2 differences were observed in Exp. 5a, and in Exp. 6a the only statistical difference indicated that L2ers were marginally slower than L1ers in increasing looks to the local antecedent after hearing the reflexive.

L2ers' slower shift away from a last-mentioned antecedent may be indicative of slower processing or working-memory limitations (Hopp, 2006, 2010; McDonald, 2006) or of a difficulty with reanalysis in L2ers (with reanalysis meaning building a new connection with an antecedent when realizing that the already established connection with another antecedent is wrong). While this was only observed in one out of four conditions, slower processing / reanalysis in L2ers compared to L1ers may explain the absence of an L1-L2 difference in eye movements despite the significant effects supporting the SSH and memory interference hypothesis in comprehension questions. It is possible that the two properties of L2ers, i.e. a stronger consideration of the more prominent first-mentioned antecedent on the one hand, and a slower processing speed/memory limitations/difficulties with reanalysis on the other hand, canceled each other out, resulting in null effects and one marginal effect.

Furthermore, it should be noted that the experimental setup led to participants already looking at the target antecedent in two conditions, namely the reflexive condition in Exp. 5 and the pronoun condition in Exp. 6. This may have prevented the occurrence of significant effects, especially for reflexives in Exp. 5, where large differences between L1ers and L2ers were observed in the ultimate interpretation, but proportions of looks did not change within the first second after hearing *sich*. In future studies, it may be useful to 'neutralize' looks (e.g. with a fixation cross or by leading participants' gaze to a third picture before hearing the anaphor), to ensure that participants are equally likely to look at either of the two potential antecedents upon hearing the pronoun or reflexive. In the absence of statistically significant L1-L2 differences in eye movements, I can only conclude that the eye-movement results can neither support nor refute any of the hypotheses of L2 sentence processing.

5.6.3 Individual Differences

This study also addressed the role of individual differences in L2 anaphor resolution. For this, the AoA of the L2, as well as L2 proficiency and L1 proficiency were considered as predictors of L2 processing and interpretation. By analyzing the different individual differences variables in one model, variables with over-

lapping predictive power could be detected, and only predictors with unique predictive power after accounting for the other variables reached significance. The results of Exps. 5a and 6a indicate that L2 proficiency is the most important predictor for end-of-trial interpretations and eye movements during later stages of processing, while AoA was the most important predictor for eye movements immediately after hearing the anaphor.

In Perani et al. (1998) and Herschensohn (2009), proficiency was regarded as a more important predictor of L2 language processing than AoA. While the present results support this conclusion for participants' late eye movements and final interpretations of anaphors, the more immediate processing was influenced by AoA more strongly than by proficiency. The effects of AoA are in line with DeKeyser (2003) and Paradis (2004), who emphasized the role of AoA in the implicit knowledge of an L2, in line with the Fundamental Difference Hypothesis (Bley-Vroman, 1989, 2009).

In eye movements during processing, a contrast between the reflexive and pronoun condition was observed: While AoA only affected the processing of the reflexive, proficiency only affected the processing of the pronoun. Condition A is generally regarded as a syntactic constraint, while Condition B is considered a semantic constraint (e.g. Reuland, 2011). These results thus suggest that AoA is more relevant than proficiency during syntactic processing, while proficiency is more relevant than AoA during semantic processing, as has been proposed by Wartenburger et al. (2003).

Thus, the earlier effects of AoA compared to L2 proficiency in eye movements in Exp. 6b may be explained by differences in the time-course of processing Conditions A and B in that experiment. Nonetheless, proficiency in the L2 was the best predictor of choosing the correct antecedent for the anaphor in both conditions, suggesting that the ultimate interpretation of the syntactic constraint of Condition A is influenced by proficiency more strongly than by AoA. Further studies may investigate this hypothesis with experiments that are specifically designed to test the pattern of AoA vs. proficiency effects in more detail, both regarding their temporal distribution and their influence on different types of processing.

How can the effect of AoA on L2 processing be explained? In Exp. 5a, later-AoA L2ers showed a stronger increase in looks to the prominent non-local (inaccessible) antecedent after hearing the reflexive, compared to earlier-AoA L2ers. In Exp. 6a, later-AoA L2ers showed stronger increases to the prominent local (accessible) antecedent than earlier-AoA L2ers, but considered the inaccessible antecedent more strongly towards the end of the time window. According to the

Fundamental Difference Hypothesis (Bley-Vroman, 1989, 2009) and research by Ullman (2001, 2005), younger children have a better procedural memory than older children, and therefore are better at learning purely syntactic relationships. In the present study, earlier-AoA L2ers seem to have learned to automatically connect the reflexive with the accessible antecedent. Later-AoA L2ers, on the other hand, emphasized non-syntactic information more strongly during sentence processing compared to earlier-AoA L2ers, and therefore showed a stronger gaze preference for the discourse-prominent antecedent, irrespective of its syntactic accessibility.

While L2 proficiency has been shown to be an important predictor of L2 anaphor resolution in many studies (Ellert, 2013b; E. Kim et al., 2015; Köylü, 2010; Patterson et al., 2014; Wilson, 2009), the role of L1 proficiency in L2 processing has only rarely been discussed. In Exp. 6a, TELC Score was the strongest predictor of L2ers' eye movements in the pronoun condition, with high-TELC participants showing a weaker increase in looks to the prominent but incorrect local antecedent. In the discussion of Exp. 6a, I hypothesized that this could be due to cross-linguistic influence, as the Turkish overt pronoun *o* generally refers to non-topic antecedents.

In Exp. 6b, the role of L1 background in the resolution of the same constructions as in Exp. 6a was investigated by comparing Russian-speaking and Turkish-speaking L2ers of German. No L1 background effect was observed in the eye movements. However, the subset of the Turkish-speaking group from Exp. 6a which was used in Exp. 6b had a significantly lower mean TELC score than the remaining Turkish-speaking participants from Exp. 6a (14.59 vs. 19.21 , t=3.87), which may have prevented the L1 background effect. If the influence of the L1 is limited to participants with a high TELC Score, this could explain the lack of an L1 background effect in Exp. 6b. Exp. 8 tests Turkish versions of the materials in Exp. 6 with Turkish L1ers. If the effect of TELC Score indicates that high-TELC L2ers are more susceptible to an influence from their L1, we would expect the eye movements observed for high-TELC participants in Exp. 6a to resemble the eye movements of Turkish L1ers in Exp. 8 more closely than the eye movements of low-TELC participants in Exp. 6a.

5.6.4 L1 background

Exps. 5b and 6b investigated the role of L1 background in the application of Conditions A and B by comparing two proficiency-matched groups of L2ers of German with L1 Russian and Turkish, respectively.

Participants' L1 background affected pronoun and reflexive interpretation in Exp. 6b. Specifically, Russian speakers had a stronger overall preference than Turkish speakers for the non-local antecedent, which was embedded in an object relative clause. These clauses exists in this form in German and Russian, but not in Turkish. The results may be explained by Russian speakers having more experience with these types of constructions, or may be due to different learning experiences between the two L2 groups. They cannot be explained by a direct influence of the binding constraints of Russian and Turkish, as this would predict lower accuracies for Turkish speakers in both conditions. Therefore, the observed L1 background effects in the interpretation of anaphors are assumed to be independent of L1 binding properties.

In eye movements, L1 background effects were observed in Exp. 5b, with Russian L1ers showing a weaker gaze preference for the non-local antecedent compared to Turkish L1ers. These results resembled those of late-AoA Turkish-speaking L2ers in Exp. 5a. Therefore, the group differences in Exp. 5b were likely caused by AoA differences between groups. In Exp. 6b, no L1 background effect was observed for eye movements. However, the overall results suggest that the lack of group differences may be due to two effects which counteracted each other. First, based on the AoA effect in Exp. 6a, Russian speakers should have considered the local antecedent more strongly than Turkish speakers, due to their later AoA. Second, based on the interpretation pattern in Exp. 6b, Russian speakers should have shown a stronger preference for the non-local antecedent compared to Turkish speakers. While this explanation is speculative, it is in line with all effects observed in Exps. 5a, 5b, 6a, and 6b regarding the source of L1-L2 effects.

Overall, the results suggest that L1 background plays a role in L2 anaphor interpretation and processing. At the same time, the L1 background effects in Exps. 5b and 6b could not explain the L1-L2 differences observed for the same materials in Exps. 5a and 6a. Furthermore, the L1 background effects seem to be caused by factors other than the differing binding constraints between Russian and Turkish. Thus, while it is valuable to compare different L2 groups to determine which factors influence L2 anaphor resolution, the L1-L2 differences in anaphor resolution go beyond a potential influence of participants' L1.

5.7 Conclusion

This study sought to investigate L1-L2 differences in anaphor resolution as well as different variables which influence the L2 processing of German anaphors.

Turkish-speaking L2ers of German showed significant differences from German L1ers in the application of Conditions A and B. These indicate that L2ers have a stronger preference for discourse-prominent antecedents compared to L1ers, in line with the hypothesis that L2ers weight non-syntactic information more strongly than L1ers in sentence processing (Clahsen & Felser, 2006, 2017; Cunnings, 2016, 2017). The AoA of the L2 seems to influence online anaphoric processing of reflexives, while L2 proficiency is more relevant for predicting the ultimate interpretation of anaphors as well as later stages of processing pronouns.

Comparing two groups of L2ers with differing L1 backgrounds (Turkish and Russian) revealed that the observed L1-L2 differences could not be explained by an influence of the Turkish-speaking participants' L1. At the same time, other L1 background effects were observed, which suggests that participant characteristics beyond proficiency, AoA, and L1 binding constraints play a role in L2 anaphor processing and resolution.

Besides the results for L2ers, this study also provided interesting results regarding L1 anaphor resolution in German. While L1ers did generally align with Conditions A and B in interpretation and processing, interference from a prominent inaccessible antecedent was observed when a pronoun was embedded in an object relative clause, both in eye movements and in the end-of-trial interpretations. These results support cue-based retrieval models of sentence processing. At the same time, the observation that L1ers may consider a local antecedent for a pronoun 25% of the time is a novel finding, and differs from previous results on English.

This raises the question of whether adherence to binding constraints is subject to cross-linguistic differences. Ch. 6 addresses this question by investigating L1 anaphor resolution in Turkish, using Turkish translations of Exps. 5 and 6.

Chapter 6

The online application of Conditions A and B in monolingual L1ers and HSs of Turkish

6.1 Introduction

As described in Ch. 2, Turkish is a pro-drop language that also has several overt anaphors. The overt pronoun *o* is thought to be subject to Condition B (e.g., Kornfilt, 2001). The standard Turkish reflexive is *kendi*, which is thought to be subject to Condition A (Dinçtopal-Deniz, 2009; Enç, 1989; Gürel, 2002; Kornfilt, 2001), even though long-distance binding of *kendi* is also sometimes deemed acceptable (Göksel & Kerslake, 2005; Kornfilt, 2001). Exp. 3 tested the offline interpretation of *kendisi* and *kendi* and revealed that *kendi* can take non-local antecedents more frequently than previously assumed. Furthermore, the inflected reflexive form *kendisi* can take both local and non-local antecedents, and has variously been classified as either a long-distance reflexive, a pronominal (Rudnev, 2011), or as a phrasal constituent (Dinçtopal-Deniz, 2009; Kornfilt, 2001).

In short, the binding properties of Turkish anaphors, and specifically, their adherence to binding conditions A and B, are not yet fully understood. In the present study, to gain a deeper understanding of the online processing of

different types of Turkish anaphor, I carried out two Visual-World eyetracking experiments. I examined the processing of the forms *o*, *kendi* and *kendisi* in two different types of syntactic context.

Furthermore, HSs have become a topic of research interest in the past decades of research on bilingualism, as discussed in Ch. 3. Previous research (Gürel & Yilmaz, 2011; J.-H. Kim et al., 2009) has found that HSs often have difficulties interpreting referentially ambiguous anaphors, and differ from monolingual L1ers in showing a stronger preference for local or linearly closer antecedents over antecedents which are further away from the anaphor. HSs also sometimes merge different anaphors in interpretation.

This study served to further investigate whether and how HL processing may differ from that of monolingual L1ers. In Ch. 4, this topic was addressed by studying participants' offline interpretation of pronouns and reflexives in subject and object positions. Significant differences between HSs and monolinguals were found. The effects indicated that HSs contrasted different types of pronoun from each other more strongly than monolinguals did. Another effect was the influence of HL proficiency on participants' anaphor resolution: HSs with higher Turkish proficiency discriminated more strongly between different anaphors and were less monolingual-like in their responses. This study allows us to test whether the results from Ch. 4 extend to HSs' online processing of anaphors. While some studies claim that HSs perform more like monolingual L1ers in offline compared to online tasks (Flores, 2015; Sorace, 2011), others report the opposite pattern (Keating et al., 2016, 2011).

In the following, I present two experiments (Exp. 7 and Exp. 8). Both experiments tested monolingual Turkish L1ers and Turkish HSs. The HS group consisted of adults who had learned Turkish from birth in their families, and had started learning German between the ages of 0 and 6 years. Exp. 7 focused on the processing of anaphors with two potential c-commanding antecedents in contexts which resemble those used in Exp. 3. In Exp. 8, the order of local and non-local antecedent was reversed, and only one of the two potential antecedents was c-commanding. For each experiment, two analyses were carried out. The first analysis focused on the group comparison between monolinguals and HSs, and the second analysis investigated the role of proficiency in anaphor resolution within the HS group.

6.2 Experiment 7: Monolingual and HS processing of Turkish object anaphors

In Exp. 5a, German L1ers showed a clear preference for the accessible antecedent over the inaccessible antecedent after hearing a pronoun (*er*) or a reflexive (*sich*), both in eye movements and end-of-trial interpretation. The present experiment represents a Turkish version of Exp. 5a, and thus allows for a cross-linguistic comparison of online anaphor resolution between German and Turkish. While German anaphors are considered to align with Conditions A and B, at least some Turkish anaphors have been reported to be ambiguous between referring to a local or a non-local antecedent (Dinçtopal-Deniz, 2009; Göksel & Kerslake, 2005; Gürel, 2002; Kornfilt, 2001; Rudnev, 2011).

This is in line with the results of Exps. 1 and 3, where the German reflexive *sich* was unambiguously assigned to the local antecedent by German monolingual L1ers in Exp. 1, but Turkish monolingual L1ers in Exp. 3 interpreted the two anaphors *kendisi* and *kendi* as referentially ambiguous in a large proportion of cases (52.78% and 45.83% of responses, respectively). The online processing of referentially ambiguous anaphors may rely on different mechanisms and may be less automatic compared to the processing of anaphors with only one accessible antecedent in the discourse, due to the added complexity of managing competing analyses of a given structure.

Previous research on HSs' processing of pronouns and reflexives has shown that HSs may lose long-distance binding options (J.-H. Kim, 2007) and choose more local interpretations compared to monolinguals (Gürel & Yilmaz, 2011; J.-H. Kim et al., 2009). Based on these results from offline studies, it is not clear whether this effect is driven by a general preference for local reference, by an underlying issue in the processing of referentially ambiguous forms (Gürel & Yilmaz, 2011), or by influence from HSs' dominant L2. In order to gain deeper insight into what drives interpretational differences between HSs and monolinguals, this study examined the online processing and end-of-trial interpretation of three types of Turkish anaphor in monolingual L1ers and HSs, using the Visual-World paradigm.

This study further set out to test whether the effect observed in Ch. 4, i.e. the stronger discrimination of anaphors in HSs compared to monolinguals, can be replicated in an online eyetracking-during-listening experiment, where time constraints may influence participants' processing.

In Exp. 3, which used materials similar to those of the present experiment in a

questionnaire study, Turkish proficiency significantly influenced participants' response patterns: HSs with a higher Turkish proficiency showed bigger differences in interpretation between different anaphors than lower-proficiency HSs.[20] The present experiment further explored how Turkish proficiency influences both online processing of pronouns and end-of-trial interpretations in HSs, by analyzing the data of the HS group for proficiency effects (measured by their TELC score). In doing so, this experiment aimed to investigate whether potential differences in anaphor resolution between HSs and monolingual L1ers can be explained by HSs' HL proficiency.

6.2.1 Method

6.2.1.1 Participants

The monolingual group consisted of 42 adult Turkish L1ers (32 female, 10 male). They were all undergraduate students at Middle East Technical University (METU), Ankara, and were tested in a METU lab room. The participants' mean age was 19.12 (range=18-22, sd=0.81). They reported having no or only very limited knowledge of German.[21] However, all participants had some knowledge of English. The average age of acquisition for English was 10, the age at which English instruction in school normally starts. Most students in Turkey do not achieve fluency in English through high school education, which is predominantly administered in Turkish, so their knowledge of English was not expected to influence their native processing of the Turkish anaphors.

Table 6.1 *Participant information for the HS group in Exps. 7 and 8*

Variable	mean	range	sd
Age	22.98	18-36	3.60
German proficiency (%)	91.75	76.67-100.00	4.78
Turkish proficiency (%)	74.35	31.82-100.00	16.91
German AoA	2.20	0-6	2.06
Length of exposure to German (years)	20.71	14-32	3.64

In the bilingual group (see Table 6.1), there were 42 Turkish-German bilinguals

[20] German AoA, on the other hand, showed no significant effects or interactions.

[21] 23 participants reported having been exposed to German at some point in their lives, and the earliest age at which a participant had started learning German was 14.

(13 male, 29 female). All participants were living in Germany at the time of testing and had been educated in primarily German-speaking schools. Participants were recruited from the Turkish community in Berlin, and were tested in a lab at Technical University (TU) Berlin. All participants had started learning German upon or before entering first grade in school. Their average score on the Goethe placement test for German was 27.52/30 (91.75% correct), which corresponds to the C2 level ('proficient') in the CEFR. Turkish proficiency was measured with the TELC C1 test for Turkish. Participants scored 16.36 out of 22 points (74.35%) on average. Thus, participants' average proficiency was higher for the majority language German than for Turkish, their HL.

All participants had normal or corrected-to-normal vision.

6.2.1.2 Materials

An experimental session contained 24 experimental trials, taken from a pool of 48 experimental items (see Appendix A.1.10 for a full list).[22] Each experimental item could appear in three different conditions, one for each of the anaphors of interest (see (6.1) below). The experimental items of Exp. 7 served as fillers for Exp. 8 (see section 6.3.1.1), and vice versa, and they were interspersed among 72 additional fillers (listed in Appendix A.1.12), leading to a total of 120 trials per experimental session. All items were auditorily presented together with a visual display on a computer screen.

Auditory stimuli The auditory stimuli were based on the materials from Exp. 5. They consisted of a single experimental sentence in which the pronoun appeared, followed by a comprehension question which asked for the interpretation of the pronoun. Each experimental sentence contained two singular potential antecedents and one pronoun or reflexive.[23] The experimental sentences always consisted of a matrix clause and a nominalized subordinate clause. Due to the verb-final structure of Turkish, the verb of the matrix-clause appeared in sentence-final position, so the subordinate clause was enclosed by the matrix clause. For all sentences, the pronoun or reflexive was in the object position of the subordinate clause verb. The verb in the subordinate clause was chosen to be ambiguous between a transitive and a reflexive interpretation, in order to

[22] As in Ch. 5, 48 bases for experimental items were created for Exps. 7 and 8. These items could be turned into experimental items for each experiment (see Appendices A.1.10 and A.1.11). Six lists were created, all of which contained 24 experimental items from Exp. 7, with the remaining 24 bases for experimental items from the pool being used for Exp. 8.

[23] Unlike in the German experiments of Ch. 5, both masculine and feminine characters were included as potential antecedents, because Turkish pronouns and reflexives are not marked for gender.

ensure that the antecedent of the anaphor could not be determined on the basis of the semantics of the verb.

Both potential antecedents appeared before the anaphor and c-commanded it, but only one of them was inside the anaphor's governing category and therefore a potential local binder, constituting the subject of the nominalized embedded clause. The other potential antecedent was non-local and was the matrix subject as well as the first-mentioned entity in the sentence. Because the matrix subject also c-commanded the pronoun, it was a potential long-distance binder. Between the second-mentioned (local) antecedent and the pronoun, a temporal adverbial clause was inserted which contained the name of a country (e.g. in (6.1)): *Fransa'yı dolaşırlarken*, 'when they visited France'). The motivation behind this insertion is described in the paragraph *Visual Stimuli* below.

(6.1) Example stimulus set, Exp. 7

a. Mühendis [doktorun [Fransa'yı dolaşırlarken] **ona** bir elma
Engineer doctor$_{\text{Gen}}$ France$_{\text{Acc}}$ visit-when s/he$_{\text{Dat}}$ an apple
aldığını] gördü.
buy-that$_{3^{\text{rd}}\text{Sing}}$ see$_{3^{\text{rd}}\text{SingPast}}$
'The engineer saw that the doctor bought him/her an apple when they visited France.'

b. Mühendis [doktorun [Fransa'yı dolaşırlarken] **kendine** bir elma
Engineer doctor$_{\text{Gen}}$ France$_{\text{Acc}}$ visit-when self$_{\text{Dat}}$ an apple
aldığını] gördü.
buy-that$_{3^{\text{rd}}\text{Sing}}$ see$_{3^{\text{rd}}\text{SingPast}}$
'The engineer saw that the doctor bought himself/herself an apple when they visited France.'

c. Mühendis [doktorun [Fransa'yı dolaşırlarken] **kendisine** bir
Engineer doctor$_{\text{Gen}}$ France$_{\text{Acc}}$ visit-when s/he/self$_{\text{Dat}}$ an
elma aldığını] gördü.
apple buy-that$_{3^{\text{rd}}\text{Sing}}$ see$_{3^{\text{rd}}\text{SingPast}}$
'The engineer saw that the doctor bought him/her/him-/herself an apple when they visited France.'

Filler sentences were divided into three categories: The 18 pseudo-filler sentences had the same basic structure as the experimental sentences, but were either constructed such that the comprehension question asked for the country mentioned in the sentence (11 out of 18), such that the pronoun could be disambiguated using contextual information (4 out of 18), or they contained bare *kendi* or genitive-marked *kendisi* as possessive pronouns (3 out of 18). By having very similar structures but differences in referential ambiguity or comprehension

questions, the pseudo-fillers served to mask the purpose of the experiment.

Furthermore, there were 18 structurally similar fillers, which did not contain anaphors, but which were similar to the experimental items in their overall structure, i.e. they always contained two characters (which were also displayed on the computer screen) and a nominalized subordinate clause. However, only three of the structurally similar fillers contained the name of a country in the sentence.

Finally, 36 structurally different fillers were added to make the experiment less monotonous for participants and to better conceal the purpose of the experiment. These filler sentences could differ from the experimental items both in the amount of characters mentioned and the sentence structure, and their respective comprehension questions asked for various parts of the sentence, including the subject and mentioned countries, animals or objects.

The task, the recording and splicing of the materials, as well as the pseudo-randomized presentation order were the same as in Exp. 5.

Visual stimuli The visual displays for the experimental items always consisted of four pictures: the two potential antecedents and two distractor pictures. One of the two distractor pictures could include a character, an animal, or an object. The second distractor picture always displayed a flag. The screen position for each of the different pictures was counter-balanced across trials, so participants could not know in which position a specific part of the sentence would appear before seeing the display and hearing the relevant section of the sentence. An example display which matches the sentences given in (6.1) is given in Figure 6.1. The human-like characters as well as the animals and most of the objects on the pictures were photographs of Playmobil® figures.

For the experimental and pseudo-filler sentences, the country represented by the flag was mentioned in the sentence, after participants heard the two antecedents, but before the anaphor appeared. The goal of inserting a country name in combination with a picture of the respective flag was to steer participants' gaze away from the last-mentioned antecedent before hearing the anaphor. That is, upon hearing the first-mentioned antecedent, participants were expected to look at the picture of the respective character on the display. Then, after hearing the second antecedent, their gaze was expected to switch to the picture of the second-mentioned antecedent. Upon hearing the country name, participants were then expected to look at the flag of the mentioned country. Thus, if the flag manipulation worked, at anaphor onset, participants would be looking at

the flag, and therefore equally likely (or unlikely) to be looking at the last-mentioned antecedent or the first-mentioned antecedent.

As mentioned above, the majority of the pseudo-fillers had comprehension questions which asked for the country mentioned in the sentence. This was done to signal to participants that the country was an important part of the sentence and to thereby ensure that participants would also pay attention to the flag picture on the display while listening to experimental sentences.

Figure 6.1. Example display for Exp. 7.

For all fillers except for the pseudo-fillers, the visual displays were somewhat more flexible. That is, out of the four pictures on the screen, one to three pictures could display characters, one to three pictures could display animals or objects other than flags, and zero to two pictures could display the flag of a country. This served to provide some variety for participants and to prevent participants from developing strategic gaze behavior during the experiment.

6.2.1.3 Procedure

Participants were welcomed by the experimenter in Turkish. They had either already filled out a background questionnaire (including personal and language background information) prior to the experimental session, or filled out the questionnaire at the beginning of the experimental session. Participants were

given the necessary information and instructions for the experiment on a sheet of paper, and after reading and agreeing to it, they were seated in front of the computer screen and the eye-tracker.

The eye-tracker model was an SMI RED250, recording at 60 Hz. The eye-tracker was calibrated, after which participants went through four practice trials. After completing the practice trials, potential questions were addressed, and then the experiment started. Participants went through the 120 trials of the experiment independently, with a short break after 40 completed trials, and another after 80. During the breaks, participants could rest their eyes and talk to the experimenter, but were not allowed to communicate with people outside of the lab.

As mentioned above, each experimental sentence was followed by a question which probed the interpretation of the anaphor. Participants had to give a forced choice about whom the anaphor referred to by clicking on the picture of the anaphor's referent. After participants answered the comprehension question with a mouse click, the experimenter manually moved on to the next trial.

The experiment lasted 45-70 minutes, depending on participants' response speed and on whether they filled out the background questionnaire before or during the experimental session. At the end of the session, participants received a remuneration (8€ in the HS group, and 23 TL in the monolingual group, which corresponded to appr. 8€ at the time of testing).

6.2.1.4 Analysis

Data cleaning For the click responses, an exclusion criterion of 1 s before and 8 s after the offset of the comprehension question was applied for monolinguals, to ensure that participants had heard all relevant parts of the question and had answered the question within a reasonable amount of time. For HSs, the upper limit was set at 10 s instead of 8 s due to their slower reaction speed. This led to 0.94% of data (19 trials) being excluded. Furthermore, 3 clicks (0.15%) that went on regions on the screen other than the two potential antecedents were excluded as well. Thus, in total, 1.09% of the data for the comprehension questions was removed during data cleaning.

For the preparation and analysis of eye-movement data, I used the R package *eyetracking-R* (Dink & Ferguson, 2016). Only looks from 200 ms after the anaphor's uniqueness point[24] (UP) up to 2200 ms after UP were considered.

[24]Unlike in Exps. 5 and 6, the present experiment contained anaphors which could be

As in Ch. 5, only looks to the four pictures on display were included. Furthermore, trials in which the trackloss ratio was above 30% were excluded from the analysis. This step removed 78 trials. As no other steps were carried out for eye-movement data cleaning, the total data loss for the eye-movement data amounted to 3.83% of trials.

In the analysis of the role of HL proficiency in the HS group, data cleaning resulted in the exclusion of five trials in which participants did not respond within the specified time frame, and two trials in which participants had clicked on a region on the screen other than the two potential antecedents. As a result, 0.69% of the data was excluded in the comprehension questions. For the eye-movement data, 47 trials (4.56%) were removed after applying the cut-off criterion of 0.3 proportion trackloss per trial.

Statistical analysis The dependent variable for the comprehension questions was categorical and binomial: it only included clicks on either the local (coded as 0) or the non-local antecedent (coded as 1). Thus, it was a direct measure of the preference of the non-local antecedent over the local antecedent. For descriptive purposes, this measure was presented in percentage points. Due to the inherent binomial nature of the dependent variable, the inferential analysis employed mixed-effect logistic regression models. Models were computed with anaphor type as a three-level predictor variable (*kendi*, *kendisi*, *o*), and the best-fitting random-effect structure was determined through model comparison.

Eye movements were analyzed separately for each anaphor. For the eye-movement data, looks to the two antecedents were analyzed separately rather than computing an antecedent gaze preference score, to account for the possibility that looks to both antecedents increase during processing. This was thought to be relevant especially for referentially ambiguous pronouns. The first 200 ms post-UP were not considered in the analysis, because it is generally assumed that it takes approximately 200 ms to program an eye-movement (Rayner et al., 1983). The two seconds after the first 200 ms post-UP were used in the analysis. During this time, participants heard the remaining parts of the sentence, and, for some trials, the beginning of the one-second silence between the sentence and the comprehension question. For none of the trials was the beginning of the comprehension question heard during the critical time window.

For the inferential analysis of the eye-movement data, an empirical logit trans-

uniquely identified before their offset. Therefore, the uniqueness point rather than the offset was chosen as the reference point for the analysis. For *o* and *kendi*, the offset and uniqueness point were identical. For *kendisi*, the uniqueness point appeared before the last syllable which contained the case suffix *-ne* or *-ni*.

formation of the proportions of looks was carried out with time bins of 50ms. As in Ch. 5, higher-order time variables (Linear, Quadratic, Cubic and Quartic) were included, to determine how often the direction of gaze shifted after hearing the anaphor. (See 5.2.1.4 for details.) The first analysis investigated the overall increase in looks to each of the antecedents for each of the pronouns for the full two-second time window after hearing the anaphor. Monolinguals and HSs were first analyzed together to determine if Group interacted with the time-course of eye movements.

After this, the two groups were analyzed separately. In an analysis of the full time window, fixed effects were selected through model comparison, i.e. a linear time variable was always included, and further time variables were included only if they significantly improved the model fit. The random effects structure was determined through model comparison. After analyzing the full time window, the data for each group and anaphor was split into four 500 ms time windows. For this analysis, only linear gaze shifts were included as fixed effects, and the random slopes for this linear time variable were included for both items and subjects as long as they led to model convergence.

In order to explore the role of Turkish proficiency in HSs' antecedent choice, TELC score was included as a continuous predictor in the analysis of HSs' response choices and eye movements. For comprehension questions, first all three anaphors were analyzed within one model. If interactions between Anaphor Type and TELC score appeared, separate analyses for each anaphor were carried out.

For eye movements in the proficiency analysis, the same steps as in the between-group analysis were taken. Instead of the Group variable in the between-group analysis, the proficiency analysis tested for effects of and interactions with TELC Score. As in the between-group analysis, first the full two seconds after hearing the anaphor were analyzed separately for each anaphor, and then the time window was split up into four time windows of 500 ms to further explore the time-course of looks.

6.2.1.5 Predictions

The following predictions were made for **monolingual L1ers of Turkish**:

1. ***O*** will be interpreted as referring to the non-local antecedent, following Condition B.

    - In comprehension questions, the non-local antecedent will be strongly

preferred for *o*.

- In the eye-movement data, hearing *o* will lead to immediate and strong increases in looks to the non-local antecedent, and no increases in looks to the local antecedent.

2. ***Kendisi*** will be associated with both antecedents, based on Kornfilt's (2001) analysis of *kendisi* as a phrasal anaphor, and the questionnaire results from Exp. 3.

   - In comprehension questions, there will be no strong preference for either antecedent for *kendisi*.

   - In the eye-movement data, hearing *kendisi* will lead to increases in looks to both antecedents.

3. ***Kendi*** is also ambiguous between a local and a long-distance binder, but will be preferentially associated with the local antecedent, based on the questionnaire results from Exp. 3.

   - In comprehension questions, the local antecedent will be preferred for *kendi*. This preference will be stronger than for *kendisi*.

   - In the eye-movement data, hearing *kendi* will lead to immediate increases in looks to the local antecedent, with smaller increases in looks to the non-local antecedent.

The following predictions were made for **HSs of Turkish**:

1. If HSs have a general **preference for linearly closer antecedents**, they should

   - make more local antecedent choices than monolinguals in the comprehension questions.

   - show larger increases in looks to the local antecedent than monolinguals in the eye-movement data.

2. If the preference for linearly closer antecedents in HSs only extends to referentially ambiguous pronouns they should show the effects mentioned in 1. only for *kendisi* and *kendi*, but not for *o*.

3. Based on the results from Exp. 3, I expect to find stronger differentiation between anaphors in HSs compared to monolingual controls in their end-of-trial interpretations.

6.2.2 Results

6.2.2.1 Comprehension questions

Response choices in the comprehension questions are displayed in Figure 6.2. In the monolingual group, the clicks on the local vs. non-local antecedent were below 50% for all three anaphors. The preference for the non-local antecedent was strongest for *o*, followed by *kendisi*, and then *kendi*. The HSs showed the same contrasts between anaphors regarding their preference for the non-local antecedent, but had a higher percentage of clicks on the local antecedent for all anaphors.

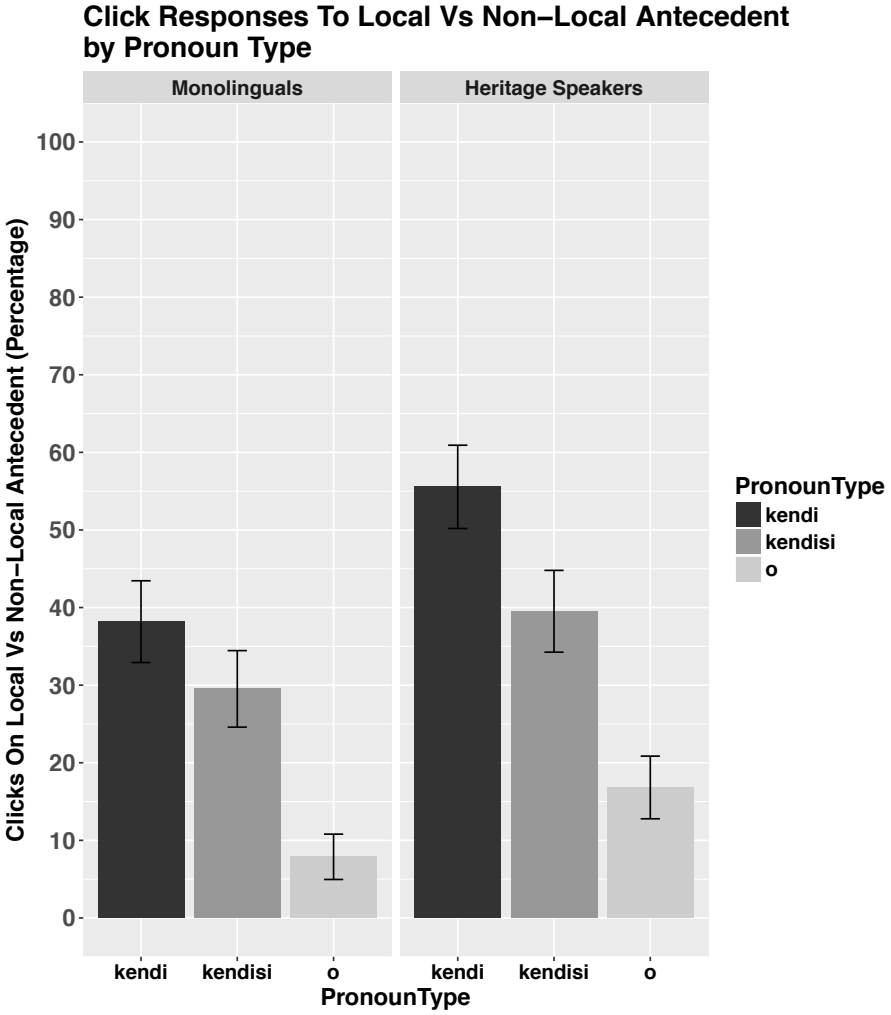

Figure 6.2. Results from the comprehension questions in Exp. 7, with the monolinguals on the left and HSs on the right.

The results of the inferential analysis of click responses are displayed in Table 6.2. In the baseline condition *kendisi*, the monolingual group significantly preferred the non-local over the local antecedent ($p<0.001$ for the intercept). This preference was weaker for *kendi* ($p<0.001$), and stronger for *o* ($p<0.001$), compared to *kendisi*. A significant group difference was found for the baseline condition ($p<0.05$), with HSs showing a weaker preference for the non-local antecedent for *kendisi*. Furthermore, there were no interactions between Group and AnaphorType$_{kendisi\text{-}kendi}$ or AnaphorType$_{kendisi\text{-}o}$. This suggests that HSs preferred the local antecedent more strongly than did the monolinguals for all three forms.

Table 6.2 *Results from the analysis of the comprehension questions in Exp. 7*

Fixed Effect	Estimate (SE)	z-value
Intercept	1.15(0.24)	**4.74**
AnaphorType$_{kendi}$	-0.50(0.19)	**-2.65**
AnaphorType$_{o}$	1.97(0.26)	**7.63**
Group$_{\text{HSs}}$	-0.56(0.23)	**-2.44**
AnaphorType$_{kendi}$*Group$_{\text{HSs}}$	-0.34(0.26)	1.29
AnaphorType$_{o}$*Group$_{\text{HSs}}$	-0.46(0.33)	-1.41

Note. Baseline condition was *kendisi* in the monolingual group. Marginal or significant effects are boldfaced.

6.2.2.2 Eye-movement data

Graphs for fixations over time are plotted separately for the three pronouns, with Figure 6.3 displaying the results for the *kendi* condition, 6.4 for *kendisi* and 6.5 for *o*.

For *kendi*, monolinguals showed an early and continued increase in looks to the local antecedent. In the HS group, looks to the local antecedent showed a relatively flat or slightly downward sloping trajectory for the first 1750 ms after hearing *kendi*. Only after 1750ms is there an increase in looks for HSs. Furthermore, there was a baseline effect: The HSs were more likely to look at the local antecedent at the beginning of the time window. Non-local looks increased for both groups. The proportions at the beginning and at the end of the 2-second time window were comparable between groups, but the increase seemed to appear somewhat earlier for the HSs.

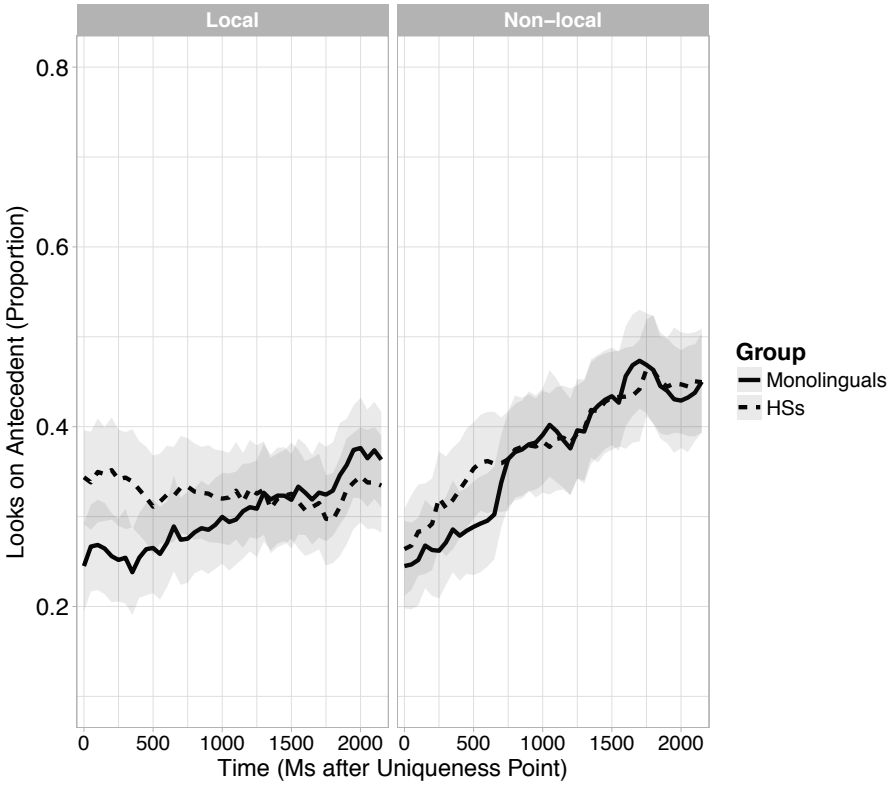

Figure 6.3. Looks to the local and non-local antecedent for the *kendi* condition for both groups, Exp. 7.

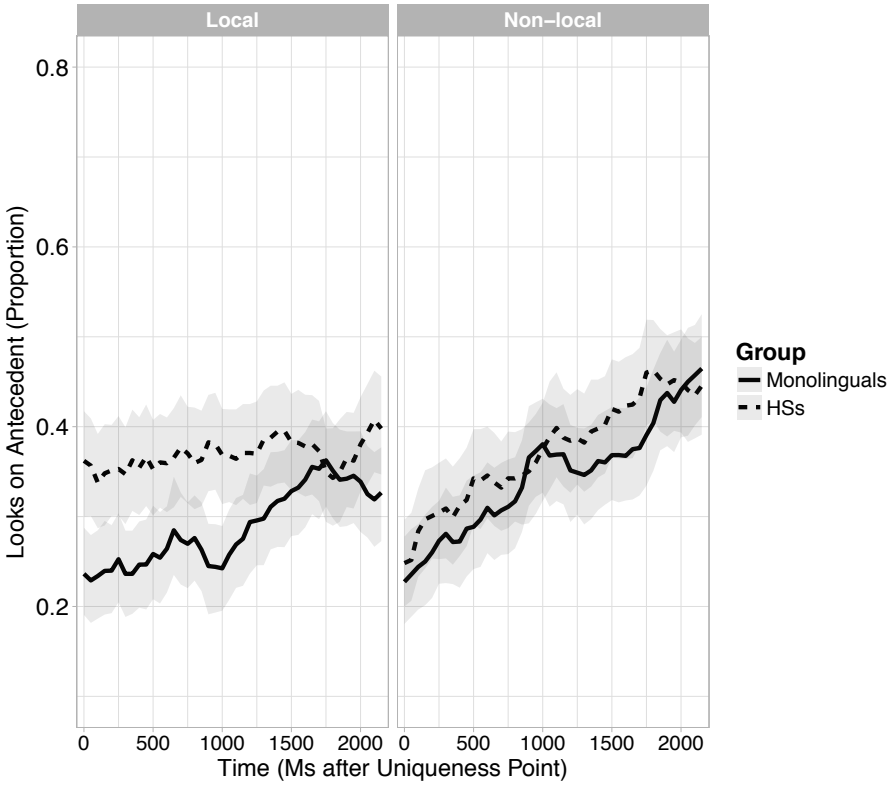

Figure 6.4. Looks to the local and non-local antecedent for the *kendisi* condition for both groups, Exp. 7.

For *kendisi*, looks to the local antecedent increased slightly at the beginning of the time window for the monolingual group, before taking a dip between 700 and 1000 ms post-UP, and then increasing again. At the end of the time window (from 1750 ms post-UP), local looks decreased again. In the HS group, looks to the local antecedent initially increased only slightly, before decreasing strongly after 1300ms post-UP, and then increasing again between 1800ms and 2200ms post-UP. However, a baseline effect was observed here as well: HSs were much more likely than monolinguals to look at the local antecedent immediately after hearing *kendisi*. For the non-local antecedent, both groups showed an immediate and large increase in looks after hearing the anaphor. The increase appeared to be slightly larger and more continuous in HSs than in monolinguals.

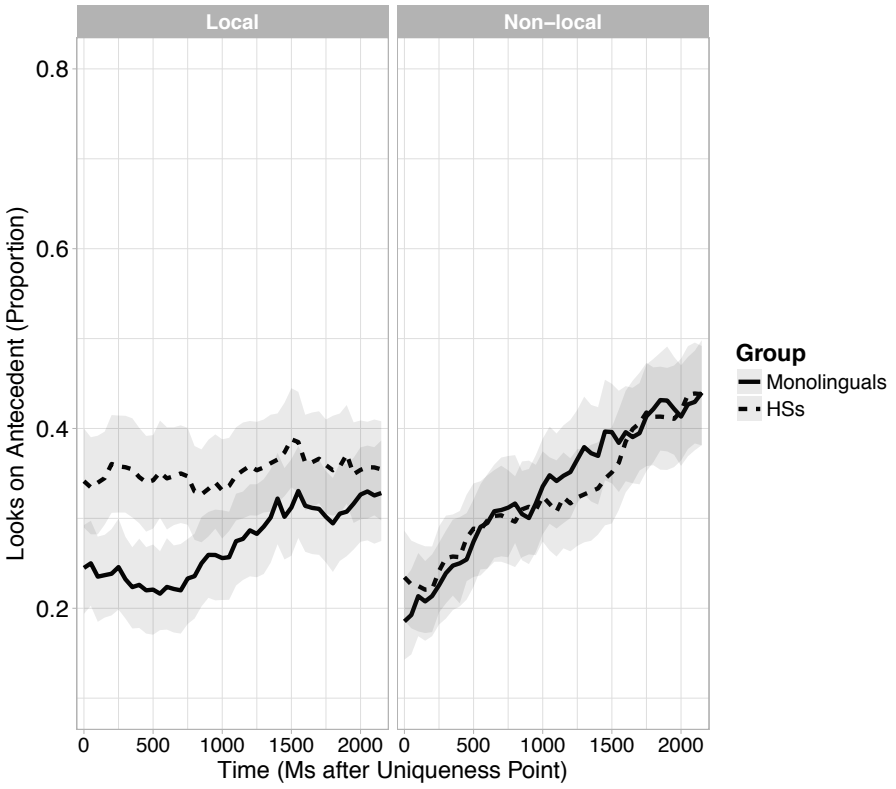

Figure 6.5. Looks to the local and non-local antecedent for the *o* condition for both groups, Exp. 7.

For *o*, group differences were observed in looks to the local antecedent. As was the case for *kendisi* and *kendi*, HSs were more likely to look at the local antecedent immediately after hearing *o*. Furthermore, only slight increases in local looks over time were observed in the HS group, while the monolinguals showed an increase after 700ms post-UP. Looks to the non-local antecedent,

on the other hand, increased immediately and strongly in both groups; only between 1000ms and 1600ms post-UP was there a slightly lower proportion of looks to the non-local antecedent in HSs compared to monolinguals.

The inferential analysis was carried out separately for each anaphor and antecedent. Effects of Group were found for *kendisi* (HSs showed more looks to the local antecedent overall, t=-2.35) and *kendi* (for the non-local antecedent: Group * Quadratic t=-2.27 and Group * Cubic t=2.52; for the local antecedent: Group * Linear t=1.95). The full results of this analysis are listed in Appendix A.2.1. Given the interactions with Group for *kendi*, I decided to analyze the two groups' fixation patterns separately.

Results from each group's empirical logit analysis of the full 2-s time window are presented in Tables 6.3 and 6.4 for monolinguals and HSs, respectively.[25] In both groups, effects of higher-order time variables were observed, suggesting that the direction of gaze shifted several times over the course of the 2-s time window. For monolinguals, effects of higher-order time variables were found mainly for *o*, while only a linear increase in looks to both antecedents was found for *kendisi*. For HSs, significant effects of quartic and/or cubic time were found for all three anaphors.

Based on the above effects and visual inspection of the time-course of looks in Figs. 6.3-6.5, four time windows of 500 ms were created to explore the time-course within each group in more detail. The results of the time-window analysis are listed in Tables 6.5 and 6.6 for monolinguals and HSs, respectively.[26] I will first describe the monolinguals' results before moving on to the HS group.

For *kendi*, monolinguals showed significant increases in looks to the local antecedent in the second time window (700-1200 ms post-UP) and the last time window (1700-2200 ms). Looks to the non-local antecedent increased significantly only in the first time window. For *kendisi*, a significant increase in looks to the local antecedent was found in the third time window (1200-1700 ms post-UP). Looks to the non-local antecedent significantly increased in the second and third time windows after hearing *kendisi*. For *o*, monolinguals showed a significant **de**crease in looks to the local antecedent in the very first time window. Only in the final time window after hearing *o* did monolinguals' looks to the local antecedent increase. In contrast, looks to the non-local antecedent increased immediately after hearing *o*, as well as in the final time window. Furthermore, a decrease in looks to the non-local antecedent was found in the second time

[25] These tables only list the t-values of the fixed effects. Full results tables for each analysis can be found in Appendix A.2.2.

[26] These tables only list the t-values of the fixed effect for a linear increase in looks over time for each time window. Full results tables for each analysis can be found in Appendix A.2.3.

window.

Turning to HSs' results (see Table 6.6), for *kendi*, looks to the local antecedent significantly decreased in the first and third time windows, before showing a significant increase in the final time window. Furthermore, a significant increase in looks to the non-local antecedent was observed in the second and third time windows. For *kendisi*, HSs showed increases in looks to the local antecedent in the first and last time windows. A significant increase in looks to the non-local antecedent after hearing *kendisi* was observed over the first three time windows. For *o*, looks to the local antecedent also increased significantly in the second time window. For the non-local antecedent, an immediate and large increase in looks reached significance in the first 500ms after hearing the pronoun. After that, no significant effects were found.

Table 6.3 *Results from the empirical logit analysis of the eye-movement data in monolinguals, Exp. 7*

Anaphor and time variable	Local	Non-local
kendi		
Intercept	**9.94**	**15.19**
Linear	**3.33**	**4.62**
Quadratic	-0.32	**-2.17**
Cubic	1.03	1.64
Quartic	0.64	-1.46
kendisi		
Intercept	**10.28**	**12.66**
Linear	**2.85**	**4.74**
Quadratic	-0.61	-1.13
Cubic	-1.32	-0.90
Quartic	-0.40	0.77
o		
Intercept	**8.45**	**12.74**
Linear	**3.33**	**4.48**
Quadratic	-0.95	**-2.11**
Cubic	-0.42	**2.48**
Quartic	**1.71**	-1.32

Note. Marginal or significant effects are boldfaced.

Table 6.4 *Results from the empirical logit analysis of the eye-movement data in HSs, Exp. 7*

Anaphor and time variable	Local	Non-local
kendi		
Intercept	**6.99**	**11.46**
Linear	0.66	**3.76**
Quadratic	1.37	0.86
Cubic	-0.30	**-2.82**
Quartic	**1.89**	0.66
kendisi		
Intercept	**23.70**	**17.96**
Linear	**1.68**	**2.82**
Quadratic	**-3.18**	**-3.35**
Cubic	0.71	-0.57
Quartic	**3.24**	**2.73**
o		
Intercept	**9.64**	**11.28**
Linear	**2.64**	**4.64**
Quadratic	1.45	0.51
Cubic	**-2.27**	**2.01**
Quartic	**2.21**	**-3.09**

Note. Marginal or significant effects are boldfaced.

Table 6.5 *Results from the empirical logit analysis of the eye-movement data with 500 ms time windows in monolinguals, Exp. 7*

Anaphor and time window	Local	Non-local
kendi		
200-700ms	1.00	**2.78**
700-1200ms	**3.15**	1.59
1200-1700ms	0.89	1.57
1700-2200ms	**2.73**	0.08
kendisi		
200-700ms	1.53	0.93
700-1200ms	1.22	**3.85**
1200-1700ms	**3.51**	**3.16**
1700-2200ms	-0.78	0.98
o		
200-700ms	**-2.51**	**3.93**
700-1200ms	0.48	**-2.15**
1200-1700ms	1.33	0.63
1700-2200ms	**3.36**	**2.29**

Note. Values in the cells are t-values for the linear increase in looks to the respective antecedent over time. Marginal or significant effects are boldfaced.

Table 6.6 *Results from the empirical logit analysis of the eye-movement data with 500 ms time windows in HSs, Exp. 7*

Anaphor and time window	Local	Non-local
kendi		
200-700ms	**-2.88**	1.21
700-1200ms	1.14	**2.07**
1200-1700ms	**-2.26**	**2.83**
1700-2200ms	**3.33**	0.17
kendisi		
200-700ms	**3.62**	**3.81**
700-1200ms	0.27	**3.60**
1200-1700ms	-0.25	**1.91**
1700-2200ms	**3.76**	-0.19
o		
200-700ms	-0.38	**4.36**
700-1200ms	**2.22**	0.22
1200-1700ms	0.41	0.59
1700-2200ms	0.32	0.37

Note. Values in the cells are t-values for the linear increase in looks to the respective antecedent over time. Marginal or significant effects are boldfaced.

6.2.2.3 Individual differences

Comprehension questions The relationship between TELC score and local vs. non-local antecedent choice is displayed in Figure 6.6. For *kendi*, participants with a higher TELC score had a slightly stronger preference for the local over the non-local antecedent on average, compared to lower-proficiency HSs. For *kendisi* and *o*, the effects pointed in the opposite direction. While there was a high variation in HSs' local vs. non-local preference for *kendisi*, the values for *o* clearly indicated a stronger preference for the non-local antecedent in higher-proficiency HSs compared to lower-proficiency HSs.

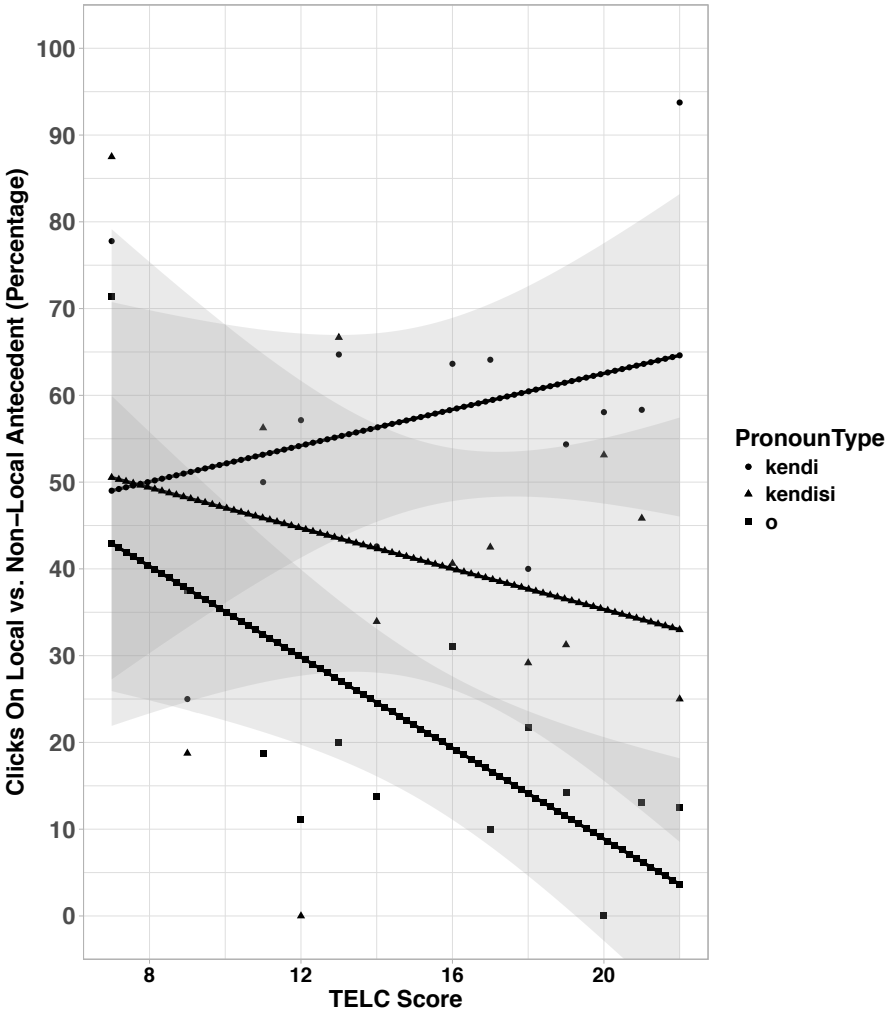

Figure 6.6. HSs' responses to the comprehension questions in relation to their TELC score, separated by anaphor type, Exp. 7. The lines represent the linear relationship that best describes the overall pattern in the individual data points. The grey bands around the lines represent the confidence interval.

The results of the inferential analysis are displayed in Table 6.7. The analysis revealed a significant interaction of TELC score and AnaphorType$_{kendisi\text{-}kendi}$ ($p<0.001$) and a marginal interaction of TELC score and AnaphorType$_{kendisi\text{-}o}$. The direction of the interactions indicates that higher-proficiency HSs contrasted the forms from each other more strongly than lower-proficiency HSs. In order to further explore the interactions, the conditions were split up and the effect of TELC score was estimated separately for each anaphor (see Appendix A.2.6 for the model outputs). For *o*, a significant effect of TELC score ($z=3.20, p<0.01$) indicated that a higher TELC score led to more non-local antecedent choices for *o*. For *kendi*, there was a marginal effect of TELC score, with a higher TELC score leading to more local antecedent choices ($z=-1.71$, $0.05<p<0.1$). Finally, TELC score had no significant effect on antecedent choices for *kendisi* ($z=0.61$, $p>0.1$).

Table 6.7 *Results from the analysis of HSs' responses to comprehension questions in relation to their TELC score, Exp. 7*

Fixed Effect	Estimate (SE)	z-value
Intercept	0.55(0.22)	**2.48**
AnaphorType$_{kendi}$	-0.80(0.18)	**-4.42**
AnaphorType$_{o}$	1.51(0.21)	**7.02**
TELC	0.04(0.05)	0.91
AnaphorType$_{kendi}$*TELC	-0.12(0.05)	**-2.41**
AnaphorType$_{o}$*TELC	0.06(0.06)	**1.93**

Note. The baseline condition was *kendisi*. Marginal or significant effects are boldfaced.

Eye-movement data The influence of TELC score on participants' eye movements is displayed in Figs. 6.7-6.9, separately for each anaphor. As in Ch. 5, the visualization compares eye movements for a high- and a low-proficiency group (determined by a median split), while the inferential analysis uses TELC score as a continuous predictor.

For *kendi*, the high-proficiency group showed more looks to the local antecedent, and fewer looks to the non-local antecedent: A steep increase in looks to the non-local antecedent after hearing *kendi* was only observed in the low-proficiency group, while high-proficiency HSs showed more moderate increases.

For *kendisi*, clear group differences only emerged after around 1250 ms post-

UP, when high-proficiency HSs showed an increase in looks to the local antecedent, while low-proficiency HSs showed an increase in looks to the non-local antecedent.

For *o*, the two groups' lines for local antecedent looks were on top of each other. For the non-local antecedent, a baseline difference was observed: high-proficiency HSs were less likely to look at the non-local antecedent at the beginning of the time window. The high-proficiency group also showed a larger increase in looks to the non-local antecedent immediately after hearing *o*. From about 750 ms post-UP, the two groups' eye movements showed very similar increases in looks to the non-local antecedent.

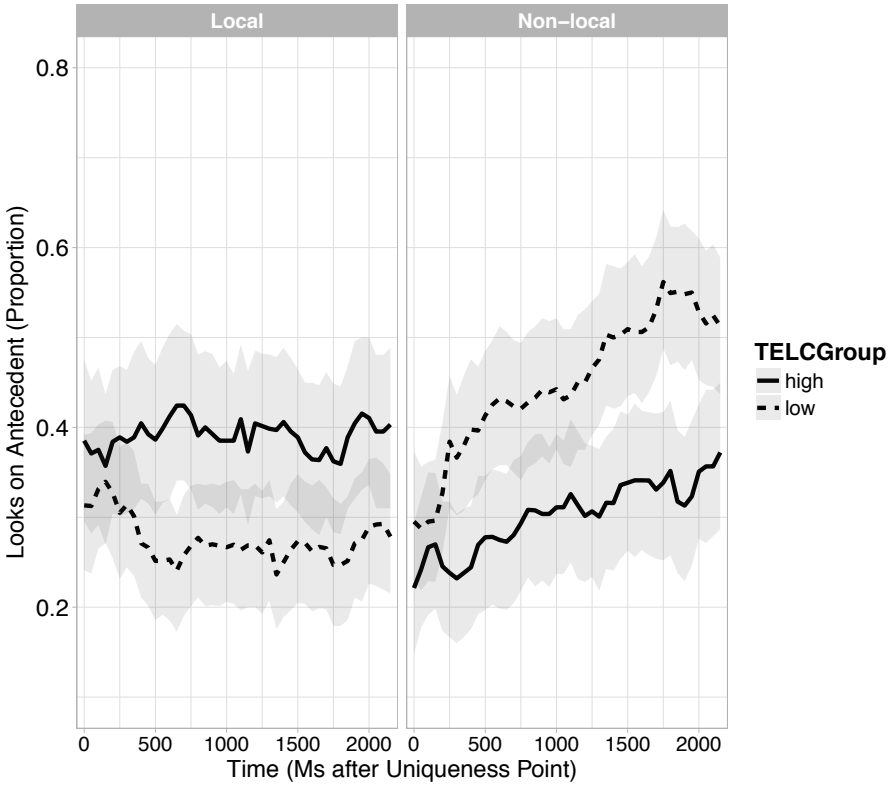

Figure 6.7. HSs' looks to the local and non-local antecedent for the *kendi* condition by TELC score, Exp. 7.

The inferential analysis of eye movements in the full time window (see Table 6.8) revealed that for *kendi*, higher-proficiency HSs showed more looks to the local antecedent than lower-proficiency HSs (t=2.31). Furthermore, higher-proficiency HSs showed a stronger increase in looks to the non-local antecedent than lower-proficiency HSs for *o* (t=2.04). No other significant or marginal effects were found in the analysis of the full time window.

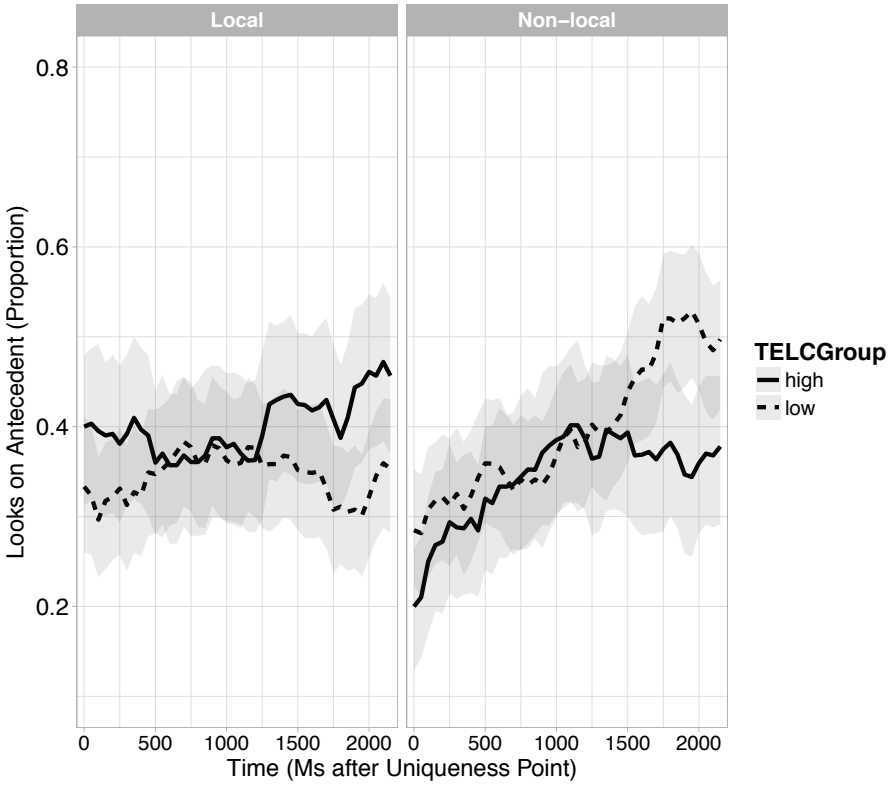

Figure 6.8. HSs' looks to the local and non-local antecedent for the *kendisi* condition by TELC score, Exp. 7.

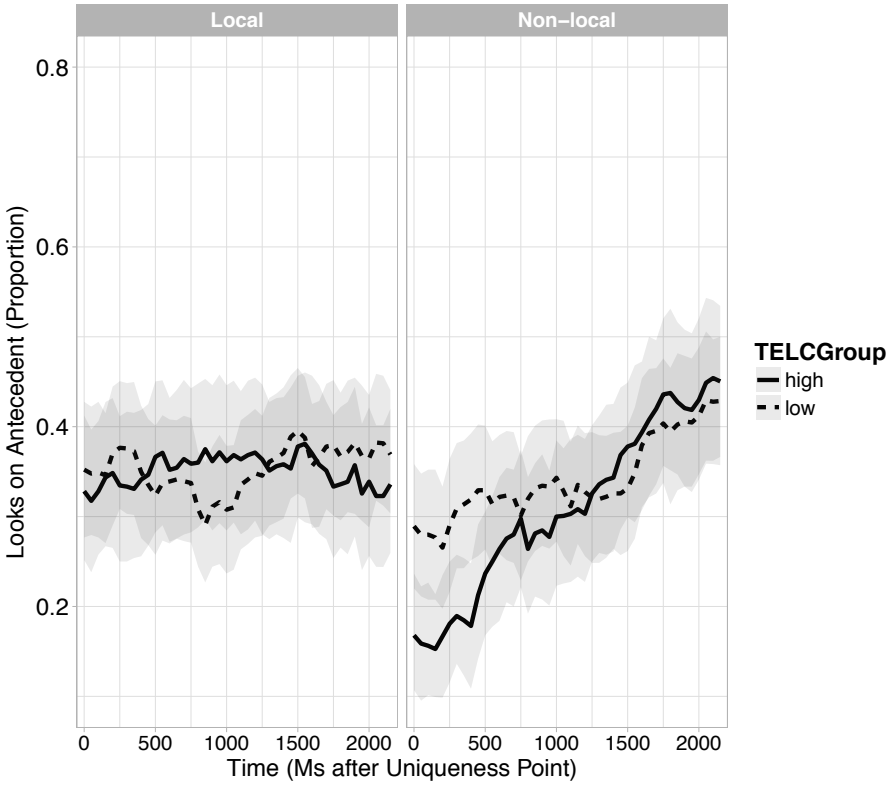

Figure 6.9. HSs' looks to the local and non-local antecedent for the *o* condition by TELC score, Exp. 7.

When splitting up the data into four 500ms time windows (see Table 6.9), a marginal or significant effect of TELC score was found for *kendi* in all four time windows: HSs with higher TELC scores were more likely to look at the local antecedent than lower-proficiency HSs. Furthermore, participants with lower TELC scores showed a marginally larger increase in looks to the local antecedent in the final time window after hearing *kendi*, compared to higher-proficiency participants (t=-1.76). There was also a trend for an influence of TELC score on looks to the non-local antecedent for *kendisi* in the first time window (200-700 ms post-UP), with higher-proficiency HSs showing a larger increase in looks to the non-local antecedent than lower-proficiency HSs (t=-1.85). No other effects reached marginal or full significance.

Table 6.8 *Effect of TELC score from the empirical logit analysis of the eye-movement data in HSs, Exp. 7*

Anaphor and time variable	Local	Non-local
kendi		
TELC	**2.31**	-0.45
TELC * Linear	0.04	-0.80
TELC * Quadratic	-0.79	1.22
TELC * Cubic	0.31	0.56
TELC * Quartic	-0.72	-1.24
kendisi		
TELC	0.53	0.54
TELC * Linear	0.58	-1.50
TELC * Quadratic	0.04	0.87
TELC * Cubic	-0.29	-0.05
TELC * Quartic	-0.16	-0.32
o		
TELC	-0.14	-0.29
TELC * Linear	-0.82	**2.04**
TELC * Quadratic	-0.42	-0.26
TELC * Cubic	-1.25	-0.28
TELC * Quartic	-0.58	-0.50

Note. Marginal or significant effects are boldfaced.

Table 6.9 *Effects of TELC from the empirical logit analysis of the eye-movement data with 500 ms time windows in HSs, Exp. 7*

	Local		**Non-local**	
Anaphor and time window	TELC	TELC * Linear	TELC	TELC * Linear
kendi				
200-700ms	**1.97**	1.31	0.18	-0.28
700-1200ms	**1.95**	0.59	-0.08	0.08
1200-1700ms	**2.63**	-0.73	-0.70	0.89
1700-2200ms	**2.98**	**-1.76**	-0.92	0.53
kendisi				
200-700ms	0.58	-0.28	-0.75	**-1.85**
700-1200ms	1.00	-0.25	1.22	-0.37
1200-1700ms	1.30	-0.12	0.12	-0.02
1700-2200ms	0.48	-0.02	-0.19	-0.80
o				
200-700ms	0.80	-0.18	0.15	0.90
700-1200ms	-0.20	-1.03	-0.59	-0.60
1200-1700ms	0.53	0.18	0.65	0.92
1700-2200ms	-0.00	-0.80	1.16	0.15

Note. Marginal or significant effects are boldfaced.

6.2.3 Discussion

In the comprehension questions, monolinguals showed a preference for the non-local antecedent for all three anaphor types. The preference for the non-local antecedent was strongest for *o*, followed by *kendisi* and then *kendi*. HSs showed the same differences between conditions, but preferred the local antecedent more strongly than monolinguals for all three forms.

In the eye-movement data, monolinguals preferred the non-local antecedent for *o*, showed increases in looks to both antecedents for *kendisi*, and preferred the local antecedent for *kendi*. HSs' eye movements overall displayed larger increases for the non-local antecedent than the local antecedent, while monolinguals showed more balanced increases in looks between the two potential antecedents.

Furthermore, HSs' results in comprehension questions and eye movements were influenced by HL proficiency.

6.2.3.1 Monolinguals

For *o*, the monolinguals' response pattern is in line with the predictions, as there is only very little consideration of the local antecedent. Furthermore, the eye-movement data reveal an immediate and large increase in looks to the non-local antecedent. Thus, the eye-movement pattern matches participants' response data, and the results are in line with the assumption that *o* is a non-reflexive pronoun which follows Condition B.

One effect in monolinguals' eye-movement data for *o* may be surprising given the strong preference for the non-local antecedent in the comprehension questions: In the second time window, there is a small but significant decrease in looks to the non-local antecedent. This cannot be attributed to increased consideration of the local antecedent, as looks to the local antecedent also decrease in this time window (the effect does not reach significance, but this is indicated by the direction of the effect in Table 6.5). Rather, participants may have briefly considered the other pictures on the display. *O* tends to prefer antecedents that are not prominent, and often prefers and sometimes even requires a sentence-external antecedent (Gürel, 2002). In this experiment, there was only one accessible antecedent for *o* inside the experimental sentence, hence it is possible that participants scanned the remaining pictures on the screen for other potential antecedents, before returning to the sentence-internal antecedents.

For *kendisi*, the pattern of results in comprehension questions and eye movements is in line with the predictions and Kornfilt (2001)'s analysis of *kendisi* as a phrasal constituent. Monolinguals chose the non-local over the local antecedent for *kendisi* 70% of the time in comprehension questions, and showed increases in looks to both antecedents in eye movements, which shows that *kendisi* is referentially ambiguous. The preference for the non-local antecedent in comprehension questions may be caused by its prominent position as the matrix subject and the first-mentioned antecedent. However, the present results cannot rule out the possibility that *kendisi* is a long-distance reflexive, as the non-local antecedent was a potential long-distance binder. Exp. 8 will test the processing and interpretation of *kendisi* in sentences without a long-distance binder, to determine whether a non-c-commanding potential antecedent is also considered for *kendisi*.

Monolinguals' response choices for *kendi* are in line with the prediction that *kendi* is interpreted as ambiguous between a local antecedent and a long-distance binder. This prediction was based on the results from Exp. 3, where monolinguals chose the long-distance antecedent in 23.3% of responses in an offline questionnaire experiment with similar materials, and chose an ambiguous response option for *kendi* in 45.83% of responses. In the present experiment, participants chose the non-local over the local antecedent in 62% of responses. A post-hoc analysis[27] revealed that the preference for the non-local antecedent is significantly above chance level.

The preference for the non-local antecedent in comprehension questions is not in line with the predictions, as a preference for the local antecedent was expected. A similar contrast between predictions and results was observed in monolinguals' eye movements for *kendi*: While larger and earlier increases in looks to the local antecedent were predicted, looks to the non-local antecedent increased earlier than looks to the local antecedent.

Both Kornfilt (2001) and Exp. 3 found a clear preference for local over non-local antecedents for *kendi*. In contrast, the present experiment found a preference for non-local antecedents for *kendi*, which was also reported in Özbek and Kahraman (2016), and is often found in long-distance reflexives (Huang, 2000). What can explain the different results patterns between Exp. 3 and the present experiment despite similar materials?[28]

[27] The analysis consisted of re-running the model in Table 6.2 with *kendi* as the baseline condition; see Appendix A.2.4 for the model output.

[28] Note that the same effect (i.e., a stronger preference for the non-local antecedent in the present experiment compared to Exp. 3) was also observed for *kendisi*.

First, the difference between experiments could be due to a task effect. A listening task like the one used in this experiment is more taxing on working memory and may therefore lead to a stronger preference for the more prominent antecedent. Previous studies have shown that subjecthood is the most important determinant of prominence in Turkish (Bouma & Hopp, 2006), and that Turkish L1ers prefer subject antecedents for referentially ambiguous pronouns (Schimke & Colonna, 2015). The most prominent antecedent in both the questionnaire and the eye-tracking study was the matrix subject, which was the non-local antecedent. In the questionnaire study, which employed an untimed written task, the prominence of the non-local antecedent was possibly not strong enough to override *kendi*'s local antecedent preference, while in the listening task employed in the present experiment, it seems that working memory limitations forced participants to rely more strongly on factors such as prominence, thereby shifting the bias for both *kendi* and *kendisi* away from the local antecedent.

Second, there was a crucial difference in the materials: the sentences in the present experiment contained an additional temporal adverbial clause (a *-ken* construction), which was inserted after the second-mentioned antecedent. This step was necessary to convert the questionnaire study into a Visual-World paradigm (as described in section 6.1), but it also increased the linear distance between the local antecedent and the anaphor. The increased distance itself may have resulted in a reduced prominence of the local compared to the non-local antecedent, but another factor may have been at play as well: When three nouns or potential antecedents are presented in a row, the second-mentioned entity is the least prominent out of the three and is hardest to reactivate. In the materials, I only presented two potential antecedents for the anaphor; however, unlike in the questionnaire materials, in the present experiment, the second antecedent was followed by the name of a country for all experimental items. This country name is a noun phrase which could theoretically be referred to later on in discourse.[29]

Hence, it is possible to think of the first three noun phrases in each sentence as a list of potential antecedents. If this is the case, the prominence of the second-mentioned antecedent may be strongly reduced compared to the first-mentioned antecedent, and more reduced than in the comparable questionnaire materials (Exp. 3), due to the introduction of a third noun phrase before the anaphor. Its strongly reduced prominence makes the second-mentioned local antecedent a less attractive antecedent for *kendi* and *kendisi*, which allow for long-distance binding and hence prefer the more prominent non-local antecedent.

[29]Furthermore, several comprehension questions in the fillers asked for the country to motivate participants to pay attention to this part of the sentence.

Another effect of the adverbial clause, which was always of the form *when they [verb] in [country name]* may have been on participants' perception of whose point of view was described in the sentence. In one-sentence contexts, point of view may be detectable, but not very strong compared to contexts in which a potential antecedent's point of view is described several times. The inserted adverbial clause may further strengthen the point-of-view expressed in the sentence compared to the questionnaire materials without an adverbial clause. Schlyter (1978) claims that *kendisi* prefers antecedents whose point of view is described, and Kornfilt (2001) has noted that *kendi* may take non-local antecedents in narrative style, where it can refer to the antecedent whose point-of-view is described. Thus, a shift in the point-of-view between questionnaire materials and eye-tracking materials may explain the different interpretation patterns for both *kendisi* and *kendi*.

One further question arises at the end of this discussion: Given the observed effect of prominence on the interpretation of the referentially ambiguous forms *kendisi* and *kendi*, one might wonder whether prominence also influenced participants' interpretation and processing of *o*. In the absence of questionnaire data (recall that Exp. 3 only tested *kendisi* and *kendi*), we can only observe that a very strong preference for a highly prominent non-local antecedent exists for *o* in a listening task. In order to sufficiently test whether this is only due to the application of Condition B or whether the fact that the accessible antecedent was also the most prominent increased participants' bias towards the non-local antecedent, it is necessary to look at how participants interpret *o* when the non-local antecedent is less prominent than the local antecedent. This is done in Exp. 8.

6.2.3.2 HSs

The finding that HSs ultimately chose the local antecedent more often than monolinguals is in line with previous offline studies reporting a preference for linearly close antecedents in HSs (Gürel & Yilmaz, 2011; J.-H. Kim et al., 2009). The results did not reveal a difference between *o* on the one hand and *kendisi* and *kendi* on the other hand regarding this preference in HSs. Thus, HSs were not more monolingual-like in the interpretation of anaphors with only one accessible antecedent in the discourse compared to referentially ambiguous anaphors, unlike what was reported in J.-H. Kim et al. (2009) and Gürel and Yilmaz (2011).

Furthermore, distinct biases for all three anaphors in the monolingual group, and

the lack of a Group by AnaphorType interaction suggests that HSs discriminated between the two forms to the same extent as the monolingual group. Thus, there was no evidence that HSs collapse *kendisi* and *kendi* in their antecedent choices. A post-hoc analysis, in which the model in Table 6.2 was re-run with HSs as the baseline group, confirmed this conclusion by finding significant differences in antecedent preference between *kendisi* and *kendi* ($z=-4.57$, $p<0.001$), as well as *kendisi* and *o* ($z=7.12$, $p<0.001$; see Appendix A.2.5 for the full results).

Turning to the eye-movement data, HSs' early increases in looks to the non-local antecedent for all three forms may indicate that HSs are initially drawn to prominent and/or first-mentioned antecedents after encountering an anaphor, even when they do not prefer the antecedent in end-of-trial choices. These results reveal a clear difference between participants' online processing behavior and end-of-trial interpretations, where the preference for the non-local antecedent was weaker or non-existent. This effect was not observed in the monolingual group.

As mentioned in the introduction, some accounts suggest that HSs have a monolingual-like accuracy in offline tasks, while their online processing may be non-monolingual-like (e.g., Flores, 2015; Sorace, 2011). However, Keating et al. (2016) reported that HSs did not differ from monolingual L1ers in an online task, while showing difficulties in a comparable questionnaire experiment. It is important to note that the data from the comprehension questions in the present experiment may not be categorized as offline results due to the fact that participants did not have unlimited time to listen to each utterance and answer the question. Rather, the experimental sentences and questions were only heard once, and participants were asked to respond as quickly as possible. Thus, the present results do not constitute an online-offline contrast in HS processing, but rather a contrast between immediate and final anaphor resolution.

A potential confound in the comparison of eye movements between the monolingual and the HS group is the observation that HSs were more likely to look at the local antecedent at the beginning of the time window. This effect was not expected and thus requires further exploration. The fact that looks to the non-local antecedent were comparable between groups at the beginning of the time window, while there were more looks to the local antecedent in the HS group indicates that HSs looked less at the other pictures on the screen at this time point.

Thus, the flag insertion, which served to move participants' gaze away from the last-mentioned antecedent (see section 6.2.1.2), was less effective in HSs than in monolinguals. A potential reason for this is that some of the HSs had previously

participated in Exp. 5, a similar Visual-World experiment in German. In the German experiment, there was no flag manipulation, and participants were very likely to look at the last-mentioned antecedent at the beginning of the time window. A mixed-effect empirical logit analysis was carried out to test whether HSs who had previously participated in the German experiment were more likely to look at the last-mentioned antecedent compared to HSs who had not been part of the German experiment. No such effect was found (t =-0.53). Furthermore, there were no interactions with Anaphor Type (ts<0.7). Thus, the probability of looking at the local antecedent was not influenced by whether or not a participant had been part of a similar study in German.

The observed baseline effect for the local antecedent may also indicate a difference between HSs and monolingual L1ers in terms of their general online processing of Visual World input. As the cause of the effect takes place before the pronoun is heard, it is not directly related to anaphoric processing. However, one difficulty of comparing groups or conditions with different baselines is that the initial proportion of looks at a picture has an impact on how the proportion may change over time (Barr, Gann, & Pierce, 2011). For example, if Group A already looks at a target picture at a very high proportion (e.g. 0.9), while Group B is very unlikely to look at the target at the beginning of the time window (e.g. 0.2), the possible changes in looks differ between groups. Looks to the target may only increase very slightly or not at all for Group A, while in Group B, there can be greater increases. As described in Barr et al. (2011), the best way to deal with these 'anticipatory baseline effects' is to statistically estimate and control for them using multilevel regression models. All inferential statistical analyses of the eye-movement data employed this method by including time variables in the model and thereby controlling for the different intercepts. Thus, the interpretation of the statistical group comparisons should not be affected by different baseline proportions.[30]

As mentioned above, the larger increases in looks to the non-local antecedent in HSs compared to monolinguals may be an indication that HSs rely on prominence when looking for an antecedent during online processing: for *kendi* and *kendisi*, the most prominent antecedent is preferred, thus there are no significant overall increases in looks to the local antecedent. There is no evidence for a stronger consideration of linearly closer antecedents in online processing. Rather, the opposite effect is observed, namely a shift away from the last-mentioned antecedent.

[30]Furthermore, the baseline proportions of looks for both groups were between 0.2 and 0.4 for all three pronouns, which, according to Barr et al. (2011), lies within the range in which the impact of anticipatory baseline effects are less severe.

Interestingly, the HS group did not differ from the monolingual group in their eye movements after hearing *o*. Thus, it seems that while no effect of a linearly close antecedent preference in HSs is observed for *o*, there is a difference in the online processing of anaphors that were considered referentially ambiguous (*kendisi* and *kendi*) and unambiguous (*o*) in a given context by monolingual L1ers. Similarly to Gürel and Yilmaz (2011); J.-H. Kim et al. (2009), HSs showed stronger deviations from a monolingual-like pattern for referentially ambiguous forms compared to forms with only one accessible antecedent in the discourse. In Ch. 4, participants were able to rate referential ambiguity in addition to antecedent choice in a questionnaire study. Turkish HSs chose unambiguous response options more frequently than monolinguals. In the present experiment, participants were forced to choose one of two potential antecedents. Thus, it was not possible to determine whether HSs considered the referentially ambiguous anaphors more unambiguous than monolinguals did based on the comprehension question data. However, the eye-movement data suggest that referentially ambiguous anaphors are processed somewhat differently in HSs than in monolinguals.

Note that the antecedent that is most prominent in the present experiment is also the matrix subject and the first-mentioned antecedent. Based on the present results, it is not possible to determine whether the pattern shown by the HSs in eye movements is caused by a preference for a prominent first-mentioned antecedent or a preference for a non-local antecedent. Exp. 8, reported below, will address this issue by manipulating the position of the pronouns' potential antecedents such that the prominent first-mentioned antecedent will be within the same clause as the pronoun.

6.2.3.3 Individual differences

Comprehension questions The results revealed that higher-proficiency HSs strongly differentiated between all three forms, while lower-proficiency HSs were more likely to collapse the pronouns in interpretation. Proficiency effects appeared for *kendi* and *o*, but in different directions: Higher-proficiency HSs were more likely than lower-proficiency HSs to choose the local antecedent for *kendi*, and the non-local antecedent for *o*. The stronger contrasting between forms in higher-proficiency HSs was further expressed in two interactions: Both the contrast between *kendisi* and *kendi* and the contrast between *kendisi* and *o* were larger in higher-proficiency HSs.

This effect of proficiency is of the same type as in the questionnaire results from

Exp. 4. In both cases, HSs with lower proficiency did not discriminate between the different types of pronoun to the same extent as monolingual controls, while HSs with higher proficiency differentiated them more than monolinguals. Thus, this study provides support for the idea that proficiency is an important factor in HL processing, and may determine to what extent a HS will show discrimination of different forms. The results also suggest that HSs with higher proficiency do not necessarily perform more native-like than lower-proficiency HSs. Rather, HL acquisition may result in a processing pattern distinct from monolingual L1ers, even when HL proficiency is on a monolingual-like level.

The effects of proficiency observed in the present experiment might further prove valuable in explaining discrepancies between the results of different HS studies. As described in section 6.2.3.2, Keating et al. (2016) found that HSs distinguished between overt and null pronouns in online processing, although another group of HSs had collapsed the two anaphor types in a previous offline interpretation study (Keating et al., 2011). This contrast in results was attributed to the different types of processing involved in offline vs. online tasks in Keating et al. (2016). Other studies (Flores, 2015; Sorace, 2011) report that HSs may perform native-like offline, but not online. It is also possible that the different results found in Keating et al. (2011) and Keating et al. (2016) may be explained by differences in proficiency between the participant groups. If the participants in (Keating et al., 2011) had a relatively low HL proficiency, while the participants in (Keating et al., 2016) had a high and possibly monolingual-like average proficiency, the pattern of merging vs. stronger contrasting would align with the results of the present experiment.[31]

Eye movements To summarize the eye-movement results, HSs with higher proficiency showed more looks to the local antecedent for *kendi* and a larger increase in looks to the non-local antecedent for *o* than lower-proficiency HSs. Furthermore, immediately after hearing *kendisi*, higher-proficiency HSs showed a larger increase in looks to the non-local antecedent than lower-proficiency HSs.

Overall, these results resemble the comprehension question data, where higher-proficiency HSs had a stronger preference for the local antecedent for *kendi*, and a stronger preference for the non-local antecedent for *o*. Thus, these eye-movement results are in line with the prediction that higher-proficiency HSs will show more distinct eye-movement patterns for the different anaphors.

[31] Keating et al. (2016) state that proficiency differences between the studies cannot be ruled out, as participants' proficiency was not tested in Keating et al. (2011), and HSs in Keating et al. (2016) had near-native proficiency.

For *kendisi*, higher-proficiency HSs showed an early increase in non-local looks which they did not show for *kendi*. This is in line with their stronger preference for a non-local antecedent in comprehension questions for *kendisi* compared to *kendi*. Lower-proficiency HSs had more similar antecedent preferences for *kendisi* and *kendi* in comprehension questions. However, in eye movements, lower-proficiency HSs showed an earlier increase in looks to the non-local antecedent for *kendi* compared to *kendisi*. It is possible that lower-proficiency HSs are more familiar with *kendi* and are well aware of its long-distance binding option, while their having less experience *kendisi* may cause relatively slower or smaller changes in fixations for this form.

As in the comprehension questions, there was no indication that a higher HL proficiency is associated with a more monolingual-like processing pattern. For example, higher-proficiency HSs showed fewer looks and a smaller increase in looks to the non-local antecedent for *kendi*, compared to both lower-proficiency HSs and monolinguals (cf. Figs. 6.3, 6.7).

Based on the present results, the hypothesis that higher-proficiency HSs contrast different forms from each other more than lower-proficiency HSs is confirmed. The role of proficiency in HL processing will be investigated with a different syntactic context in Exp. 8, and will be further discussed after reviewing the results in the General Discussion of this chapter.

6.3 Experiment 8: The role of antecedent prominence and c-command in monolingual and HS processing of Turkish object anaphors

Exp. 8 aimed to investigate to what extent non-c-commanding antecedents are considered for Turkish anaphors. For this, Exp. 8 used materials that were based on the sentences from Exp. 7, but employed a different structure. While in Exp. 7 the pronoun had two c-commanding potential antecedents, in Exp. 8 the second-mentioned antecedent was embedded in an adverbial clause and did not c-command the anaphor. The first-mentioned antecedent was c-commanding and in the same clause as the anaphor, and therefore still an acceptable antecedent for a true reflexive.

If *kendi* is a true (long-distance) reflexive, as proposed in the literature and in this thesis, it should not consider the embedded antecedent during processing.

Previous research has shown that the online processing of reflexives is very fast, and inaccessible antecedents are excluded very early. If *kendisi* is a phrasal constituent, as proposed e.g. by Kornfilt (2001), a non-c-commanding antecedent should not be excluded, because Condition A does not apply. However, a non-c-commanding antecedent may be dispreferred as an antecedent when competing with a more prominent entity in the discourse.

With regards to *o*, Exp. 7 showed that a local antecedent is clearly dispreferred for *o* both in participants' online processing and in their final antecedent choices. The accessible antecedent for *o* was in a prominent position in Exp. 7, thus it is not possible to determine whether participants' processing of *o* was also guided by prominence rather than only by Condition B. In the case of the former, a local antecedent in a more prominent syntactic position may have received more consideration during processing.

In Exp. 8, the local antecedent was the matrix subject and thus very prominent, while the non-local antecedent was embedded in an adverbial clause. If prominence does play a role in the online processing of *o*, I expect to see more consideration of the (inaccessible) local antecedent in Exp. 8 compared to Exp. 7 in participants' eye movements. At the same time, *o* tends to prefer non-topical antecedents, as described in Ch. 2 and confirmed by the results of Exp. 4. Therefore, monolinguals are expected to choose the non-c-commanding non-local antecedent over the prominent topical antecedent, irrespective of their eye movements.

Regarding HSs, Exp. 7 found a stronger preference for the local antecedent in HSs compared to monolingual L1ers in comprehension questions. This is in line with the assumption that HSs tend to prefer linearly closer antecedents more strongly than monolinguals (Gürel & Yilmaz, 2011; J.-H. Kim, 2007; J.-H. Kim et al., 2009). What remains unclear is whether HSs rely more strongly on linear proximity or syntactic locality (i.e. clause-internal vs. clause-external antecedents) during anaphor resolution. The non-canonical word order used in Exp. 8 allowed to test this, because the linearly closer antecedent was syntactically non-local.

The results from Exp. 7 also showed that, unlike in their final interpretation, Turkish HSs prefer a non-local antecedent more strongly than monolinguals in eye movements. As mentioned above, the non-local antecedent was the first-mentioned antecedent in Exp. 7. Based on these results, it was proposed that HSs may prefer first-mentioned matrix subject antecedents over second-mentioned antecedents during online processing. This suggests that if the local antecedent appears in the prominent first-mentioned matrix subject position, it

may receive more looks compared to the non-local.

Exp. 8 also allowed to further test the claim that HSs have more difficulties with referentially ambiguous anaphor resolution than monolinguals (Gürel & Yilmaz, 2011; J.-H. Kim et al., 2009). In Exp. 7, both potential antecedents were grammatically acceptable for *kendi*, whereas *kendi* was expected to be referentially unambiguous in the present experiment due to the c-command constraint for reflexives. *O* was also unambiguous, as it was in Exp. 7, because there was only one non-local antecedent. The non-local antecedent was also non-c-commanding, but *o* can readily take non-c-commanding antecedents. Unlike *o* and *kendi*, *kendisi*, can take both local and non-c-commanding antecedents (Rudnev, 2011) and was therefore the only ambiguous antecedent in the present experiment. If HSs have greater difficulties with processing referentially ambiguous pronouns than with unambiguous forms, differences between monolinguals and HSs should be stronger for *kendisi* than for *kendi* and *o*.

The individual differences analysis of HSs in Exp. 7 revealed that HL proficiency influenced both eye movements during listening and final interpretations of anaphors. Therefore, the influence of HSs' Turkish proficiency on anaphoric processing was assessed for Exp. 8 as well. If HL proficiency affects both comprehension questions and eye movements in the same way as in Exp. 7, stronger contrasting between forms is expected in higher-proficiency HSs.

6.3.1 Method

The visual stimuli, procedure, and participants were identical to Exp. 7 (see section 6.2.1). The experiment only differed from Exp. 7 in the auditory stimuli, the amount of data excluded during data cleaning, and the predictions, described below.

6.3.1.1 Materials

Auditory stimuli

(6.2) Example stimulus set, Exp. 8

a. Doktor [mühendis ile [Fransa'yı dolaşırken] **ona** bir elma
Doctor engineer with France$_{Acc}$ visit-when s/he$_{Dat}$ an apple
almak istedi.
buy$_{Inf}$ want$_{3^{rd}SingPast}$
'The doctor, when visiting France with the engineer, wanted to buy him/her an apple.'

b. Doktor [mühendis ile [Fransa'yı dolaşırken] **kendine** bir elma
Doctor engineer with France$_{Acc}$ visit-when s/he$_{Dat}$ an apple
almak istedi.
buy$_{Inf}$ want$_{3^{rd}SingPast}$
'The doctor, when visiting France with the engineer, wanted to buy himself/herself an apple.'

c. Doktor [mühendis ile [Fransa'yı dolaşırken] **kendisine** bir
Doctor engineer with France$_{Acc}$ visit-when s/he$_{Dat}$ an
elma almak istedi.
apple buy$_{Inf}$ want$_{3^{rd}SingPast}$
'The doctor, when visiting France with the engineer, wanted to buy him/her/him-/herself an apple.'

The materials were constructed from the materials in Exp. 7; hence, the characters, countries, and verbs used in the sentences were identical. The structure, however, was altered. In this experiment, there were again two potential antecedents within each sentence as well as an object anaphor (*o*, *kendisi*, or *kendi*). However, unlike Exp. 7, the anaphor was part of the matrix clause. One of the antecedents, the first-mentioned entity, was the matrix subject and therefore c-commanded the anaphor within its local domain. The other antecedent (in the second-mentioned position) was linearly closer to the anaphor, but was embedded in an adverbial clause and therefore did not c-command the anaphor. Due to this, it was not possible to establish a binding relation between the anaphor and the second-mentioned antecedent, as binding requires c-command. A c-commanding antecedent is not necessary for co-reference relations, so if an anaphor allows for co-reference, it would still be possible to link it to the second-mentioned antecedent.

An example of an experimental item is given in (6.2), and a full list of experimental items is provided in Appendix A.1.11. The corresponding visual display was the same as in Exp. 7 (see Figure 6.1).

Because the aim in material construction was to keep the sentences as close to the materials in Exp. 7 as possible, the local and non-local antecedents were kept the same between experiments. That is, in both examples from Exp. 7 (see (6.1)) and Exp. 8 (see (6.2)), the doctor (*doktor*) is the local antecedent, while the engineer (*mühendis*) is the non-local antecedent. The filler items were the same as in Exp. 7 (see Appendix A.1.12), and 24 experimental items from Exp. 7 served as additional fillers in each experimental session of Exp. 8.

6.3.1.2 Analysis

The data cleaning analysis was carried out in the same way as in Exp. 7 (see section 6.2.1.4). The data cleaning for the between-group analysis resulted in the removal of 36 trials (1.79% of data) in the comprehension question results. 30 trials (1.49%) were removed due to the time criterion, and six trials (0.30%) were excluded because the participants clicked on an area other than one of the two potential antecedents. In the eye-movement data, a total of 75 trials (3.68%) were excluded that had a trackloss proportion of 0.3 or more. The statistical analyses were identical to Exp. 7 (see 6.2.1.4).

The individual differences analysis data cleaning resulted in the removed of ten trials for the comprehension questions, in which participants clicked before hearing the full question or because they took longer than ten seconds to choose an antecedent. Furthermore, two comprehension question trials were excluded because participants clicked on an area on the screen that did not display either of the two potential antecedents. Thus, in total, 12 trials (1.19% of data) were removed from the comprehension question data. For the eye-movement data in the individual differences analysis, 40 trials (3.88%) were removed after excluding trials with a trackloss proportion of 0.3 or above.

6.3.1.3 Predictions

The following predictions were made for **monolingual L1ers of Turkish**:

1. ***O*** will be interpreted as referring to the non-local antecedent. If L1 processing of *o* is influenced by antecedent prominence, L1ers may show temporary consideration of the prominent local antecedent.

    - In the comprehension questions, the non-local antecedent will be strongly preferred for *o*, following Condition B and *o*'s preference for non-topical antecedents.

    - In the eye-movement data, hearing *o* will lead to immediate and large increases in looks to the non-local antecedent, following Condition B, and smaller or shorter-lived increases in looks to the local antecedent.

2. ***Kendisi*** will be considered ambiguous between the two potential antecedents.

    - In the comprehension questions, there will be no absolute preference for one of the two antecedents for *kendisi*.

- In the eye-movement data, hearing *kendisi* will lead to increases in looks to both antecedents.

3. ***Kendi*** will be associated with the local antecedent only, due to the exclusion of the non-c-commanding antecedent.

    - In the comprehension questions, the local antecedent will be strongly preferred for *kendi*. This preference will be stronger than for *kendisi*.

    - In the eye-movement data, hearing *kendi* will lead to immediate increases in looks to the local antecedent, and no increases in looks to the non-local antecedent.

The following predictions were made for **HSs of Turkish**:

1. If HSs have a general preference for linearly closer antecedents in anaphor interpretation, they should consider the non-local antecedent more for *kendisi* and *kendi* in comprehension questions, compared to monolinguals.

    - Alternatively, if the local preference effect found in Exp. 7 was driven by syntactic rather than linear proximity, HSs may show a monolingual-like strong preference for the local antecedent for *kendi*, and a stronger preference for the local antecedent for *kendisi* than monolinguals.

2. If HSs generally consider prominent first-mentioned or matrix subject antecedents more than other antecedents during online processing, they should show larger increases in looks to the local antecedent and fewer increases/larger decreases in looks to the non-local antecedent, compared to monolingual L1ers.

3. If HSs have more trouble with referentially ambiguous anaphor resolution than referentially unambiguous anaphor resolution, differences between HSs and monolinguals should be larger for *kendisi* compared to *kendi* and *o*.

6.3.2 Results

6.3.2.1 Comprehension questions

The results from the comprehension questions are displayed in Figure 6.10. The monolingual group showed a clear preference for the local antecedent for both *kendi* and *kendisi*; the local preference was stronger for *kendi* than for *kendisi*.

For *o*, on the other hand, monolinguals almost exclusively chose the non-local antecedent. In HSs, the percentage of local vs. non-local clicks was very similar to the monolingual group for *kendi* and *o*. For *kendisi*, HSs had a slightly weaker preference for the local antecedent than monolinguals. Nonetheless, HSs' local vs. non-local clicks were above 50%, indicating a preference for the local antecedent.

The results of the inferential analysis of the comprehension question data are displayed in Table 6.10. The observed preference for the local antecedent in the *kendisi* condition was significant for monolinguals ($p<0.001$). This preference was weaker for *kendisi* than for *kendi* ($p<0.001$), but stronger for *kendisi* than for *o* ($p<0.001$). The analysis further found a non-significant effect of Group for *kendisi* and no interactions of Group and $\text{AnaphorType}_{kendisi\text{-}o}$ or $\text{AnaphorType}_{kendisi\text{-}kendi}$.

Table 6.10 *Results from the analysis of the comprehension questions in Exp. 8*

Fixed Effect	Estimate (SE)	z-value
Intercept	-1.16(0.24)	**-4.86**
$\text{AnaphorType}_{kendi}$	-0.86(0.22)	**-3.98**
AnaphorType_{o}	5.23(0.38)	**13.66**
$\text{Group}_{\text{HSs}}$	-0.45(0.28)	1.62
$\text{AnaphorType}_{kendi}$*$\text{Group}_{\text{HSs}}$	-0.43(0.30)	-1.41
AnaphorType_{o}*$\text{Group}_{\text{HSs}}$	-0.72(0.48)	-1.50

Note. The baseline condition was *kendisi* in the monolingual group. Marginal or significant effects are boldfaced.

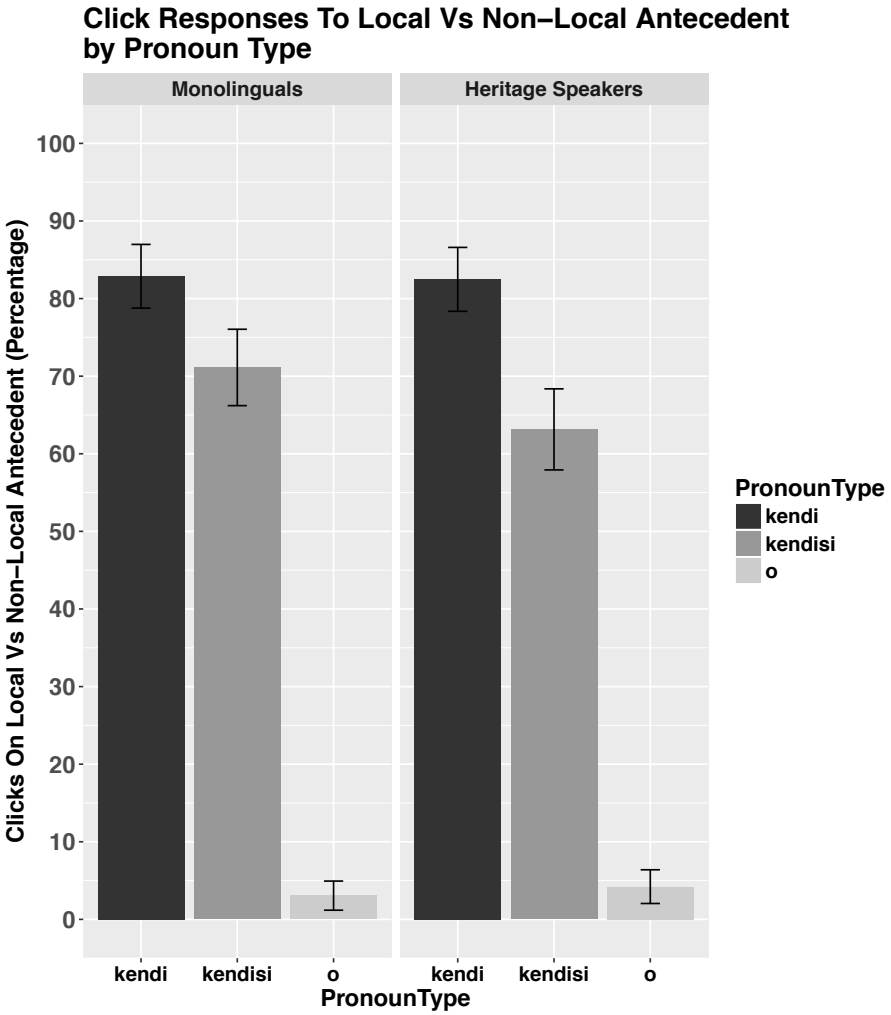

Figure 6.10. Results from the comprehension questions in Exp. 8, with the monolinguals on the left and HSs on the right.

6.3.2.2 Eye-movement data

Plots of fixation proportions to the two antecedents for each pronoun can be found in Figs. 6.11, 6.12, and 6.13.

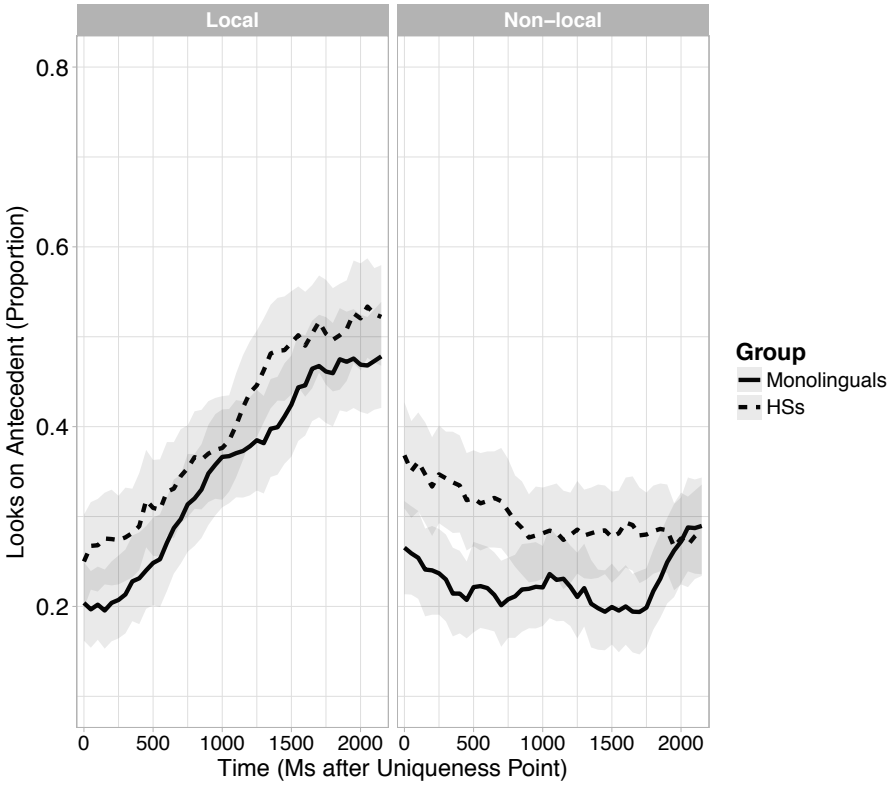

Figure 6.11. Looks to the local and non-local antecedent for the *kendi* condition for both groups, Exp. 8.

For *kendi*, there was an immediate and continued increase in looks to the local antecedent in both groups. The proportion of looks was slightly higher in HSs than in the monolingual group overall, but the two curves approached each other around 1000 ms post-UP. For the non-local antecedent, monolinguals showed a slight decrease at the beginning of the time-window, followed by a slight increase between 700 and 1100 ms post-UP. After that, looks again decreased slightly, before increasing sharply from 1750 ms post-UP onwards. HSs had a higher proportion of non-local antecedent looks at the beginning of the time window, but showed a decrease in looks in the first second after hearing *kendi*, after which there was no change in fixation proportions. Despite the initial decrease, HSs' proportion of looks to the non-local antecedent remained higher than in the monolingual group throughout the first two seconds after hearing *kendi*.

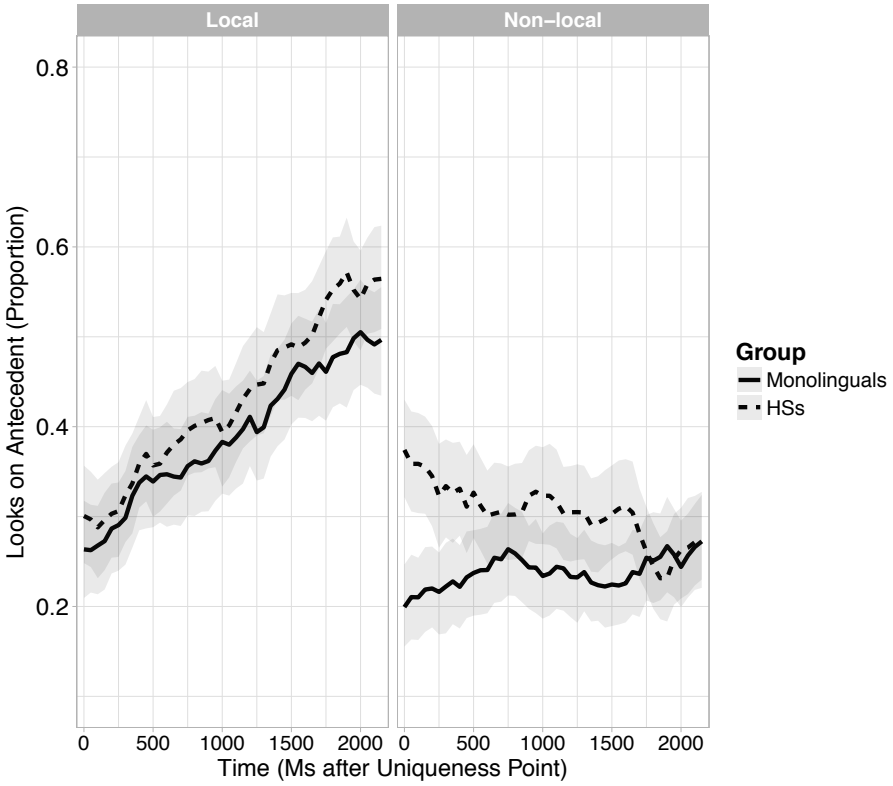

Figure 6.12. Looks to the local and non-local antecedent for the *kendisi* condition for both groups, Exp. 8.

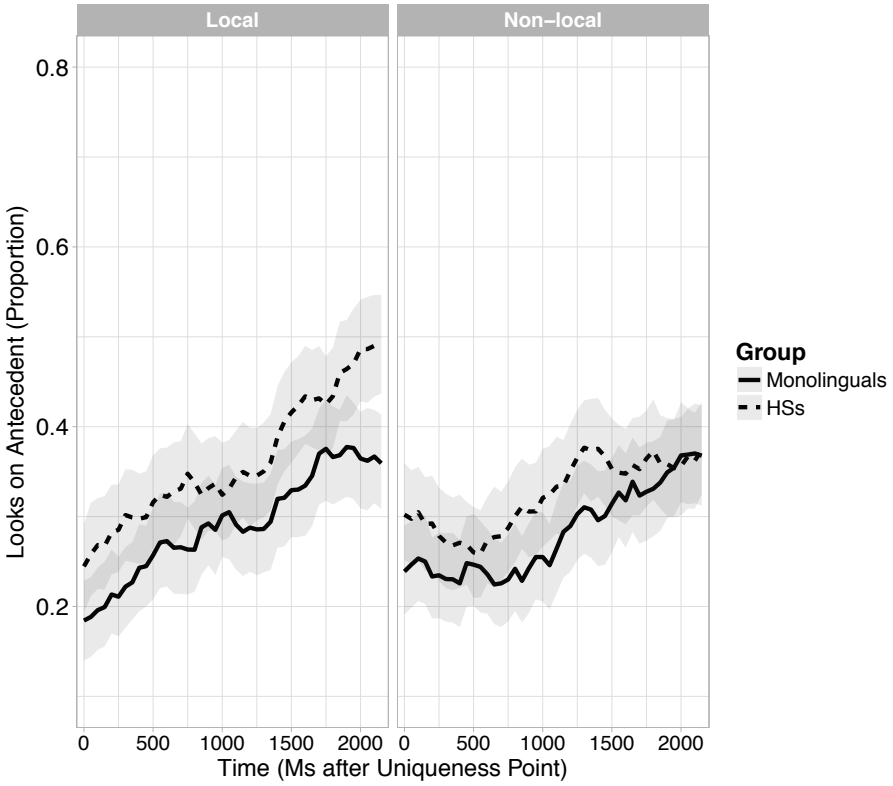

Figure 6.13. Looks to the local and non-local antecedent for the *o* condition for both groups, Exp. 8.

For *kendisi*, looks to the local antecedent again increased a lot over time for both groups, and the proportion of looks is comparable between groups. Towards the end of the time window (i.e. starting from approximately 1600ms post-UP), looks to the local antecedent seemed to increase slightly more in the HSs compared to the monolinguals. The proportion of looks to the non-local antecedent, on the other hand, changed only slightly over time in the monolingual group: Looks increased slightly up until 750 ms post-UP, after which there was a slight decrease until about 1400 ms post-UP. Towards the end of the time-window, looks to the non-local antecedent increased again in monolinguals. HSs were nearly twice as likely as monolinguals to look at the non-local antecedent at the beginning of the time window (proportions of 0.38 vs. 0.2, respectively). Furthermore, HSs showed an initial decrease in looks to the non-local antecedent, followed by relative stability, and then a large decrease at approximately 1700 ms post-UP.

For *o*, monolinguals showed an immediate increase to the local antecedent, which was smaller than for *kendisi* and *kendi*. The increase in the monolingual group ended at around 1750 ms post-UP. HSs also showed an immediate increase in looks to the local antecedent, which was larger than in the monolingual group after approximately 1300ms post-UP. Looks to the non-local antecedent did not increase in the monolingual group until about 750 ms post-UP. At the end of the time window, the proportions of looks to the non-local and local antecedent reached similar levels in the monolingual group. HSs showed a similar pattern to monolinguals for the non-local antecedent, but their initial proportion of looks was slightly higher than in the monolingual group, and the increase in looks to the non-local antecedent ended at around 1300 ms post-UP in HSs, but not monolinguals.

The inferential analysis of the full two-second time window, which included Group and four different time variables as predictors, revealed interactions with Group and time for looks to both potential antecedents. The data on looks to the local antecedent revealed significant effects of time variables (for *o*, Linear: t=4.79, Quadratic: t=-1.91, Cubic: t=2.55, Quartic: t=-2.39; for *kendisi*, Linear: t=4.70 and Quartic: t=-2.44; for *kendi*, Linear: t=6.12 and Quadratic: t=-3.45) as well as a Group effect and interactions with Group and Time in the *kendi* condition (Group: t=-1.75; Group*Quadratic: t=-1.96, Group*Cubic: t=2.08). Furthermore, for looks to the non-local antecedent, interactions of Group and higher-order time variables were found for all three pronouns (for *o*, Group*Quartic: t=-2.09; for *kendisi*, Group*Quartic: t=1.92 and Group*Cubic: t=1.71; for *kendi*, Group*Cubic: t=1.92). This paragraph only reports effects with a $t \geq 1.68$. For tables that include all effects for the discussed analyses,

see Appendix A.2.7.

The reported interactions with Group and different time variables, which were marginal or significant for four of six analyses, indicate that the time-course of looks differs between monolingual L1ers and HSs. Due to this, the data were split up, and the two groups were analyzed separately.

Results from each group's analysis for the full 2-s time window can be found in Tables 6.11 and 6.12 for monolinguals and HSs, respectively.[32]

In both groups, effects of higher-order time variables (Cubic and Quartic time) were observed for all three anaphors. This indicates that the direction of participants' eye movements shifted at least twice over the course of two seconds after hearing the anaphor. Given this complex time-course of looks for the different pronouns, the two-second time window was split up into four 500 ms-time windows to explore the pattern of looks in more detail.

The results of the time window analysis can be found in Tables 6.13 and 6.14 for monolinguals and HSs, respectively.[33] As in Exp. 7, I will first describe the monolinguals' results, before moving on to the HSs.

For *kendi*, monolinguals showed increases in looks to the local antecedent throughout the first three time windows. Looks to the non-local antecedent increased only in the final time window (1700-2200 ms post-UP, t=4.00). For *kendisi*, looks to the local antecedent increased in the first (200-700 ms post-UP, t=2.76) and third time windows (1200-1700 ms post-UP, t=2.99) for monolinguals. Looks to the non-local antecedent only increased in the final time window (t=1.98). For *o*, looks to the local antecedent increased in the third time window (t=4.07), and then decreased in the final time window (t=-1.92), while looks to the non-local antecedent increased in the final time window (t=3.44).

HSs showed a significant increase in looks to the local antecedent in the first and second time windows after hearing *kendi*. No significant changes in looks appeared for the non-local antecedent. For *kendisi*, looks to the local antecedent increased in the first three time windows for the HS group. Looks to the non-local antecedent decreased in the first time window (t=-3.51), before increasing in the second time window (t=2.72). For *o*, significant increases in looks to the local antecedent were found for HSs in the first (t=3.11) and third time windows (t=3.46). Looks to the non-local antecedent, on the other hand, decreased

[32] These tables only list the t-values of the fixed effects. Full results tables for each analysis can be found in Appendix A.2.8.

[33] These tables only list the t-values of the fixed effects for a linear increase in looks over time for each time window. Full results tables for each analysis can be found in Appendix A.2.9.

significantly within the same time windows (t=-2.88 and t=-3.01, respectively). No increases in looks to the non-local antecedent were observed.

Table 6.11 *Results from the empirical logit analysis of the eye-movement data for monolinguals, Exp. 8*

Anaphor and time variable	Local	Non-local
kendi		
Intercept	**12.50**	**6.72**
Linear	**4.25**	1.45
Quadratic	**-3.40**	1.30
Cubic	**1.95**	**1.77**
Quartic	-0.29	1.07
kendisi		
Intercept	**16.06**	**6.56**
Linear	**3.43**	0.98
Quadratic	-1.40	-0.76
Cubic	-0.20	**1.95**
Quartic	**-2.07**	-1.16
o		
Intercept	**10.74**	**11.39**
Linear	**3.23**	**2.37**
Quadratic	-1.56	1.38
Cubic	1.50	0.17
Quartic	**-1.93**	0.44

Note. Marginal or significant effects are boldfaced.

Table 6.12 *Results from the empirical logit analysis of the eye-movement data for HSs, Exp. 8. Marginal or significant effects are boldfaced.*

Anaphor and time variable	Local	Non-local
kendi		
Intercept	**17.63**	**8.16**
Linear	**4.51**	-1.26
Quadratic	-1.00	-0.89
Cubic	**1.88**	-1.37
Quartic	1.49	0.02
kendisi		
Intercept	**15.04**	**10.56**
Linear	**3.48**	-1.26
Quadratic	0.75	**2.08**
Cubic	-1.00	-1.00
Quartic	-0.97	**2.86**
o		
Intercept	**11.27**	**7.57**
Linear	**3.53**	**2.30**
Quadratic	-0.76	-1.33
Cubic	**3.48**	-0.99
Quartic	0.02	**2.39**

Table 6.13 *Results from the empirical logit analysis of the eye-movement data with 500ms time windows for monolinguals, Exp. 8*

Anaphor and time window	Local	Non-local
kendi		
200-700ms	**2.41**	-1.34
700-1200ms	**3.22**	-0.36
1200-1700ms	**3.76**	0.52
1700-2200ms	1.57	**4.01**
kendisi		
200-700ms	**2.76**	1.13
700-1200ms	0.80	-0.23
1200-1700ms	**2.99**	0.33
1700-2200ms	-0.05	**1.98**
o		
200-700ms	1.17	-0.53
700-1200ms	1.24	-0.35
1200-1700ms	**4.07**	1.43
1700-2200ms	**-1.92**	**3.44**

Note. Values in the cells are t-values for the linear increase in looks to the respective antecedent over time. Marginal or significant effects are boldfaced.

Table 6.14 *Results from the empirical logit analysis of the eye-movement data with 500ms time windows for HSs, Exp. 8*

Anaphor and time window	Local	Non-local
kendi		
200-700ms	**4.06**	0.40
700-1200ms	**3.65**	1.02
1200-1700ms	0.81	0.87
1700-2200ms	0.30	0.03
kendisi		
200-700ms	**3.21**	**-3.51**
700-1200ms	**2.81**	**2.72**
1200-1700ms	**1.78**	0.31
1700-2200ms	0.12	0.36
o		
200-700ms	**3.11**	**-2.88**
700-1200ms	-1.38	0.35
1200-1700ms	**3.46**	**-3.01**
1700-2200ms	0.97	-0.64

Note. Values in the cells are t-values for the linear increase in looks to the respective antecedent over time. Marginal or significant effects are boldfaced.

6.3.2.3 Individual differences

Comprehension question The comprehension question results are plotted in Figure 6.14. For *kendi*, HSs had a strong preference for the local antecedent at all TELC scores. Similarly, HSs had a very strong preference for the non-local antecedent for *o*, irrespective of TELC score. For *kendisi*, an effect of TELC score can be observed: Lower-proficiency HSs showed a local preference for *kendisi*, while higher-proficiency HSs had no clear preference for one antecedent over the other.

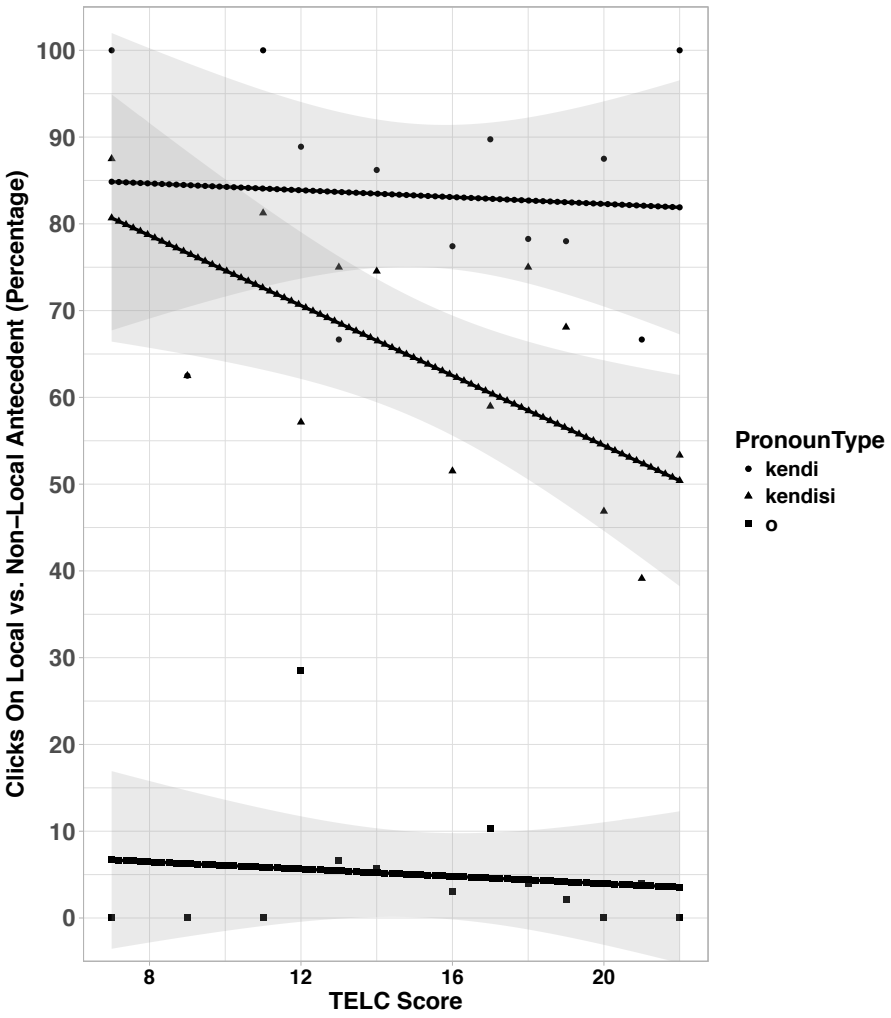

Figure 6.14. HSs' responses to the comprehension questions in relation to their TELC score, separated by anaphor type, Exp. 8).

In the inferential analysis, no converging model was found for the *kendisi* condition. Therefore, *kendi* was chosen as the baseline. The results are listed in

Table 6.15. The analysis revealed a significant interaction of TELC score and AnaphorType$_{kendi\text{-}kendisi}$ ($p<0.05$), which indicates that higher-proficiency HSs contrasted the two forms from each other more strongly. In order to further explore this interaction, a separate analysis was conducted for each anaphor (see Appendix A.2.10 for full results). For *kendi* and *o*, TELC score had no influence on antecedent choices ($z=0.10$ and $z=0.74$, respectively). For *kendisi*, a marginal effect of TELC score ($z=1.70$) indicated that higher-proficiency HSs made more non-local antecedent choices.

Table 6.15 *Results from the analysis of the comprehension questions in Exp. 8*

Fixed Effect	Estimate (SE)	z-value
Intercept	-1.90(0.25)	**-7.77**
AnaphorType$_{kendisi}$	1.22(0.21)	**5.77**
AnaphorType$_{kendi}$	5.56(0.38)	**14.67**
TELC	-0.00(0.06)	-0.80
AnaphorType$_{kendisi}$ * TELC	0.12(0.06)	**2.04**
AnaphorType$_{kendi}$ * TELC	0.07(0.09)	0.77

Note. The baseline condition was *kendi*. Marginal or significant effects are boldfaced.

Eye movements Partcipants' eye movements for each anaphor are plotted in Figs. 6.15–6.17.

For *kendi*, a strong increase in looks to the local antecedent was observed in both high- and low-proficiency HSs. While both groups reached the same level of local antecedent looks, the increase appeared earlier in the low-proficiency group. Looks to the non-local antecedent decreased slightly over the course of the full time window. Again, the low-proficiency group showed the decrease slightly earlier, but the divergence of the two groups' curves was smaller than for the local antecedent.

For *kendisi*, looks to the local antecedent again increased a lot for both groups. The high-proficiency group showed a very short decrease in local looks, followed by a steep increase, while the increase in the low-proficiency group was more consistent and more moderate over the full time window. Looks to the non-local antecedent showed a steep decrease in the high-proficiency group, but stayed around the same level in the low-proficiency group.

For *o*, the two groups' curves were almost on top of each other for both the local and the non-local antecedent. Looks to the local antecedent showed a large increase, which was only slightly lower than for *kendisi* and *kendi*. Looks to the non-local antecedent, on the other hand, increased only slightly from around 500 ms post-UP.

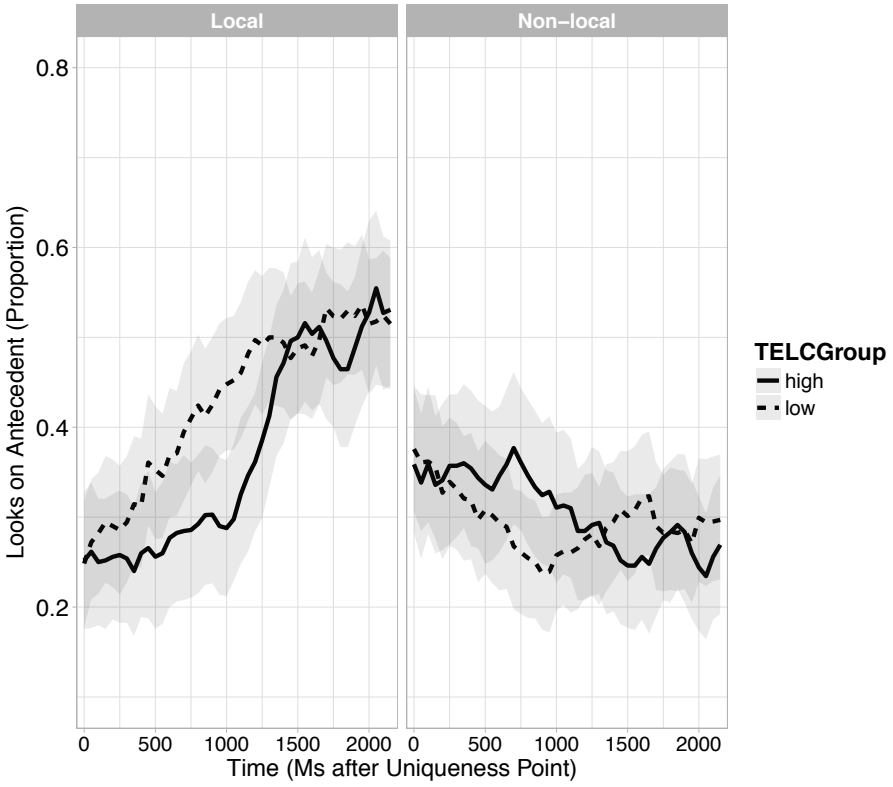

Figure 6.15. HSs' looks to the local and non-local antecedent for the *kendi* condition by TELC score, Exp. 8.

The inferential analysis of eye movements (see Table 6.16) revealed a marginally significant interaction of TELC score and Quadratic time for *kendi* (t=1.93), indicating that higher-proficiency HSs showed a more quadratic shape in their eye movements for the local antecedent than lower-proficiency HSs. Furthermore, there was a significant interaction of TELC score and Linear time for *kendisi* (t=2.52), indicating that participants with a higher TELC score showed larger increases in looks to the local antecedent than lower-proficiency HSs. At the same time, higher-proficiency HSs had marginally fewer looks to the local antecedent than lower-proficiency HSs overall (t=-1.77). For *o*, no effects of TELC on the full time window were found.

When splitting up the data into four 500 ms-time windows (see Table 6.17),

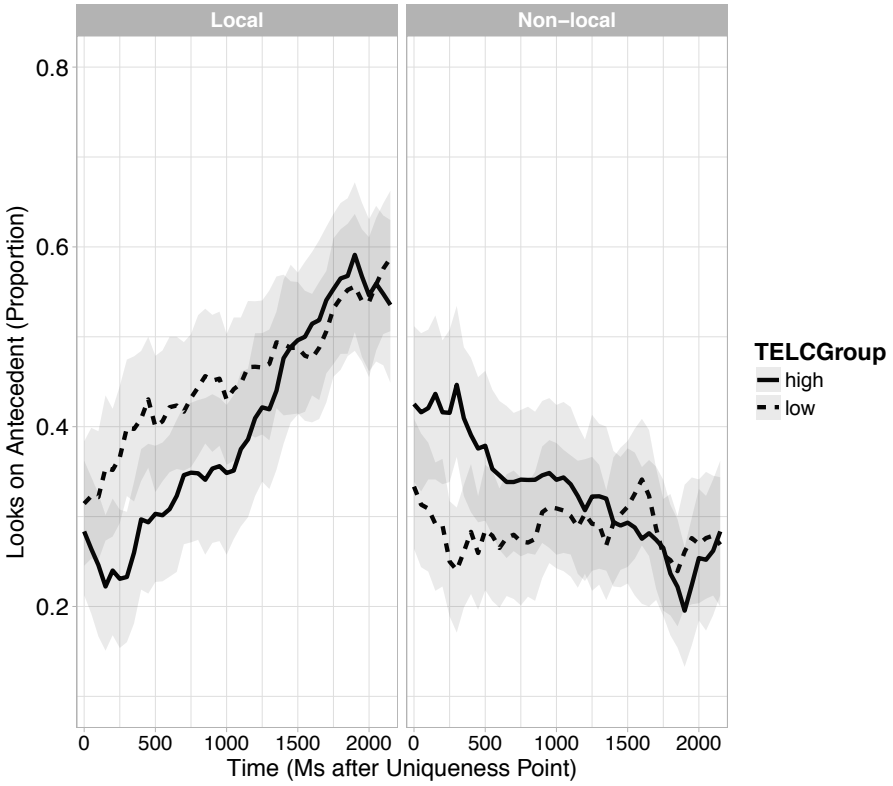

Figure 6.16. HSs' looks to the local and non-local antecedent for the *kendisi* condition by TELC score, Exp. 8.

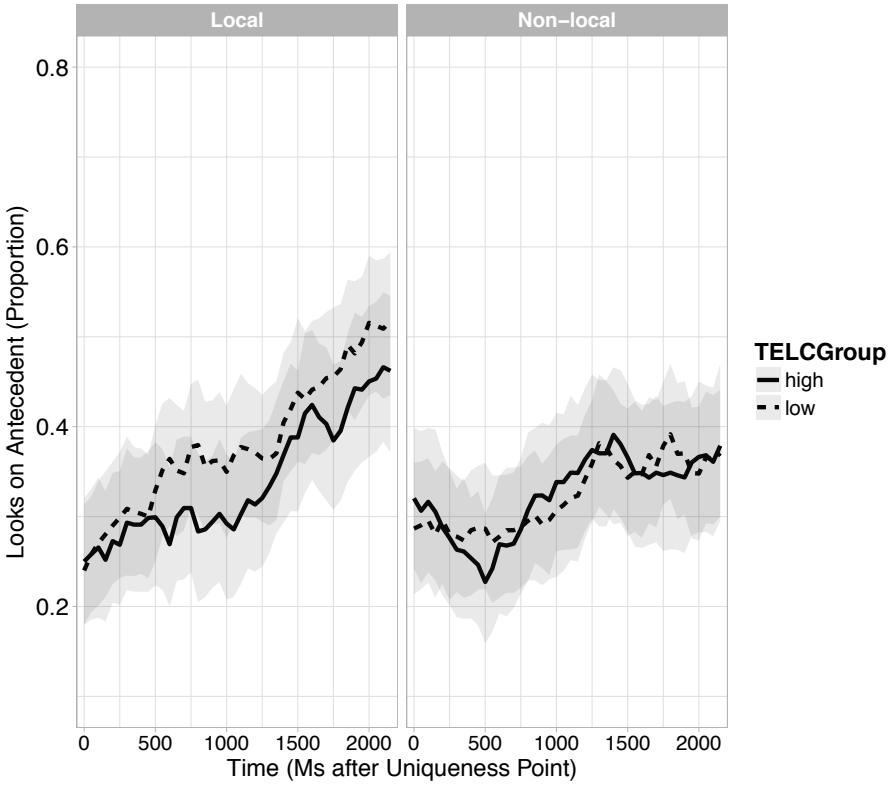

Figure 6.17. HSs' looks to the local and non-local antecedent for the *o* condition by TELC score, Exp. 8.

effects of TELC were found for *kendi* and *o*, but not *kendisi*. For *kendi*, higher-proficiency HSs were marginally less likely to look at the non-local antecedent in the final time window (1700-2200 ms post-UP, t=1.75). For *o*, higher-proficiency HSs showed a marginally smaller increase in looks to the local antecedent in the first time window (200-700 ms post-UP, t=-1.71), but a larger increase in local antecedent looks in the final time window (t=2.91). Furthermore, higher-proficiency HSs were less likely than lower-proficiency HSs to look at the local antecedent in the final time window (t=-3.04). An effect on non-local antecedent looks was also found for *o* in the final time window: Higher-proficiency HSs showed a significantly smaller increase in looks to the non-local antecedent than lower-proficiency HSs (-2.04).

Table 6.16 *Effect of TELC score from the empirical logit analysis of the eye-movement data in HSs, Exp. 8*

Anaphor and time variable	Local	Non-local
kendi		
TELC	-0.51	1.31
TELC * Linear	0.14	0.19
TELC * Quadratic	**1.93**	-0.45
TELC * Cubic	-1.33	-0.28
TELC * Quartic	-0.05	-0.04
kendisi		
TELC	**-1.77**	0.59
TELC * Linear	**2.52**	-1.53
TELC * Quadratic	0.21	0.60
TELC * Cubic	-0.75	0.77
TELC * Quartic	-0.56	0.01
o		
TELC	0.29	0.77
TELC * Linear	-0.96	0.06
TELC * Quadratic	0.13	-0.86
TELC * Cubic	0.68	-1.49
TELC * Quartic	1.12	1.45

Note. Marginal or significant effects are boldfaced.

Table 6.17 *Effects of TELC from the empirical logit analysis of the eye-movement data with 500ms time windows in HSs, Exp. 8*

	Local		**Non-local**	
Anaphor and time window	TELC	TELC * Linear	TELC	TELC * Linear
kendi				
200-700 ms	-0.57	-1.09	1.02	1.01
700-1200 ms	-0.71	0.55	1.55	0.88
1200-1700 ms	0.40	1.17	0.93	-0.45
1700-2200 ms	-0.67	0.50	**1.75**	-1.29
kendisi				
200-700 ms	-1.39	0.06	1.03	-1.03
700-1200 ms	-1.24	0.65	0.54	-0.81
1200-1700 ms	-0.27	0.39	0.24	-1.55
1700-2200 ms	0.02	0.08	0.50	-0.46
o				
200-700 ms	-0.78	**-1.71**	-0.57	-1.05
700-1200 ms	0.74	-1.00	0.91	0.87
1200-1700 ms	-0.21	0.02	0.89	0.05
1700-2200 ms	**-3.04**	**2.91**	1.51	**-2.04**

Note. Marginal or significant effects are boldfaced.

6.3.3 Discussion

In comprehension questions, monolingual L1ers of Turkish preferred a prominent first-mentioned local antecedent for both *kendi* and *kendisi*. The local antecedent was preferred more strongly for *kendi* than *kendisi*. For *o*, a very strong preference for the non-local antecedent was observed for monolinguals. HSs showed no marginal or significant differences from monolinguals.

In eye movements, large and continued increases in looks to the local antecedent for both *kendi* and *kendisi* were observed for both groups. Monolinguals further showed an increase in looks to the non-local antecedent at the end of the time window for both *kendi* and *kendisi*. For *o*, monolinguals' looks to the local antecedent increased before looks to the non-local antecedent, but in the final time window, they showed a gaze shift from the local to the non-local antecedent. HSs' eye movements differed from monolinguals' in considering the local antecedent more.

As in Exp. 7, HL proficiency proved a significant predictor of HSs' interpretation and processing of Turkish anaphors.

6.3.3.1 Monolinguals

For *o*, the fact that monolinguals chose the non-local antecedent 97% of the time is in line with the predictions and shows that monolingual L1ers have no trouble applying Condition B in interpretation. The proportion of non-local antecedent choices is slightly higher than in Exp. 7 (92%), where the non-local antecedent was the sentence topic. No statistical comparison between experiments was made, but the result supports the hypothesis that monolingual L1ers prefer non-topical antecedents for *o*.

However, the response choices stand in stark contrast with the eye movements, where participants looked to the local and the non-local antecedent in comparable proportions, and showed earlier increases in looks to the local antecedent than in looks to the non-local antecedent. This behavior was not predicted, and illustrates that participants' eye-movement patterns in a Visual World paradigm are not always indicative of their antecedent choice. Instead, gaze preferences seem to be influenced by antecedent prominence, while antecedent choice is guided by Condition B and *o*'s preference for non-topical antecedents.

Despite the prominent local antecedent attracting many looks early on, participants did apply Condition B during processing as well: Shifts from the local to

the non-local antecedent were observed between 800 ms and 1300 ms post-UP (not statistically significant) and in the final time window (1700-2200 ms post-UP, statistically significant). The fact that a significant effect for the non-local antecedent only appears in the final time window might indicate that Condition B is in fact only applied after considering the most prominent antecedent. Thus, evidence for the application of Condition B and an indication for participants' ultimate antecedent choice can be found in the gaze data, albeit very late and only after an effect of prominence.

The effects for *o* are also relevant for an open question from Exp. 6 (cf. sections 5.4.3.3 and 5.6.3). Turkish-German bilinguals with a high Turkish proficiency showed smaller increases to the local antecedent immediately after hearing the pronoun in Exp. 6, which is the German version of the present experiment. It was hypothesized that the effect could be due to cross-linguistic influence, if Turkish L1ers show fewer increases in looks to the local antecedent for *o* than German L1ers did in Exp. 6 for the pronoun. However, no such cross-linguistic difference is observed, as the Turkish-speaking group also showed an early increase in looks to the inaccessible but prominent local antecedent. Thus, the effect of TELC Score from Exp. 6 cannot be due to an influence from Turkish. Instead, it might show that differences between bilinguals with high and low Turkish proficiency, such as the stronger contrasting observed for higher-proficiency HSs in Exps. 3 and 7, may even extend to another language, such as the dominant L2. Further research is necessary to explore this potential explanation for the effect of TELC in Exp. 6.

Regarding the interpretation of *kendisi*, no absolute preferences were predicted due to the referentially ambiguous nature of *kendisi*. Given that the non-c-commanding antecedent was chosen approximately 30% of the time, I conclude that *kendisi* cannot be considered a true reflexive. It can readily take a non-c-commanding antecedent, even when a c-commanding local antecedent may be preferred due to its prominence in the sentence.

Evidence for this can also be found in the eye-movement data; however, there are only few significant effects for *kendisi*. Possibly due to its referential ambiguity, the changes in looks are not extreme for *kendisi*. The data for *kendisi* indicate that both antecedents were considered during processing, which is in line with the phrasal analysis of *kendisi* (Dinçtopal-Deniz, 2009; Kornfilt, 2001).

Kendi was interpreted as more referentially ambiguous than predicted based on the hypothesis that *kendi* is a reflexive. Nonetheless, the preference for a local antecedent is very high at 82.87%. The surprising rate of non-local choices may have been caused by the more complex sentence structure compared to

Exp. 7, in combination with the modality of the task; working memory effects may have played a role in the auditory task. For example, Cunnings and Felser (2011) found that in eyetracking-during-reading, participants with a low working memory span considered a linearly closer but syntactically non-local antecedent while processing the English reflexive *himself*. As an auditory task is more taxing for working memory, it is possible that this interference effect applied to the full participant group. No working memory test was carried out in this experiment. Therefore, it is not possible to determine whether working memory played a role in how likely a participant was to consider the non-local antecedent for *kendi*.

Monolinguals' eye-movement data for *kendi*, on the other hand, suggest that *kendi* is a reflexive that does not consider a non-c-commanding constituent as its antecedent, given that large increases in looks to the local antecedent were observed for *kendi*, while looks to the non-local antecedent did not increase until the final time window. I interpret the results as being in line with the hypothesis that *kendi* is a true anaphor which cannot take a non-c-commanding antecedent. The issue of whether a non-c-commanding antecedent is allowed for *kendi* at all may be investigated in experiments that ask participants to judge sentences in which *kendi* unambiguously refers to a non-c-commanding antecedent. I expect that these antecedents will not be accepted in an offline task or in an online task which is less taxing for working memory than the present experiment.

6.3.3.2 HSs

The HSs' results from the comprehension questions were native-like. The predicted stronger preference for the linearly closest antecedent compared to monolinguals was not found. Similarly, the HSs did not prefer the local antecedent more than monolinguals. These results suggest that a non-monolingual-like preference for the last-mentioned local antecedent like the one observed in Exp. 7 may only appear if the last-mentioned antecedent is c-commanding the reflexive. Thus, HSs recognize the syntactic constraint which excludes non-c-commanding antecedents for *kendi* to the same extent as monolinguals.

In eye movements, the HS group again showed the same baseline effect as in Exp. 7: in the beginning of the critical time window, they were more likely to look at the second-mentioned antecedent compared to the monolingual group. This suggests that the flag picture insertion (see section 6.2.1.2), which served to drive participants' looks away from the last-mentioned antecedent before hearing the pronoun, was less successful in the HS group than the monolinguals.

Some of the HSs had previously taken part in a very similar German version of this experiment (Exp. 6). In the German experiment, no flag manipulation was inserted, and participants were often looking at the last-mentioned antecedent at the beginning of the critical time window. This may have caused participants who had taken part in the German study to disregard the flag picture in the Turkish study as irrelevant. If participation in the German eye-tracking experiment influenced participants' eye movements, this should be visible in their probability of looking at the second-mentioned antecedent at the beginning of the time window. However, a mixed-effect empirical logit regression model revealed no differences between participants who had taken part in the German study and new participants (t=0.08), and the pronouns were not processed differently in the two HS groups (ts<0.3). Thus, the baseline effect shown by HSs must be an effect of HL processing rather than individual processing patterns. As mentioned in the discussion of Exp. 7, by using empirical logit models which control for the different intercepts for groups or anaphors, baseline effects were statistically controlled in the present study.

The eye-movement results revealed larger increases in looks to the local antecedent compared to the non-local antecedent for all three forms, and unlike monolinguals, HSs showed decreases in looks to the non-local antecedent. This suggests that HSs consider first-mentioned matrix subject antecedents more during online processing than monolinguals. Furthermore, this stronger consideration overrides binding constraints during online antecedent search: although HSs almost exclusively chose the non-local antecedent in comprehension questions for *o*, they showed a gaze preference for the local antecedent in eye movements.

Based on the present results, it is not possible to determine which property of the first-mentioned antecedent is decisive in attracting HSs' gaze during processing. For example, if HSs rely mainly on the linear order when searching for an antecedent, they might disprefer a matrix subject antecedent which is mentioned after the matrix object. However, if subjecthood is more important than first-mention for HSs, a second-mentioned matrix subject should be considered more strongly in eye movements. Further experiments are needed to disentangle the specific determinants of HSs' online antecedent gaze preference.

A third prediction for HSs dealt with referentially ambiguous vs. unambiguous anaphor resolution. The comprehension question results found differences between HSs and monolinguals for the referentially ambiguous form *kendisi*, and almost identical results between groups for the forms with only one accessible antecedent in the discourse, *kendi* and *o*. However, in contrast with the prediction, the difference for *kendisi* did not reach statistical significance. In the

eye movements, no effect of referential ambiguity was observed, as HSs differed from monolinguals in the processing of all three forms. Therefore, the present results do not suggest that HSs did not recognize the referential ambiguity of *kendisi*.

6.3.3.3 Individual Differences

Comprehension questions To summarize, HSs' tendency to assign a non-local antecedent to *kendisi* was higher in higher-proficiency HSs than in lower-proficiency HSs. At the same time, HL proficiency did not influence HSs' interpretation of *kendi* or *o*.

In the group comparison, HSs did not differ from monolinguals in their interpretation of *kendisi*, as both groups had a preference for the local antecedent. In the individual differences analysis, participants with higher Turkish proficiency were less likely to have a bias for the local antecedent for *kendisi*. Taken together, these results provide further evidence that participants at the higher end of the proficiency scale are not always more likely to show a monolingual-like pattern in language processing.

The HS group had a weaker preference for the local antecedent than monolinguals, and HS with native-like proficiency levels did not have a bias towards either of the two antecedents. A stronger preference for the non-local antecedent in the interpretation of *kendisi* in higher-proficiency HSs may stem from their desire to contrast the pronouns from each other more strongly, as predicted.

The absence of proficiency effects for *kendi* and *o* can be explained by the fact that both forms are unambiguous in the experimental sentences, and even lower-proficiency HSs showed a very strong preference for the only accessible antecedent. Thus, floor and ceiling effects may have prevented further proficiency effects in the present experiments.

Even without effects for two of the three anaphors, the present results show a stronger contrasting of anaphors in higher-proficiency HSs' compared to lower-proficiency HSs' interpretation, which is in line the patterns observed in Exps. 3, 4, and 7. A potential cause of this stronger contrasting observed in HSs compared to monolinguals will be discussed in the General Discussion of this chapter.

Eye movements In eye movements, higher-proficiency HSs showed less consideration of the local antecedent than lower-proficiency HSs immediately after

hearing the anaphor for all three forms. However, in the *kendisi* condition, higher-proficiency HSs' lower proportion of looks to the local antecedent was accompanied by a larger increase in looks to the local antecedent. For the non-local antecedent, higher-proficiency HSs' had fewer looks to this antecedent in the final time window after hearing *kendi*, as well as a smaller increase in looks in the final time window after hearing *o*.

No evidence for stronger contrasting between anaphors during processing in higher-proficiency HSs was observed. Instead, where differences between higher- and lower-proficiency HSs appeared, they were relatively similar for the three forms. The results suggest that HSs with higher proficiency initially considered the local antecedent less. It is unclear why higher-proficiency HSs would consider the non-local antecedent more than lower-proficiency HSs. Higher-proficiency HSs may be better at recognizing the non-local antecedent as a potential antecedent and take more time to analyze its accessibility in a complex syntactic environment. However, this explanation is speculative. It would be interesting to see whether the observed proficiency effect can be replicated in other syntactic environments.

Proficiency differences are often used as an explanation for processing differences between bilinguals and monolingual L1ers. However, in Exp. 7, higher-proficiency HSs did not show eye-movement patterns which were more similar to monolinguals than those of lower-proficiency HSs. This was explained as a result of higher-proficiency HSs' tendency to contrast different anaphors from each other. In the present experiment, the stronger contrasting was not observed in the eye-movement data. Nonetheless, the results of Exp. 8 do not indicate that higher-proficiency HSs behave more monolingual-like than lower-proficiency HSs. For example, a higher baseline proportion and larger decrease in looks to the non-local antecedent for *kendisi* is observed in HSs than in monolinguals (cf. Figure 6.12). This differences between HSs and monolinguals is driven by the higher-proficiency, not lower-proficiency HSs (cf. Figure 6.16).

Thus, while proficiency differences between L1ers and L2ers may explain non-native-like processing in L2ers, the results of the present study suggest this explanation does not apply to the differences in processing between HSs and monolingual L1ers.

6.4 General Discussion

This chapter had two aims: First, to investigate the antecedent options and online processing of Turkish anaphors in Condition A and B environments in adult monolingual L1ers; second, to investigate potential differences between monolinguals and HSs of Turkish in the processing and interpretation of these anaphors. The discussion of this chapter's results is structured according to these aims, with the first part of the discussion focusing on monolinguals, and the second part focusing on HSs. At the beginning of the discussion for each participant group, I will give a brief summary of the relevant findings.

6.4.1 Monolingual L1ers' online application of Conditions A and B

In Exp. 7, monolingual L1ers of Turkish preferred the non-local antecedent over the local antecedent for all three anaphors in the comprehension questions, while showing distinct biases for all three forms. Furthermore, the eye-movement data for *o* revealed a strong online consideration of the non-local antecedent. For *kendi* and *kendisi*, monolinguals considered both antecedents with their eye movements, but looks to the non-local antecedent started increasing before looks to the local antecedent did.

Exp. 8 differed from Exp. 7 in that the local antecedent was prominent and first-mentioned, while the non-local antecedent did not c-command the anaphor. This resulted in a reversed pattern in the responses to comprehension questions compared to Exp. 7 for both *kendi* and *kendisi*: both preferred the local over the non-local antecedent, with the bias being significantly stronger for *kendi* than for *kendisi*. *O* again very strongly preferred the non-local antecedent over the local antecedent. In the eye movements, the gaze preference for the local antecedent was clearly visible for *kendi*. For *kendisi*, the local antecedent was also considered more online, but less consistently than for *kendi*. Unlike in the comprehension questions, the local antecedent was strongly considered during processing for *o*.

When comparing participants' final interpretation of each anaphor across experiments, similar results were found for *o* and *kendisi*: In both experiments, a local antecedent was excluded for *o*, while *kendisi* was considered referentially ambiguous. Note that *kendisi* preferred different antecedents in Exp. 7 and Exp. 8, but the strength of the bias suggests that these preferences were not absolute in either case. Regarding participants' interpretation of *kendi*, Exp. 7 showed

that *kendi* can readily serve as a long-distance reflexive, as it was preferentially interpreted as referring to a prominent long-distance antecedent. In Exp. 8, the non-local antecedent did not c-command the anaphor, and it was not accepted as an antecedent for *kendi*. The observed differences in interpretation between the three anaphors under investigation are in line with previous claims that *o* is a pronoun constrained by Condition B, *kendi* is a reflexive, and *kendisi* is referentially ambiguous as predicted by Kornfilt's (2001) phrasal analysis.

Turning to the eye-movement results, in Exp. 7, participants' eye movements aligned with their end-of-trial interpretation, showing a considerable increase in proportion of looks to the non-local antecedent for all three anaphors, but more consistently so for *o* than for *kendisi* and *kendi*. For looks to the local antecedent, the inverse pattern was observed, that is earlier and more consistent increases in looks to the local antecedent for *kendisi* and *kendi* than for *o*. In Exp. 8, a contrast between eye movements and comprehension question results was observed for *o*, as the inaccessible but prominent local antecedent received much more attention in eye movements after hearing *o* than in comprehension questions.

While the results from Exp. 8 suggest that a non-c-commanding antecedent is not considered for *kendi*, Exp. 7 showed that a c-commanding non-local antecedent can readily bind the anaphor and may even be preferred over a local antecedent if it is in a prominent subject position. However, in the questionnaire results from Exp. 3, *kendi* was preferentially interpreted as referring to the subject of the subordinate clause, rather than the matrix subject. Thus, it seems that *kendi* is ambiguous between a local and a long-distance antecedent, and may reverse its bias depending on factors such as sentence structure and the task. It may be categorized as a long-distance reflexive. As mentioned before, this goes against the classification that *kendi* has received in most of the literature on Turkish anaphors (Dinçtopal-Deniz, 2009; Enç, 1989; Göksel & Kerslake, 2005; Gürel, 2002; Kornfilt, 2001), but can account for recent experimental evidence with diverging interpretations of *kendi* (Gračanin-Yüksek et al., 2017; Özbek & Kahraman, 2016).

Kendisi showed evidence that both antecedents were considered during processing in both Exp. 7 and in Exp. 8. Hence, *kendisi* is not limited to c-commanding antecedents, and therefore cannot be considered a true reflexive. The eye-movement pattern does not provide evidence of the application of a binding condition in either of the two experiments, suggesting that antecedent search for *kendisi* is independent of binding conditions, and *kendisi* is free to refer to any antecedent in the discourse. This pattern is in line with the analysis

provided by Kornfilt (2001), which claims that *kendisi* is neither a pronominal nor a reflexive, but rather a phrasal constituent.

Considering that all three anaphors preferred the non-local antecedent over the local antecedent in Exp. 7, it was unclear whether the high prominence of the antecedent caused participants to choose the non-local over the local antecedent for *o*, rather than a Condition B constraint, which excluded the local antecedent. Exp. 8 showed that this was not the case, as a local antecedent that was more prominent than the non-local antecedent was chosen at an even lower rate for *o* than the local antecedent in Exp. 7. Thus, *o* preferred a less prominent antecedent in the comprehension questions of Exp. 8. However, the prominent local antecedent was still strongly considered in participants' eye-movement data, suggesting that prominence does play a role in participants' processing of *o*, even when their antecedent choices are guided by structural or structure-sensitive constraints.

Based on Turkish monolinguals' results in Exps. 7 and 8, as well as Exp. 3, it becomes clear that antecedent prominence affects anaphor resolution both during processing and in end-of-trial interpretation. When Condition B rules out all but one antecedent in the discourse (such as for *o* in this study), antecedent prominence only affects online processing of this anaphor, but not final interpretation. That is, participants did not violate Condition B in their interpretation of *o*, but temporarily considered a prominent inaccessible antecedent. However, *kendisi* and *kendi* were referentially ambiguous in this study, and the results for these forms revealed effects of antecedent prominence both during processing and in participants' final interpretation.

Similar effects regarding the influence of contextual biases on the resolution of *o*, *kendisi*, and *kendi* were observed in Gračanin-Yüksek et al. (2017): The most referentially ambiguous form *kendisi* was most influenced by a contextual bias in a self-paced reading experiment. The results of this chapter go beyond Gračanin-Yüksek et al. (2017) by showing that even *kendi* is less determined by its syntactic bias towards a local antecedent than previously assumed: In a Visual World experiment (Exp. 7), a long-distance antecedent was preferred over a local antecedent for *kendi*, both during online processing and in end-of-trial interpretation.

This study provides insight into the role of different types of constraints in the online processing of Turkish anaphors. Both the present results and the results from Gračanin-Yüksek et al. (2017) provide support for cue-based retrieval models, which propose that both syntactic and non-syntactic cues such as antecedent prominence are considered during sentence processing. Similar

effects were reported for German in Ch. 5. However, compared to the results of German L1ers in Ch. 5, Turkish L1ers seem to rely less strongly on binding constraints when resolving anaphors online. Instead, prominent antecedents attract L1ers' gaze during anaphor resolution, even when they are not licensed by binding conditions. First-mention and subjecthood were discussed as factors influencing antecedent prominence. Further research on online processing is necessary to disentangle potential determinants of antecedent prominence in order to study their role in Turkish anaphor resolution. The observed cross-linguistic difference between German and Turkish will be further discussed in the General Discussion (Ch. 7).

6.4.2 HSs' online application of Conditions A and B

Taking together the results from Exps. 7 and 8, a number of patterns in HS processing can be detected. In both experiments, HSs distinguished between all three anaphors in interpretation and processing. Furthermore, the contrasts between different forms were stronger than for monolinguals in Exp. 7, and Exps. 7 and 8 further revealed that the tendency to contrast different anaphors from each other is stronger in higher-proficiency HSs. In their eye movements, HSs showed larger increases in looks to the first-mentioned non-local antecedent than monolinguals in Exp. 7, and larger increases to the first-mentioned local antecedent than monolinguals in Exp. 8.

There was no evidence that HSs collapsed different forms in anaphor resolution. Patterns of simplification and collapsing have previously been reported in various HS studies (Kaltsa et al., 2015; Keating et al., 2011; J.-H. Kim et al., 2009; Polinsky, 2008). The present results suggest that HSs are not necessarily impaired compared to monolinguals L1ers in their ability to discriminate between different forms and their distinct antecedent options, but may even discriminate more strongly between anaphors in interpretation. As the results from the proficiency analyses showed, the tendency to discriminate between different forms increased from lower-proficiency to higher-proficiency speakers. Some of the lower-proficiency speakers showed patterns of merging, in line with the results from previous studies. However, high-proficiency HSs contrasted forms more strongly than L1ers, a pattern that has been reported more rarely (Bamyaci, 2016; Bamyaci & von Heusinger, 2016).

Recent accounts of HL processing have noted that research on HSs has mostly focused on lower-proficiency HSs living in North America, and the results found for this group may reflect very different knowledge and processing compared to

higher-proficiency, European HSs (Flores, 2015; Kupisch, 2013). In Exps. 3 and 4 as well as Exps. 7 and 8, a measure of Turkish proficiency (TELC C1 score) was a significant predictor of participants' anaphor resolution. That is, in low-proficiency HSs, all anaphors received similar antecedent preferences, whereas high-proficiency HSs contrasted the forms more strongly than monolinguals. In the eye movements, high-proficiency HSs considered less prominent antecedents more than both low-proficiency HSs and monolinguals. These results suggest that native-like proficiency in HSs may not necessarily lead to convergence on monolingual norms. Rather, three distinct processing patterns are observed for high-proficiency HSs, low-proficiency HSs, and monolingual L1ers.

Based on the results reported in this chapter and the effect of proficiency found in Exps. 3 and 4, I conclude that considering HL proficiency may prove valuable in bridging the gap between seemingly contradictory findings in previous HS studies. This could be done in a variety of ways. One possibility is to distinguish between two groups of HSs, and possibly give them different labels, as suggested in Kupisch (2013). This would also mean focusing on a homogeneous group of either high- or low-proficiency HSs. Another option is to include HSs of a wide variety of proficiency levels, and include proficiency as a continuous predictor in the statistical analyses of the data, as was done in this study. The choice between the two options may depend on a study's specific focus and goals.

Irrespective of the proficiency effects, the question arises of why (high-proficiency) HSs show stronger contrasting of different forms. As HSs receive less input in their HL than monolinguals, they may have difficulties recognizing and reproducing nuances in antecedent options between different anaphors. Thus, the stronger contrast may be an example of incomplete acquisition in HSs. Maximizing contrasts and developing a more rigid representation of the Turkish anaphor system also represents a form of simplification, like the merging of categories observed in lower-proficiency HSs. In previous HS studies, a similar overgrammaticalization in the HL has been reported for word order (Hopp & Putnam, 2015) as well as copula use (Sánchez-Alonso et al., 2016).

Another question in this study concerned differential processing of referentially ambiguous anaphors. Some results suggest that differences between HSs and monolinguals are more likely to appear for referentially ambiguous than unambiguous anaphors. For example, in Exp. 7, HSs' eye movements were monolingual-like (after taking into account the baseline difference) for *o*, for which only one potential antecedent was not ruled out by Condition B, but not for the referentially ambiguous forms *kendisi* and *kendi*. In Exp. 8, no group differences were found in comprehension questions, even though the biggest dif-

ference appeared for the referentially ambiguous form *kendisi*. However, Exp. 8 also found a proficiency effect only for the ambiguous *kendisi*, but not for the two unambiguous forms *o* and *kendi*. Higher-proficiency HSs showed a weaker preference for the local antecedent than monolinguals, while lower-proficiency HSs had a stronger preference for the local antecedent than monolinguals, and tended to treat *kendisi* and *kendi* alike. Overall, these results support the conclusion that HSs have difficulties with the resolution of referentially ambiguous anaphors (Gürel & Yilmaz, 2011; J.-H. Kim et al., 2009).

As pointed out by Flores (2015), HSs generally show more deviation from native-like patterns in areas where there is more variation in the input (e.g. colloquial spoken language). If a certain linguistic feature can be expressed in various ways, it may take longer to acquire this feature than a feature that only appears in one type of relation or construction. This could be explained by the idea that it takes a certain amount of exposure to a structure before accepting and completely acquiring it (an 'input threshold'). Thus, the observed HS effects for referentially ambiguous anaphors may be considered a result of incomplete acquisition, if one assumes that the input threshold has not been reached for these forms. Given the questionnaire results from Ch. 4, in which HSs preferred unambiguous response options even for referentially ambiguous pronouns while no such pattern was observed in monolinguals, it seems that ambiguous anaphors do indeed constitute a vulnerable domain in HL acquisition.

The results reported in this chapter cannot be explained by cross-linguistic influence from HSs' majority language German. In Exp. 7, the same group difference is observed for all three anaphors (i.e., a stronger consideration of the local over the non-local antecedent in HSs' interpretation compared to monolinguals), even though pronouns cannot have local antecedents in German. Thus, the preference for a linearly closer antecedent for *o* in Exp. 7 cannot be due to cross-linguistic influence. In Exp. 8, the HSs performed monolingual-like in comprehension questions for *kendi*, even though L1ers' local antecedent preference for the German reflexive *sich* was much higher in the corresponding German experiment (Exp. 6). In the eye-movement data, HSs considered the local antecedent more than monolinguals for *o*, despite the fact that German *er* has identical antecedent options to Turkish *o*. Overall, the present study provides no evidence for cross-linguistic influence from German affecting HSs' online or end-of-trial processing.

An interesting group difference was observed in the eye-movement data: HSs showed less consideration of the last-mentioned antecedent and/or stronger consideration of the first-mentioned antecedent compared to monolinguals. Note

that the last-mentioned antecedent was the local antecedent in Exp. 7, and the non-local antecedent in Exp. 8. This suggests that order of mention and prominence played a larger role in online anaphor resolution in HSs compared to monolingual L1ers. However, the stronger consideration of the first-mentioned over the second-mentioned antecedent appeared only in eye movements immediately after hearing the anaphors, but not in participants' final interpretation in their responses to comprehension questions. Thus, it seems that HSs may be temporarily more distracted by a prominent antecedent, but finally converge on a more monolingual-like pattern in interpretation. The observation that HSs performed more like the monolingual group in the comprehension questions than in the eye-movement data stands in contrast with the results for Spanish HSs' processing of subject pronouns from Keating et al. (2016), but is in line with results from Flores (2015) and Sorace (2011).

The pattern of results for *o* proved proved particularly surprising, as HSs considered a local antecedent more than monolinguals in their eye movements in Exp. 8. Furthermore, HSs considered a second-mentioned local antecedent in comprehension questions more than monolinguals in Exp. 7. A potential explanation of this result is that HSs consider pragmatic information more than monolinguals during anaphor resolution. In referentially ambiguous contexts, *o* tends to prefer non-topical and less prominent antecedents. In the present study, Turkish monolinguals initially considered the more prominent antecedent for *o*, before considering the syntactically accessible antecedent more in later eye movements as well as comprehension questions. HSs' pattern of results for *o* can be described as an even stronger initial gaze preference for the prominent antecedent during online processing, followed by a shift towards the less prominent and non-topical antecedent, even when this antecedent was syntactically inaccessible (Exp. 7).

6.5 Conclusion

Based on monolinguals' data, I conclude that Turkish *o* does observe Condition B. For *kendi*, non-c-commanding antecedents are clearly dispreferred, but a c-commanding non-local antecedent can readily bind the reflexive. *Kendi* therefore cannot be considered a 'standard' Condition A reflexive, but rather a long-distance reflexive. *Kendisi* is ambiguous between a local and a non-local antecedent, and may further refer to a non-c-commanding coreference antecedent. Based on this, I accept the phrasal analysis of *kendisi* provided by Kornfilt (2001).

Factors other than binding constraints also seemed to affect monolingual L1ers' anaphor resolution, specifically in their eye movements: In Exp. 8, the local antecedent received more looks overall than did the non-local antecedent, whereas in Exp. 7 it was the non-local antecedent that received more looks overall. This difference might be attributed to differences between the two antecedents' relative syntactic or discourse prominence in the two sentence types used.

The results of this chapter also lead to a better understanding of the factors that guide HSs' anaphoric processing. While lower-proficiency HSs showed the collapsing of categories in interpretation reported in previous studies, higher-proficiency HSs contrasted the anaphors more strongly than monolinguals. These results suggest that proficiency is an important factor to consider in HL research, and may help unify the contradictory results of previous studies.

Furthermore, the results presented in this study suggest that HSs rely less exclusively on binding constraints when searching for antecedents during online processing, compared to monolinguals. HSs considered a prominent first-mentioned matrix subject antecedent more than monolinguals in eye movements, while showing a last-mentioned antecedent preference in comprehension questions. In future research, it would be interesting to further investigate the weighting of different information in HSs' anaphoric processing to determine which factors cause the HSs to express these non-monolingual-like antecedent preferences; this could be done by manipulating first-mention, subjecthood, and other factors that influence an antecedent's relative discourse prominence.

Chapter 7

General Discussion

The aim of this thesis was to investigate offline and online anaphor resolution in monolingual and bilingual populations. Specifically, the following research questions were posed at the beginning of the thesis.

1. **How do the constraints that guide L1 anaphor resolution differ between German and Turkish?**
2. **Do Turkish-speaking L2ers of German process German anaphors differently than German L1ers?**
3. **Do German-speaking HSs of Turkish process Turkish anaphors differently than monolingual Turkish L1ers?**

The different experiments addressed these research questions. In the following, I will first present a summary of the results of the different experiments, in which the relevant research questions will be indicated at the beginning of each chapter summary. Following that, I will discuss the main insights regarding the research questions stated above.

7.1 Results summary

An overview of all results in this thesis can be found in Table 7.1. In the following, I will briefly go through the results from each chapter and the interpretation presented in the respective chapter. This will serve as the basis for the conclusions drawn in the following sections.

7.1.1 Chapter 4 (addresses questions 1, 2 and 3)

In an offline questionnaire on the resolution of German anaphors (Exps. 1 and 2), L1ers of German chose only syntactically licit antecedents for reflexives and were sensitive to the pragmatic bias for sentence-internal over sentence-external antecedent for subject pronouns. Turkish-speaking L2ers of German were more likely than L1ers to choose a syntactically illicit antecedent for the reflexive *sich*, but not for *sich selbst*. Furthermore, they were more likely to choose a sentence-external antecedent for a subject pronoun than L1ers. However, the latter effect was dependent on the connector between the main clause which contained the pronoun, and the preceding subordinate clause which contained a potential antecedent. Furthermore, response accuracy was higher in L2ers with a higher L2 proficiency than in lower-proficiency L2ers, both for reflexives and the subject pronoun *er*.

The results for the reflexives suggest a stronger weighting of antecedent prominence as well as the semantic difference between *sich selbst* and *sich* in L2ers compared to L1ers. Furthermore, L2ers considered the semantic information of the connector when choosing an antecedent for the pronoun more strongly than L1ers. This is in line with Cunnings (2016) and Clahsen and Felser (2006, 2017), who suggest that L2ers weight non-syntactic information more strongly than L1ers during sentence processing, which includes anaphor resolution.

The analysis of individual differences for both experiments revealed an influence of German proficiency (measured by the Goethe test), but not Turkish proficiency (measured by the TELC test) or German AoA, when all three predictors were included in the same analysis. These results suggest that L2 proficiency is a better predictor of (offline) L2 anaphor resolution than L2 AoA or L1 proficiency.

The corresponding Turkish questionnaire (Exps. 3 & 4) revealed that when either of the two anaphors *kendi* and *kendisi* appear in an embedded object position they are ambiguous between a local and non-local antecedent which both c-command the anaphor. For subject pronouns (*o*, *kendisi*, *pro*), L1ers showed different pragmatic preferences for all three forms. Furthermore, the connector which appeared between the subordinate clause containing one of the two potential antecedents and the main clause containing the pronoun influenced antecedent choices for all three forms, indicating semantic effects. These effects were similar for *o* and *kendisi*, but not *pro*.

The results on object anaphors suggests that Turkish reflexives do not strictly abide by Condition A, which contrasts with most theoretical literature for *kendi*. Similar results were found in Özbek and Kahraman (2016) for offline interpretation, and Gračanin-Yüksek et al. (2017) for online processing data. The subject pronoun data showed that *pro* represents the standard pronominal form in Turkish, while *kendisi* and *o* both seem to be marked forms, but that still show significantly different interpretational biases.

For Turkish HSs, the object anaphor experiment revealed a stronger local preference for *kendi*, and a stronger tendency to interpret *kendisi* as referentially unambiguous, compared to monolingual L1ers. Furthermore, HSs tended to contrast different subject pronominal forms from each other more strongly, and they had a stronger local preference for *kendisi* and *pro* compared to monolingual L1ers. Analyzing individual differences revealed an effect of Turkish proficiency on the interpretation of *kendisi* in embedded object position, and an effect of German AoA on the interpretation of *kendisi* in subject position. Out of all anaphors tested in the two experiments, *kendisi* is the least frequent and

most referentially ambiguous form.

These results suggest that HSs may have an overall stronger preference for local antecedents than monolingual L1ers (cf. Gürel & Yilmaz, 2011; J.-H. Kim, 2007; J.-H. Kim et al., 2009). However, they also have a stronger preference for contrasting different forms from each other, suggesting that they overemphasize differences between forms (cf. Putnam, 2016; Sánchez-Alonso et al., 2016), compared to monolingual L1ers. This could be due to difficulties with ambiguous forms (Gürel & Yilmaz, 2011). The individual differences results revealed that both HL proficiency and the AoA of the majority language may influence HS anaphoric resolution, depending on the phenomenon.

7.1.2 Chapter 5 (addresses questions 1 and 2)

In Exps. 5 & 6, German L1ers showed sensitivity to structure-sensitive constraints for reflexives and pronouns both in eye movements and end-of-trial interpretation. The only exception was a condition in which the only accessible antecedent of a pronoun appeared embedded in a subordinate clause. L1ers' accuracy was just 75%, compared to over 90% for the three other conditions. Furthermore, in this condition, participants showed a gaze shift towards the inaccessible local antecedent rather than the correct non-local antecedent.

Overall, this evidence provides support for cue-based memory retrieval models of sentence processing (R. L. Lewis & Vasishth, 2005; Van Dyke & McElree, 2011), which propose that both syntactic cues (such as c-command) and non-syntactic cues (such as prominence) are considered from the earliest stages of processing. The evidence further supports models which propose that syntactic constraints are weighted more strongly than non-syntactic constraints (e.g. Van Dyke & McElree, 2011). Only in one condition, the pronoun condition in Exp. 6, did adult L1ers show evidence of also considering a previously mentioned and prominent but syntactically inaccessible antecedent during processing and in their final interpretation, despite the presence of an accessible antecedent in a less prominent position.

L2ers of German with L1 Turkish had a stronger tendency to consider a syntactically inaccessible antecedent than L1ers in their final interpretation (for both pronouns and reflexives). They showed an overall preference for a prominent first-mentioned antecedent, and had a native-like accuracy when this antecedent was the correct antecedent for the pronoun. During online processing, only minor (marginal) differences between L2ers and L1ers of German were observed. These results suggested that L2ers were more hesitant to shift their

gaze away from the last-mentioned antecedent towards the first-mentioned antecedent when the first-mentioned was the correct antecedent for the anaphor.

The results from the comprehension questions are in line with predictions based on Cunnings (2016) and Clahsen and Felser (2006, 2017), who claim that, during online processing of dependencies such as anaphors, L2ers rely more strongly on discourse-based cues than on syntactic cues compared to L1ers, and therefore consider the prominent first-mentioned antecedent more than L1ers.

Individual differences also play a role in L2ers' interpretation of both reflexives and pronouns in end-of-trial questions. When testing the three predictors German proficiency, German AoA, and Turkish proficiency together in one model, German proficiency was the only significant predictor, which suggests that any predictive power of the other two variables was shared with the German proficiency score. This is in line with the idea that L2ers become more native-like with increasing proficiency (e.g. Hopp, 2010; Ullman, 2001, 2005, 2015).

The eye-movement results do not support the prediction that L2ers will consider the prominent first-mentioned antecedent more than L1ers, based on the hypothesis that discourse-based cues are weighted more strongly in L2ers than L1ers. Rather, the L2ers were merely slightly slower to shift their gaze after hearing the anaphor. However, these results were only marginal. The absence of significant L1-L2 differences may also be due to properties of the experimental design and general difficulties with reanalysis in L2ers compared to L1ers. Thus, the results can neither support nor refute the hypotheses put forth by Cunnings (2016) and Clahsen and Felser (2006, 2017).

The analysis of individual differences in the eye-movement data revealed effects of AoA on the processing of reflexives, and effects of (German and Turkish) proficiency on the processing of the pronoun in Exp. 6. No effects of individual differences were found for the pronoun in Exp. 5. These results are in line with the proposal by Wartenburger et al. (2003) that AoA is more relevant in grammatical processing, while L2 proficiency is more relevant in semantic processing.

Comparing a group of Russian-speaking late L2ers of German to a proficiency-matched subset of the Turkish-speaking L2 group (only early bilinguals) revealed group differences in only one condition for the comprehension question data, the pronoun condition of Exp. 6. In the eye movements, differences between proficiency-matched Russian-speaking late and Turkish-speaking early L2ers of German were found in the initial stages of processing the pronoun in Exp. 5, where the Russian-speaking group was marginally more hesitant to shift their

gaze away from the last-mentioned antecedent. In both cases, there was no effect of AoA in the Turkish-speaking group that could have explained the group difference. The observed group differences could be explained by differences in the exposure to the relevant grammatical structures, due to different learning experiences between groups, or due to L1 influence. A potential L1 influence could explain the observed Turkish-Russian group differences on a general level, but not in terms of a transfer of binding properties between languages.

7.1.3 Chapter 6 (addresses questions 1 and 3)

Exps. 7 & 8 were Turkish translations of Exps. 5 & 6. In end-of-trial interpretations, L1ers of Turkish preferred a c-commanding non-local antecedent over a c-commanding local antecedent for all three anaphors (*o, kendisi, kendi*) in Exp. 7. Eye-movement data suggest that during processing, only the non-local antecedent is considered for *o*, while hearing *kendisi* or *kendi* led to increases in looks to both antecedents. When the non-local antecedent was embedded in a relative clause, and closer to the anaphor (Exp. 8), L1ers preferred the first-mentioned local antecedent for both *kendisi* and *kendi* (the preference was stronger for *kendi* than for *kendisi*). For *o*, there was again a strong preference for the non-local antecedent. In the eye movements, all three forms showed increases in looks to the local antecedent. This effect was strongest for *kendi*, followed by *kendisi* and then *o*.

These results support the categorization of *o* as a pronoun which adheres to Condition B. *Kendisi* can take both local and non-local as well as non-c-commanding antecedents, which is in line with the phrasal analysis of *kendisi* put forward by Kornfilt (2001). *Kendi* takes both local and long-distance antecedents, but disprefers non-c-commanding antecedents, suggesting that it is a type of long-distance reflexive. Comparing the offline results of Exp. 3 to the online interpretation in Exp. 7 for *kendisi* and *kendi*, a difference in antecedent preference is observed for these referentially ambiguous forms: In the online experiment, the preference for the non-local antecedent was stronger.

Like the results from German L1ers, these results support cue-based retrieval models of sentence processing: Even when there was only one accessible antecedent based on syntactic information (for *o*), syntactically illicit antecedents were considered during the early stages of processing, if they were very prominent. Anaphors that were referentially less restricted by binding constraints (*kendisi*, but also *kendi*) showed stronger effects of changing relative prominence. This is in line with findings from Gračanin-Yüksek et al. (2017).

Turning to HSs, in Exp. 7, HSs showed a stronger preference for local antecedents in their ultimate interpretations, but considered a prominent first-mentioned antecedent more during processing, compared to monolingual L1ers. Furthermore, lower-proficiency HSs had a tendency to collapse different anaphors in their interpretation, while higher-proficiency HSs contrasted the forms more than monolingual L1ers, both in interpretation and eye movements. When the local antecedent was first-mentioned and the non-local antecedent was embedded in a relative clause (Exp. 8), HSs performed identically to monolinguals in end-of-trial interpretations. In eye movements, HSs again preferred the first-mentioned antecedent more strongly than monolinguals. Higher-proficiency HSs were more likely to choose the embedded non-local antecedent for *kendisi* in end-of-trial interpretations, but also more likely to show increases to the local antecedent in their eye movements. In both cases, this meant that higher-proficiency HSs performed less monolingual-like than lower-proficiency HSs.

HSs may temporarily be more distracted by a prominent but syntactically illicit antecedent, compared to monolingual L1ers. Differences from monolingual L1ers were most prominent for referentially ambiguous forms, and HSs had a tendency to contrast the different anaphors from each other more strongly than monolinguals, both in eye movements and end-of-trial interpretations. Furthermore, HL proficiency appears to be a very important factor to consider in research on HSs, because lower- and higher-proficiency HSs may show very different patterns. In both experiments, participants at the higher end of the proficiency scale were more likely to contrast different anaphors from each other, but they did not always behave more like monolingual L1ers than lower-proficiency HSs.

Table 7.1 *Overview of results in this thesis, categorized by population, language and anaphor type*

Population	**L1ers**				**L2ers**				**HSs**			
Language	**German**		**Turkish**		**German**				**Turkish**			
		Constraint		Constraint		Constraint	≠L1	Ind.		Constraint	≠Mono	Ind.
questionnaire	**sich**	CondA✓	**kendi**	CondA(✓)	**sich**	CondA(✓)	✓	✓	**kendi**	CondA ✗	✓	✗
	selbst	CondA✓	**kendisi**	CondA/B✗	**selbst**	CondA✓	✗	✗	**kendisi**	CondA/B✗	✓	✓
	er	INT.(✓)	**o**	EXT.✓	**er**	INT.(✓)	✓	✓	**o**	EXT.✓	✗	✗
			kendisi	EXT.✗					**kendisi**	EXT.✗	✓	✓
			pro	INT.✓					**pro**	INT.✓	✓	✗
eye-movements	**sich**	CondA✓	**kendi**	CondA✗	**sich**	CondA✓	(✓)	✓	**kendi**	CondA✗	✓	✓
	er	CondB(✓)	**kendisi**	CondA/B✗	**er**	CondB(✓)	(✓)	✓	**kendisi**	CondA/B✗	✓	✓
			o	CondB(✓)					**o**	CondB(✓)	✓	✓
end-of-trial interpretation	**sich**	CondA✓	**kendi**	CondA✗	**sich**	CondA(✓)	✓	✓	**kendi**	CondA✗	✓	✓
	er	CondB(✓)	**kendisi**	CondA/B✗	**er**	CondB(✓)	✓	✓	**kendisi**	CondA/B✗	✓	✓
			o	CondB✓					**o**	CondB(✓)	✓	✓

Note. ≠L1 = L2ers behaved non-native-like, ≠Mono = HSs behaved non-monolingual-like, Ind. = Effects of individual differences variables, EXT. = sentence-external preference, INT.= sentence-internal preference, ✓= true / constraint was followed, (✓) = partly true / constraint was partly followed, ✗ = false / constraint was not followed.

7.2 The role of syntactic and non-syntactic information in L1 anaphor resolution across languages (question 1)

German has one standard third person pronoun *er/sie/es* and one standard reflexive *sich*. Both are strongly determined by Conditions B and A of Binding Theory, respectively. (However, while Condition A identifies the reflexive's antecedent, Condition B only excludes potential antecedents of a pronoun.) While there was no evidence for the consideration of illicit antecedents for reflexives by L1ers, an illicit and prominent antecedent was considered for the pronoun *er* during processing and in interpretation.

Turkish has two standard pronouns (*o*, *pro*), a standard reflexive (*kendi*), and a phrasal anaphor (*kendisi*). For all of these forms, it seems that both syntactic information (such as subjecthood and local vs. non-local status) and pragmatic information (such as prominence and the constraint that *o* prefers non-topic antecedents) were considered in monolinguals' processing and interpretation of these forms. Furthermore, the semantic function of a sentence-internal connector affected the interpretation of subject anaphors *o*, *kendisi*, and *pro*.

Thus, it seems there are substantial differences between German and Turkish in the relative weighting of syntactic vs. non-syntactic information during anaphor resolution, with Turkish L1ers considering non-syntactic, and specifically pragmatic, information more than German L1ers.

For both German and Turkish, in non-canonical sentence structures and in a taxing online task, monolingual adult L1ers failed to apply binding constraints for some anaphors not just temporarily, but sometimes even in their final interpretation. This was the case for a pronoun (subject to Condition B) in German and a reflexive (subject to Condition A) in Turkish. For other forms, if participants considered syntactically illicit antecedents, the effect was limited to eye movements.

The results for German are in line with previous Visual-World studies which tested both pronouns and reflexives and found a stronger consideration of illicit antecedents in Condition B environments than in Condition A environments (Clackson et al., 2011; Runner & Head, 2014). This may indicate a stronger reliance on information beyond binding constraints for pronouns than for reflexives. Unlike German L1ers, Turkish L1ers violated both binding conditions during processing. This raises the question of whether the proposed difference in sensitivity to binding constraints between pronouns and reflexives holds cross-

linguistically.

Irrespective of cross-linguistic differences, the Visual World eye-tracking experiments were able to capture a temporary divergence from binding constraints even when participants show full compliance with these constraints in offline interpretation, in both German and Turkish monolingual L1ers. Assuming a cue-based retrieval model of anaphor resolution, in which syntactic cues are weighted more strongly than non-syntactic cues (Patterson, 2013; Van Dyke & McElree, 2011), binding constraints are more likely be violated during online processing when checking these constraints is more complex (for example when a potential antecedent is embedded in an object relative clause), or when non-syntactic information shows a clear bias.

Further support for cue-based retrieval models with stronger weighting of syntactic cues comes from a meta-analysis (Jäger, Engelmann, & Vasishth, 2017) which found that a non-weighted model (R. L. Lewis & Vasishth, 2005) cannot explain the evidence on reflexive processing. A more recent model (Engelmann, Jäger, & Vasishth, 2018) which takes into account prominence and context-dependent retrieval more strongly than R. L. Lewis and Vasishth (2005) provides a better fit to the data on reflexive processing in computational simulations. Engelmann et al. (2018) state that their implementation of context-dependent retrieval may be a indirect way of weighting syntactic retrieval cues more strongly than semantic cues.

7.3 Cue-based retrieval and individual differences in L2 anaphor resolution (question 2)

Results from L2ers in Chapters 4 and 5 provide support for the memory interference hypothesis (Cunnings, 2016) and the shallow structure hypothesis (Clahsen & Felser, 2006, 2017), which both claim that L2ers weight syntactic information less strongly than non-syntactic information during anaphor resolution. Jacob, Lago, and Patterson (2016) question whether Cunnings' (2016) hypothesis about memory retrieval mechanisms in L2ers can be extended to offline processing, as online and offline methods have often been described as measuring different mechanisms. In a response to Jacob et al.'s (2016) comments, Cunnings (2017) suggests that interference during the resolution of syntactic dependencies is more likely to persist in L2ers than L1ers. Based on this argument and the similarity of L1-L2 differences in online and offline interpretation in this thesis, I believe the memory interference hypothesis is also valuable for explaining L1-L2

differences in offline interpretation.

Other current models of L2 language processing cannot accurately capture the present findings for L2ers. My results cannot be explained by capacity-based approaches to L2 processing (Hopp & Putnam, 2015; McDonald, 2006), as the L2ers were not just slower or globally less accurate, but instead showed a specific qualitative pattern of differences from L1ers. Furthermore, AoA and L1 proficiency influenced L2 anaphor resolution beyond L2 proficiency effects. My results are also not in line with the interface hypothesis (Sorace, 2011), as L2ers were able to use both syntactic and pragmatic or semantic information during anaphor resolution, and even did so more extensively than L1ers in some cases. L1-L2 differences appeared both in Condition A and B environments, and in contexts where anaphor resolution requires the integration of syntactic and pragmatic information.

However, while the interpretation data provided evidence in favor of Cunnings (2016) and Clahsen and Felser (2006, 2017), the online eye-tracking results were less conclusive. Thus, it would be useful to further investigate whether changing aspects of the experimental design can provide eye-tracking evidence in support of the hypothesis that L2ers' rely more strongly on non-syntactic information during processing than L1ers.

Cunnings (2016) stated he expects early bilinguals to behave like L1ers. However, the group of Turkish-German bilinguals that I tested included more early than late bilinguals, and still showed significant differences from monolingual L1ers in their online and offline resolution of anaphors. Therefore, I believe that the memory interference hypothesis at least partly applies to early bilinguals as well. Rather than the AoA of the L2, proficiency played an important role in predicting L2 processing, with the highest-proficiency L2ers approaching native-like interpretation. For eye movements, AoA was also relevant. However, many of the effects observed for the eye movements were marginal. Thus, it would be interesting to further investigate the role of individual differences in a larger-scale study with a participant sample which is more balanced and covers a wider range for factors like AoA and L2 proficiency.

This thesis also asked whether L1 background affects the processing of anaphors in German, which was addressed in the eye-tracking experiments in Ch. 5: Comparing the Turkish-speaking L2ers to Russian-speaking L2ers of German revealed an L1 background effect on the processing of anaphors. However, the observed effects cannot be explained by a direct influence of L1 binding properties. Alternative explanations for group differences are different learning experiences or a more general influence of the L1.

Furthermore, the differences between Turkish-speaking and Russian-speaking L2ers of German were observed in conditions where there were no L1-L2 differences for German L1ers and Turkish-speaking L2ers of German. Thus, the observed pattern for L2 online processing of German anaphors cannot be reduced to an L1 background effect.

Nonetheless, it would be interesting to further explore the role of L1 background in offline anaphor resolution, by testing a group of Russian-speaking L2ers of German on the questionnaire study in Exps. 1 and 2, and comparing Russian-speaking and Turkish-speaking L2ers to each other, as L1 influence cannot be fully ruled out as an explanation for the results of the L2 group in offline interpretation.

7.4 The role of referential ambiguity and proficiency in HS anaphor resolution (question 3)

L1ers and HSs were most different from each other in processing the referentially ambiguous forms *kendisi* and *kendi*. This effect may indicate incomplete acquisition in HSs. If the input threshold for acquiring accurate 'graded' antecedent preferences was not reached, HSs could be 'stuck' in a mechanism that they developed based on their limited input. This could also explain the observation from Exp. 3 that while HSs did not differ from monolinguals in their average local vs. non-local preference for *kendisi*, individual participants had strong biases and many did not consider *kendisi* referentially ambiguous in those contexts, while in the monolingual group the most frequently chosen response option was that *kendisi* was fully ambiguous between the local and the non-local antecedent.

Furthermore, HSs' tendency to contrast different forms from each other more strongly could be attributed to incomplete acquisition in the same way: They have not yet received enough input to conclude that instances that did not align with the assumed absolute preference were in fact not errors, but indicators of a graded preference in the respective form. This argument has been made for different phenomena (Putnam, 2016; Sánchez-Alonso et al., 2016), and it would be valuable to further explore this hypothesis, for example by increasing the exposure to different interpretations of referentially ambiguous forms in HS experiments, and testing whether this affects their processing behavior.

Higher-proficiency HSs showed this contrasting more strongly, which sometimes meant that they behaved less like monolingual L1ers than lower-proficiency HSs. It seems that even high-proficiency HSs are affected by reduced exposure to their HL, and have tried to overgrammaticalize the input they have received. Higher-proficiency HSs may be better than lower-proficiency HSs at recognizing patterns based on little input. However, if this results in overgrammaticalization, it may cause the observed failure to recognize graded patterns for referentially ambiguous forms.

The stronger preference for local antecedents that was observed in HSs' ultimate interpretation both offline and online is in line with previous findings on HSs' resolution of reflexives (e.g. J.-H. Kim et al., 2009).

The eye-movement data presented a novel finding, namely a stronger consideration of first-mentioned antecedents during online processing in HSs compared to monolingual L1ers, irrespective of whether the first-mentioned antecedent was a local (Exp. 8) or non-local antecedent (Exp. 7) to the anaphor. The first-mentioned antecedent was also the matrix subject, so it is not clear what is the cause of and the mechanism behind HSs' gaze preference for this antecedent. Future research may address this question by investigating the influence of these factors separately.

There is currently no comprehensive model or theory of HL processing. While some of my results are consistent with previous findings and hypotheses about HL processing, others cannot be captured by existing theories. There is a need for the development of a comprehensive model of HL processing. For L2ers, debates about how to characterize L2 processing have led to the development of various models that can be tested and compared to each other. While HL research as a field is younger than L2 research, it could greatly benefit from having models that go beyond HL acquisition and focus on processing. Currently, the most prominent characterization of HL online processing is found in the interface hypothesis (Sorace, 2011), which was originally proposed for L2 processing and later extended to HSs, and states that these populations have trouble integrating syntactic and non-syntactic (e.g. pragmatic or semantic) information during online processing. However, my results do not indicate that the higher-proficiency HSs tested in this thesis have trouble integrating syntactic and pragmatic information. As the interface hypothesis and most other hypotheses about HL processing were developed for lower-proficiency HSs, it is important to consider the role of proficiency in HL processing. It might even be more valuable to develop separate models for lower- and higher-proficiency HSs, based on the observation that lower- and higher-proficiency HSs may show very

different processing patterns (Flores, 2015; Kupisch, 2013). However, doing so would introduce the difficulty of specifying if, when and how an individual HS may move from lower-proficiency-specific to higher-proficiency-specific processing patterns.

7.5 Parallels and differences in L2ers' and HSs' anaphoric resolution (questions 2 and 3)

Overall, the results in this thesis suggest differences between monolingual L1ers and both L2ers and HSs in anaphor resolution. While similarities between L2 and HL comprehension have been reported (e.g. Montrul, 2002), the two bilingual groups in the present study differed from monolinguals L1ers in different ways: While L2ers showed a stronger preference for the first-mentioned antecedent in interpretation compared to monolingual L1ers, HSs showed the opposite pattern, namely a preference for the last-mentioned antecedent. Furthermore, HSs had a tendency to overgrammaticalize antecedent biases by contrasting different anaphors more strongly than monolingual L1ers, which was not observed in L2ers.

Another difference between HL and L2 anaphor resolution concerned individual differences in proficiency: Whereas in the L2 group a higher L2 proficiency indicated more native-like interpretation and processing, HSs with a higher HL proficiency showed stronger contrasting of forms, which could result in higher-proficiency HSs being more different from monolingual L1ers than were lower-proficiency HSs.

HSs and L2ers cannot be characterized within one global model of bilingual processing, unless their different types of acquisition and exposure to a language are considered. While Cunnings (2016) and Clahsen and Felser (2006, 2017) have offered useful descriptions of L2 processing, HL processing is currently lacking a hypothesis or model of comparable value.

Furthermore, individual differences such as proficiency, AoA, and the type of exposure seem to strongly influence language processing in both L2ers and HSs. Thus, any model that wants to portray not just a very specific subset of bilinguals, but L2ers or HSs more generally needs to address the role of individual differences.

7.6 Limitations and outlook

Despite the contributions described above, this study has several limitations, some of which may be resolved in future research.

First, the eye-tracking experiments found baseline differences between monolinguals and both types of bilingual population. While the German experiment used only an auditory buffer between the last-mentioned antecedent and the anaphor, the Turkish experiment aimed to eliminate the baseline difference by moving participants' gaze to an unrelated image before hearing the anaphor (the 'flag manipulation', cf. section 6.2.1.2). However, this measure was less effective in HSs, and so baseline differences were also found in the Turkish experiments. Even though the baseline differences were controlled for statistically, it is always better to ensure that eye movement responses begin from the same point at the onset of the critical anaphor, so that group differences are attributable to different reactions to the anaphor and not to an earlier difference in processing the sentence. The effects illustrate the difficulty of designing experiments for different populations who may differ not only in language processing, but possibly also regarding extra-linguistic factors. In future studies, measures such as showing a blank screen before hearing the anaphor may help make initial gaze position more uniform; this may however come at the expense of making the experiment less naturalistic for the participant.

A second limitation of this study concerns the nature of monolingual-HS differences. The results suggest a stronger consideration of first-mentioned subject antecedents over other antecedents during processing. With the materials of this study, it was not possible to disentangle the property or properties which determine non-monolingual-like antecedent preferences in HSs. A potential extension of this study may therefore be to manipulate subjecthood, first-mention, and other factors such as topichood, and then compare monolingual and HS processing of anaphors with these different antecedent types. The results may then contribute to formulating a comprehensive model of HL processing.

Further, this study did not systematically investigate the role of cross-linguistic influence in L2 and HL anaphor resolution. Overall, the results suggest no or only a minor role of cross-linguistic influence in the populations under investigation. However, cross-linguistic influence cannot be fully ruled out as an explanation of some L1-L2 differences, and for the HSs no second HS group was tested to investigate the role of cross-linguistic influence. In order to do so, one would have to test other HSs of Turkish with a majority language that is more comparable to Turkish in the phenomena of interest, e.g. Japanese or Malay.

However, to my knowledge there is no language with constraints on anaphor resolution that are identical to the Turkish system. Also, it might be hard to find sizable populations of Turkish HSs in these countries.

Chapter 8

Conclusion

This thesis addressed the resolution of subject and object anaphors in German and Turkish, in monolingual and bilingual populations.

I found evidence in support of cue-based retrieval models of anaphor resolution in monolingual L1ers of two languages. I further propose that the weighting of different cues during anaphor resolution may differ not only between anaphors of the same language and different populations, but also between languages. Specifically, the processing of Turkish anaphors seems to rely less on the structural information relevant for Conditions A and B than does the processing of German anaphors.

The evidence on HL and L2 processing of anaphors suggests that L2ers weight non-syntactic information more strongly than L1ers in anaphor resolution, while HSs overgrammaticalize distinctions in their HL, especially if they have a high HL proficiency. Thus, while both groups show differences from monolingual L1ers, the two bilingual populations do not show the same patterns in anaphor resolution.

Large effects of individual differences such as L2/HL proficiency and L2 AoA illustrate the need to consider the influence of these variables on processing patterns in future models of L2 and HS language processing.

References

Agresti, A. (2002). *Categorical Data Analysis* (2nd ed.). Hoboken, New Jersey: John Wiley & Sons Inc.

Ahrenholz, B. (2007). *Verweise mit Demonstrative im gesprochenen Deutsch: Grammatik, Zweitspracherwerb und Deutsch als Fremdsprache.* Berlin – New York: W. de Gruyter.

Altmann, G. T. M., & Kamide, Y. (1999). Incremental interpretation at verbs: restricting the domain of subsequent reference. *Cognition*, *73*(3), 247–64.

Ariel, M. (1988). Referring and Accessibility. *Journal of Linguistics*, *24*(1), 65–87.

Ariel, M. (1990). Accessing noun-phrase antecedents. *Linguistics*(96), 113–118.

Arslan, S., Bastiaanse, R., & Felser, C. (2015). Looking at the evidence in visual world: eye-movements reveal how bilingual and monolingual Turkish speakers process grammatical evidentiality. *Frontiers in Psychology*, *6*(1387), 1–13. doi: 10.3389/fpsyg.2015.01387

Baayen, H., Davidson, D., & Bates, D. (2008). Mixed-effects modeling with crossed random effects for subjects and items. *Journal of Memory and Language*, *59*(4), 390–412. doi: 10.1016/j.jml.2007.12.005

Badecker, W., & Straub, K. (2002). The processing role of structural constraints on interpretation of pronouns and anaphors. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *28*(4), 748–769. doi: 10 .1037//0278-7393.28.4.748

Bailyn, J. F. (2012). *The syntax of Russian.* Cambridge: Cambridge University Press.

Bamyaci, E. (2016). *Comparing semantics-syntax and pragmatics-syntax interfaces: Animacy and Givenness in the grammar of monolingual and bilingual heritage speakers of Turkish.* Presentation at Linguistic Evidence Conference, 2016, Tübingen, Germany.

Bamyaci, E., & von Heusinger, K. (2016). *Animacy effects on Differential Object Marking in Turkish.* Presentation at Linguistic Evidence Conference, 2016, Tübingen, Germany.

Barr, D. J. (2008). Analyzing 'visual world' eyetracking data using multilevel logistic regression. *Journal of Memory and Language*, *59*(4), 457–474. doi: 10.1016/j.jml.2007.09.002

Barr, D. J., Gann, T. M., & Pierce, R. S. (2011). Anticipatory baseline effects and information integration in visual world studies. *Acta psychologica*, *137*(2), 201–7. doi: 10.1016/j.actpsy.2010.09.011

Benmamoun, E., Albirini, A., Montrul, S., & Saadah, E. (2014). Arabic plurals and root and pattern morphology in Palestinian and Egyptian heritage speakers. *Linguistic Approaches to Bilingualism*, *4*(2014), 89–123. doi: 10.1075/lab.4.1.04ben

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: 10.1515/tl-2013-0009

Bley-Vroman, R. (1989). The logical problem of foreign language learning. *Linguistic Analysis*, *20*(1-2), 2–49. doi: 10.1017/CBO9781139524544.005

Bley-Vroman, R. (2009). The Evolving Context of the Fundamental Difference Hypothesis. *Studies in Second Language Acquisition*, *31*(2), 175. doi: 10.1017/S0272263109090275

Bosch, P., Katz, G., & Umbach, C. (2007). The Non-Subject Bias of German Demonstrative Pronouns. *Anaphors in Text: Cognitive, formal and applied approaches to anaphoric reference*, 145–164.

Bosch, P., Rozario, T., & Zhao, Y. (2003). Demonstrative Pronouns and Personal Pronouns. German der vs. er. *Proceedings of the 2003 EACL Workshop on The Computational Treatment of Anaphora*.

Bouma, G., & Hopp, H. (2006). Effects of Word Order and Grammatical Function on Pronoun Resolution in German. In *Ambiguity in anaphora workshop proceedings* (pp. 5–12).

Brooks, P. J., & Kempe, V. (2014). Visual World Eye-Tracking Paradigm. In *Encyclopedia of language development* (pp. 657–658).

Bustin, A. (2016). *Variation in sentence processing strategies between bilingual groups: On-line and off- line pronoun interpretation.* Poster presented at CUNY 2016, Gainesville, USA.

Carminati, M. N. (2002). *The Processing of Italian Subject Pronouns* (Unpublished doctoral dissertation). University of Amherst, MA.

Chomsky, N. (1981). *Lectures on Government and Binding*. Dordrecht: Foris.

Chow, W. Y., Lewis, S., & Phillips, C. (2014). Immediate sensitivity to structural constraints in pronoun resolution. *Frontiers in Psychology*, *5*(JUN), 1–16. doi: 10.3389/fpsyg.2014.00630

Clackson, K., Felser, C., & Clahsen, H. (2011). Children's processing of reflexives and pronouns in English: Evidence from eye-movements dur-

ing listening. *Journal of Memory and Language*, *65*(2), 128–144. doi: 10.1016/j.jml.2011.04.007

Clackson, K., & Heyer, V. (2014). Reflexive anaphor resolution in spoken language comprehension: Structural constraints and beyond. *Frontiers in Psychology*, *5*(904), 1–9. doi: 10.3389/fpsyg.2014.00904

Clahsen, H., & Felser, C. (2006). Grammatical processing in language learners. *Applied Psycholinguistics*, *27*(1), 3–42. doi: 10.1017/S0142716406060024

Clahsen, H., & Felser, C. (2017). Critical Commentary: Some notes on the shallow structure hypothesis. *Studies in Second Language Acquisition*, *0*, 1–14. doi: 10.1017/S0272263117000250

Clifton, C., Frazier, L., & Deevy, P. (1999). Feature manipulation in sentence comprehension. *Rivisita di Linguistica*, *11*, 11–39.

Clifton, C., Kennison, S. M., & Albrecht, J. E. (1997). Reading the Words Her , His , Him : Implications for Parsing Principles Based on Frequency and on Structure. *Journal of Memory and Language*, *292*(36), 276–292.

Cole, P., & Hermon, G. (1998). Long distance reflexives in Singapore Malay: An apparent typological anomaly. *Linguistic Typology*, *2*(1), 1–41. doi: 10.1515/lity.1998.2.1.57

Colonna, S., Schimke, S., & Hemforth, B. (2015). Different effects of focus in intra- and inter-sentential pronoun resolution in German. *Language, Cognition and Neuroscience*, *30*(10), 1306–1325. doi: 10.1080/23273798.2015.1066510

Cunnings, I. (2016). Parsing and Working Memory in Bilingual Sentence Processing. *Bilingualism: Language and Cognition*. doi: 10.1017/S1366728916000675

Cunnings, I. (2017). Interference in Native and Non-Native Sentence Processing. *Bilingualism: Language and Cognition*, 1–10. doi: 10.1017/S1366728916001243

Cunnings, I., & Felser, C. (2011). The role of working memory in the processing of reflexives. *Language and Cognitive Processes*, *28*(1-2), 188–219. doi: 10.1080/01690965.2010.548391

Cunnings, I., Patterson, C., & Felser, C. (2014). Variable binding and coreference in sentence comprehension: Evidence from eye movements. *Journal of Memory and Language*, *71*(1), 39–56. doi: 10.1016/j.jml.2013.10.001

DeKeyser, R. M. (2003). Implicit and Explicit Learning. In C. J. Doughty & M. H. Long (Eds.), *The handbook of second language acquisition* (pp. 313–348). Blackwell: Oxford University Press.

DeKeyser, R. M., Alfi-Shabtay, I., & Ravid, D. (2010). Cross-linguistic evidence for the nature of age effects in second language acquisition. *Applied Psycholinguistics*, *31*, 413–438.

de la Fuente, I., & Hemforth, B. (2012). *Expectations matter when resolving pronouns in explanations and temporal clauses : The differences between even and only.* Poster presented at AMLaP 2013, Marseille, France. doi: 10.13140/RG.2.1.1794.8323

de la Fuente, I., & Hemforth, B. (2014). *The time course of semantic constraints in pronoun resolution.* Poster presented at AMLaP 2014, Edinburgh, UK. doi: 10.13140/2.1.3148.7365

Demirci, M. (2000). The role of pragmatics in reflexive interpretation by Turkish learners of. *Second Language Research*, *16*(4), 325–353.

Dillon, B. W. (2011). *Structured Access in Sentence Comprehension* (Unpublished doctoral dissertation). University of Maryland.

Dillon, B. W., Mishler, A., Sloggett, S., & Phillips, C. (2013). Contrasting intrusion profiles for agreement and anaphora: Experimental and modeling evidence. *Journal of Memory and Language*, *69*(2), 85–103. doi: 10.1016/j.jml.2013.04.003

Dinçtopal-Deniz, N. (2009). *Anaphora in Turkish* (No. 1999).

Dink, J., & Ferguson, B. (2016). *eyetrackingR.* Retrieved from http://www.eyetracking-r.com

Durrell, M. (2011). *Hammer's German Grammar and Usage* (5th ed.) (No. December). London and New York: Routledge. doi: 10.1161/01.CIR.31.2.273

Dussias, G. (2016). *The changing L1: How bilingualism affects syntactic processing in the native language.* Presentation at CUNY 2016, Gainesville, USA.

Eckardt, R. (2001). Reanalysing selbst. *Natural Language Semantics*, *9*(4), 371–412.

Edmondson, J. A., & Plank, F. (1978). Great Expectations : An Intensive Self Analysis. *Linguistics and Philosophy*, *2*(3), 373–413.

Ellert, M. (2013a). Information Structure Affect the Resolution of the Subject Pronouns Er and Der in Spoken German Discourse. *Discours*, *12*.

Ellert, M. (2013b). Resolving ambiguous pronouns in a second language : A visual-world eye-tracking study with Dutch learners of German. *International Review of Applied Linguistics in Language Teaching*, *51*(2013), 171–197. doi: 10.1515/iral-2013-0008

Enç, M. (1986). Topic switching and pronominal subjects in Turkish. *Studies in Turkish Linguistics*, *8*, 195–208. doi: 10.1075/tsl.8.11enc

Enç, M. (1989). Pronouns, Licensing, and Binding. *Natural Language & Linguistic Theory*, *7*(1974), 51–92.

Engelmann, F., Jäger, L. A., & Vasishth, S. (2018). The effect of prominence and cue association in retrieval processes : A computational account. *Sub-*

mitted to Cognitive Science.

Featherston, S., & Sternefeld, W. (2003). The interaction of factors in judgements of reflexive structures : Data from object coreference in German. In L. Gunkel, G. Müller, & G. Zifonun (Eds.), *Arbeiten zur Reflexivierung. Linguistische Arbeiten* (481st ed., pp. 25–50). Tübingen: Niemeyer.

Felser, C., & Cunnings, I. (2012). Processing reflexives in a second language: The timing of structural and discourse-level constraints. *Applied Psycholinguistics*, *33*(3), 571–603. doi: 10.1017/S0142716411000488

Felser, C., Sato, M., & Bertenshaw, N. (2009). The on-line application of binding Principle A in English as a second language. *Bilingualism: Language and Cognition*, *12*(4), 485. doi: 10.1017/S1366728909990228

Ferreira, F., & Patson, N. D. (2007). The 'Good Enough' Approach to Language Comprehension. *Language and Linguistics Compass*, *1*(1-2), 71–83. doi: 10.1111/j.1749-818X.2007.00007.x

Filiaci, F. (2010). Null and Overt Subject Biases in Spanish and Italian : A Cross-linguistic Comparison. In M. E.-E. &. P. P. C. Borgonovo (Ed.), *Selected proceedings of the 12th Hispanic Linguistics Symposium* (pp. 171–182). Somerville, MA: Cascadilla Proceedings Project.

Filiaci, F., Sorace, A., & Carreiras, M. (2014). Anaphoric biases of null and overt subjects in Italian and Spanish: a cross-linguistic comparison. *Language and Cognitive Processes*, *29*(7), 825–843. doi: 10.1080/01690965.2013.801502

Flores, C. M. M. (2015). Understanding heritage language acquisition. Some contributions from the research on heritage speakers of European Portuguese. *Lingua*, *164*, 251–265. doi: 10.1016/j.lingua.2014.09.008

Foote, R. (2009). Age of acquisition and proficiency as factors in language production: Agreement in bilinguals. *Bilingualism: Language and Cognition*, *13*(2), 99. doi: 10.1017/S136672890999040X

Foraker, S., & McElree, B. (2011). Comprehension of linguistic dependencies: Speed-accuracy tradeoff evidence for direct-access retrieval from memory. *Linguistics and Language Compass*, *5*(11), 764–783. doi: 10.1111/j.1749-818X.2011.00313.x

Frenck-Mestre, C., Foucart, A., Carrasco-Ortiz, H., & Herschensohn, J. (2009). Processing of grammatical gender in French as a first and second language: Evidence from ERPs. *EUROSLA Yearbook*, *9*(1), 76–106. doi: 10.1075/eurosla.9.06fre

George, L. M., & Kornfilt, J. (1981). Finiteness and Boundedness in Turkish. In F. Heny (Ed.), *Binding and filtering* (pp. 105–127).

Gernsbacher, M. A., & Hargreaves, D. J. (1988). Accessing sentence participants: The advantage of first mention. *Journal of Memory and Language*,

27(6), 699–717. doi: 10.1016/0749-596X(88)90016-2

Givón, T. (1983). *Topic continuity in discourse: A quantitative cross-language study.* Amsterdam and Philadelphia: John Benjamins.

Goethe Institut. (2010). *German placement test.* Retrieved from http://www.goethe.de/cgi-{%}0Abin/einstufungstest/einstufungstest.pl(retrieved01/01/2015)

Göksel, A., & Kerslake, C. (2005). *Turkish : A Comprehensive Grammar.*

Gordon, P. C., Grosz, B., & Gilliom, L. (1993). Pronouns, names, and the centering of attention in discourse. *Cognitive Science*, *17*(1 993), 311–347. doi: 10.1207/s15516709cog1703_1

Gračanin-Yüksek, M., Lago, M. S., Şafak, D. F., Demir, O., & Kırkıcı, B. (2017). The interaction of contextual and syntactic information in the processing of Turkish anaphors. *Journal of Psycholinguistic Research.* doi: 10.1007/s10936-017-9502-2

Gundel, J. K., Hedberg, N., & Zacharski, R. (1993). Cognitive Status and the Form of Referring Expressions in Discourse. *Language*, *69*(2), 274–307.

Gürel, A. (2002). *Linguistic Characteristics of Second Language Acquisition and First Language Attrition: Turkish Overt versus Null Pronouns* (Unpublished doctoral dissertation). McGill University.

Gürel, A. (2004). Selectivity in L2-induced L1 attrition: a psycholinguistic account. *Journal of Neurolinguistics*, *17*(1), 53–78. doi: 10.1016/S0911-6044(03)00054-X

Gürel, A. (2006). L2 acquisition of pragmatic and syntactic constraints in the use of overt and null subject pronouns. In R. Slabakova, S. Montrul, & P. Prévost (Eds.), *Inquiries in linguistic development* (pp. 259–282). Amsterdam and Philadelphia: John Benjamins.

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

Hawkins, R., & Chan, C. Y.-h. (1997). The partial availability of Universal Grammar in second language acquisition: the 'failed functional features hypothesis'. *Second Language Research*, *13*(3), 187–226. doi: 10.1191/026765897671476153

Hemforth, B., Vaillant, E., Konieczny, L., & Scheepers, C. (2010). Language specific preferences in anaphor resolution : Exposure or Gricean maxims ? *Proceedings of the 32nd Annual Conference of the Cognitive Science Society*(2), 2218–2223.

Hensch, T. K. (2004). Critical Period Regulation. *Annual Review of Neuroscience*, *27*(1), 549–579. doi: 10.1146/annurev.neuro.27.070203.144327

Hentschel, E., & Weydt, H. (2013a). Adverbien. In *Handbuch der deutschen grammatik* (pp. 238–247).

Hentschel, E., & Weydt, H. (2013b). Artikel, Pronomina, Numeralia. In *Handbuch der deutschen Grammatik* (pp. 208–237).

Herschensohn, J. (2009). Fundamental and Gradient Differences in Language Development. *Studies in Second Language Acquisition*, *31*(2), 259. doi: 10.1017/S0272263109090305

Hinterwimmer, S. (2009). A Unified Account of the Properties of German Demonstrative Pronouns. In *The Proceedings of the Workshop on Pronominal Semantics at NELS. Vol. 40.*

Hopp, H. (2006). Syntactic features and reanalysis in near-native processing. *Second Language Research*, *22*(3), 369–397. doi: 10.1191/0267658306sr272oa

Hopp, H. (2010). Ultimate attainment in L2 inflection: Performance similarities between non-native and native speakers. *Lingua*, *120*(4), 901–931. doi: 10.1016/j.lingua.2009.06.004

Hopp, H., & Putnam, M. T. (2015). Syntactic restructuring in heritage grammars: Word order variation in Moundridge Schweitzer German. *Linguistic Approaches to Bilingualism*, *5*(2), 180–214. doi: 10.1075/lab.5.2.02hop

Huang, Y. (2000). *Anaphora: A Cross-linguistic Study.* New York: Oxford University Press.

Huettig, F., Rommers, J., & Meyer, A. S. (2011). Using the visual world paradigm to study language processing: a review and critical evaluation. *Acta psychologica*, *137*(2), 151–71. doi: 10.1016/j.actpsy.2010.11.003

Jacob, G., Lago, M. S., & Patterson, C. (2016). L2 processing and memory retrieval: Some empirical and conceptual challenges. *Bilingualism: Language and Cognition*, 1–3. doi: 10.1017/S1366728916000948

Jaeggli, O. (1982). *Topics in Romance syntax.* Dordrecht: Foris.

Jäger, L. A., Engelmann, F., & Vasishth, S. (2017). Similarity-based interference in sentence comprehension: Literature review and Bayesian meta-analysis. *Journal of Memory and Language*, *94*, 316–339. doi: 10.1016/j.jml.2017.01.004

Järvikivi, J., van Gompel, R. P. G., Hyönä, J., & Bertram, R. (2005). Ambiguous pronoun resolution: Contrasting the first-mention and subject-preference accounts. *Psychological Science*, *16*(4), 260–264. doi: 10.1111/j.0956-7976.2005.01525.x

Johnson, J. S., & Newport, E. L. (1989). Critical period effects in second language learning: The influence of maturational state on the acquisition of English as a second language. *Cognitive Psychology*, *21*(1), 60–99.

Kaiser, E. (2011). Focusing on pronouns: Consequences of subjecthood,

pronominalisation, and contrastive focus. *Language and Cognitive Processes*, *26*(10), 1625–1666. doi: 10.1080/01690965.2010.523082

Kaiser, E., & Runner, J. T. (2008). Intensifiers in German and Dutch Anaphor Resolution. In *Proceedings of the 27th West Coast Conference on Formal Linguistics. Somerville, MA: Cascadilla Proceedings Project* (pp. 265–273).

Kaiser, E., Runner, J. T., Sussman, R. S., & Tanenhaus, M. K. (2009). Structural and semantic constraints on the resolution of pronouns and reflexives. *Cognition*, *112*(1), 55–80. doi: 10.1016/j.cognition.2009.03.010

Kaltsa, M., Tsimpli, I. M., & Rothman, J. (2015). Exploring the source of differences and similarities in L1 attrition and heritage speaker competence: Evidence from pronominal resolution. *Lingua*, *164*, 266–288. doi: 10.1016/j.lingua.2015.06.002

Keating, G. D., Jegerski, J., & Vanpatten, B. (2016). Online processing of subject pronouns in monolingual and heritage bilingual speakers of Mexican Spanish. *Bilingualism: Language and Cognition*, *19*(191), 36–49. doi: 10.1017/S1366728914000418

Keating, G. D., VanPatten, B., & Jegerski, J. (2011). Who Was Walking on the Beach? *Studies in Second Language Acquisition*, *33*, 193–221. doi: 10.1017/S0272263110000732

Kim, E., Montrul, S., & Yoon, J. H. (2015). The on-line processing of binding principles in second language acquisition: Evidence from eye tracking. *Applied Psycholinguistics*, *36*, 1317–1374. doi: http://dx.doi.org/10.1017/S0142716414000307

Kim, J.-H. (2007). *Binding interpretations in adult bilingualism: A study of language transfer in L2 learners and heritage speakers of Korean.* (Unpublished doctoral dissertation). University of Illinois at Urbana-Champaign.

Kim, J.-H., Montrul, S., & Yoon, J. H. (2009). Binding Interpretations of Anaphors by Korean Heritage Speakers. *Language Acquisition*, *16*(1), 3–35. doi: 10.1080/10489220802575293

Knoeferle, P. S., & Crocker, M. W. (2006). The coordinated interplay of scene, utterance, and world knowledge: evidence from eye tracking. *Cognitive science*, *30*, 481–529. doi: 10.1207/s15516709cog0000_65

Knoeferle, P. S., Crocker, M. W., Scheepers, C., & Pickering, M. J. (2005). The influence of the immediate visual context on incremental thematic role-assignment: Evidence from eye-movements in depicted events. *Cognition*, *95*(1), 95–127. doi: 10.1016/j.cognition.2004.03.002

Kondo-Brown, K. (2005). Differences in Language Skills: Heritage Language Learner Subgroups and Foreign Language Learners. *The Modern Language Journal*, *89*(iv), 563–581.

Kornfilt, J. (1987). Beyond binding conditions: The case of Turkish. *Studies on modern Turkish. Proceedings of the third conference on Turkish linguistics*, 105–120.

Kornfilt, J. (1997a). Anaphora and Reflexives. In *Turkish* (pp. 128–158). New York: Routledge.

Kornfilt, J. (1997b). *Turkish*. New York: Routledge.

Kornfilt, J. (2001). Local and Long-distance Reflexives in Turkish. In P. Cole, G. Hermon, & C.-T. J. Huang (Eds.), *Syntax and semantics: Long-distance reflexives (33)* (pp. 197–226). San Diego and London: Academic Press.

Köylü, Y. (2010). *Acquisition of English Reflexives by Turkish L2 Learners of English* (Unpublished master's thesis). Middle East Technical University.

Kupisch, T. (2013). A new term for a better distinction? A view from the higher end of the proficiency scale. *Theoretical Linguistics*, *39*(3-4), 203–214. doi: 10.1515/tl-2013-0012

Kupisch, T., Barton, D., Hailer, K., Klaschik, E., Stangen, I., Lein, T., & van de Weijer, J. (2014). Foreign Accent in Adult Simultaneous Bilinguals. *Heritage Language Journal*, *11*(2), 123–150. doi: 10.1017/CBO9781107415324.004

Kupisch, T., Lein, T., Barton, D., Schröder, D. J., Stangen, I., & Stoehr, A. (2014). Acquisition outcomes across domains in adult simultaneous bilinguals with French as weaker and stronger language. *Journal of French Language Studies*, *24*, 347–376. doi: 10.1017/S0959269513000197

Lewis, G. L. (1967). *Turkish Grammar*. Oxford / New York: Oxford University Press. doi: 10.2307/411144

Lewis, R. L., & Vasishth, S. (2005). An activation-based model of sentence processing as skilled memory retrieval. *Cognitive Science*, *29*(3), 375–419. doi: 10.1207/s15516709cog0000_25

Lewis, R. L., Vasishth, S., & Van Dyke, J. A. (2006). Computational principles of working memory in sentence comprehension. *Trends in Cognitive Sciences*, *10*(10), 447–454. doi: 10.1016/j.tics.2006.08.007

MacDonald, M. C., Pearlmutter, N. J., & Seidenberg, M. J. (1994). The lexical nature of syntactic ambiguity resolution. *Psychological Review*, *101*(4), 676–703.

Mayberry, M. R., Crocker, M. W., & Knoeferle, P. S. (2009). Learning to attend: A connectionist model of situated language comprehension. *Cognitive Science*, *33*(3), 449–496. doi: 10.1111/j.1551-6709.2009.01019.x

McDonald, J. L. (2006). Beyond the critical period: Processing-based explanations for poor grammaticality judgment performance by late second language learners. *Journal of Memory and Language*, *55*(3), 381–401. doi:

10.1016/j.jml.2006.06.006

McRae, K., Spivey-Knowlton, M. J., & Tanenhaus, M. K. (1998). Modeling the influence of thematic fit (and other constraints) in on-line sentence comprehension. *Journal of Memory and Language*, *38*(3), 283–312. doi: 10.1006/jmla.1997.2543

Meral, H. M. (2010). Some notes on Turkish pronominal anaphora. *Turkish Studies*, *5*(4), 535–563.

Meral, H. M. (2013). Binding as an A'-phenomenon?: Some remarks from Turkish. *International Journal of Theoretical Linguistics*, *5*(1), 45–68.

Montrul, S. (2002). Incomplete acquisition and attrition of Spanish tense/aspect distinctions in adult bilinguals. *Bilingualism: Language and Cognition*, *5*(1), 39–68. doi: 10.1017/S1366728902000135

Montrul, S. (2008). *Incomplete Acquisition in Bilingualism: Re-Examining the Age Factor*. Amsterdam: John Benjamins.

Montrul, S. (2009). Knowledge of tense-aspect and mood in Spanish heritage speakers. *International Journal of Bilingualism*, *13*(2), 239–269. doi: 10.1177/1367006909339816

Montrul, S. (2010). Dominant language transfer in adult second language learners and heritage speakers. *Second Language Research*, *26*(3), 293–327. doi: 10.1177/0267658310365768

Montrul, S. (2011). Morphological Errors in Spanish Second Language Learners and Heritage Speakers. *Studies in Second Language Acquisition*, *33*(2), 163–192. doi: 10.1017/S0272263110000720

Montrul, S. (2012). Is Heritage Language Like a Second Language. In *EUROSLA Yearbook* (pp. 1–42). doi: 10.1038/nm1209-1348

Montrul, S. (2016). *The Acquisition of Heritage Languages*. Cambridge: Cambridge University Press.

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*(3), 503–553. doi: 10.1111/j.1467-9922.2008.00449.x

Nicol, J., & Swinney, D. (1989). The role of structure in coreference assignment during sentence comprehension. *Journal of Psycholinguistic Research*, *18*(1), 5–19.

Orfitelli, R., & Polinsky, M. (2017). When performance masquerades as comprehension: Grammaticality Judgments in Experiments with Non-Native Speakers. In M. Kopotev, O. Lyashevskaya, & A. Mustajoki (Eds.), *Quantitative approaches to the Russian language.* London: Routledge.

Özbek, A., & Kahraman, B. (2016). Interpretations of Turkish reflexive pronouns kendi and kendisi. *Dil ve Edebiyat Dergisi*, *13*(1), 71–94.

Paradis, M. (2004). *A neurolinguistic theory of bilingualism.* Amsterdam and Philadelphia: John Benjamins.

Patterson, C. (2013). *The role of structural and discourse-level cues during pronoun resolution* (Unpublished doctoral dissertation). University of Potsdam.

Patterson, C., Trompelt, H., & Felser, C. (2014). The online application of binding condition B in native and non-native pronoun resolution. *Frontiers in psychology*, *5*, 147. doi: 10.3389/fpsyg.2014.00147

Perani, D., Paulesu, E., Galles, N. S., Dupoux, E., Dehaene, S., Bettinardi, V., ... Mehler, J. (1998). The bilingual brain: Proficiency and age of acquisition of the second language. *Brain*, *121*, 1841–1852.

Pfaff, C. W. (1991). Turkish in contact with German: Language maintenance and loss among immigrant children in Berlin (West). *International Journal of the Sociology of language*, *90*, 97–130. doi: 10.1515/ijsl.1991.90.97

Polinsky, M. (1997). American Russian: Language Loss Meets Language Acquisition. In *Proceedings of the annual workshop on formal approaches to slavic linguistics.the cornell meeting 1995* (pp. 370–406). Ann Arbor: Michigan Slavic Publications. doi: 10.1007/s13398-014-0173-7.2

Polinsky, M. (2006). Incomplete Acquisition : American Russian. *Journal of Slavic Linguistics*, *14*, 191–262.

Polinsky, M. (2008). Gender under Incomplete Acquisition: Heritage Speakers' Knowledge of Noun Categorization. *Heritage Language Journal*, *6*(1), 40–71.

Polinsky, M. (2011). Reanalysis in Adult Heritage Language: A Case for Attrition. *Studies in Second Language Acquisition*, *33*, 305–328. doi: 10.1017/S027226311000077X

Polinsky, M. (2013). Raising and control. In M. den Dikken (Ed.), *The cambridge handbook of generative syntax* (pp. 1–52). Cambridge: Cambridge University Press.

Polinsky, M. (2016). *What does it take to be a native speaker?* Presentation at CUNY 2016, Gainesville, USA.

Polinsky, M., & Kagan, O. (2007). Heritage Languages: In the 'Wild' and in the Classroom. *Language and Linguistics Compass*, *1*(5), 368–395. doi: 10.1111/j.1749-818X.2007.00022.x

Prentza, A. (2014). Pronominal Subjects in English L2 Acquisition and in L1 Greek : Issues of Interpretation , Use and L1 Transfer. In *Major Trends in Theoretical and Applied Linguistics 2: Selected Papers from the 20th ISTAL, 2* (pp. 369–386).

Prévost, P., & White, L. (2000). Missing Surface Inflection or Impairment in second language acquisition? Evidence from tense and agree-

ment. *Second language Research*, *16*(2000), 103–133. doi: 10.1191/026765800677556046

Primus, B. (1992). Selbst - Variants of a Scalar Adverb in German. In J. Jacobs (Ed.), *Informationsstruktur und Grammatik* (pp. 54–88). Wiesbaden: VS Verlag für Sozialwissenschaften.

Putnam, M. T. (2016). *Gradient representation in multilingual grammars.* Presentation at Workshop: Heritage Language Acquisition, Tromsø, Norway.

Pyykkönen, P., Matthews, D., & Järvikivi, J. (2010). Three-year-olds are sensitive to semantic prominence during online language comprehension : A visual world study of pronoun resolution. *Language and Cognitive Processes*, *25*(1), 115–129.

R Core Team. (2017). *R: A Language and Environment for Statistical Computing.* Vienna, Austria: R Foundation for Statistical Computing. Retrieved from `https://www.r-project.org/`

Rayner, K., Slowiaczek, M. L., Clifton, C., & Bertera, J. H. (1983). Latency of sequential eye movements: implications for reading. *Journal of Experimental Psychology. Human perception and performance*, *9*(6), 912–922.

Reinhart, T. (1981). Pragmatics and Linguistics: An Analysis of Sentence Topics. *Philosophica*, *1*(27), 53–93.

Reuland, E. (2011). *Anaphora and Language Design.* Cambridge, Massachusetts and London, England: The MIT Press.

Rinke, E. (2016). *The interpretation of overt and null pronominal subjects in Portuguese-German heritage bilinguals.* Presentation at Workshop: Heritage Language Acquisition, Tromsø, Norway.

Roberts, L., Gullberg, M., & Indefrey, P. (2008). Online Pronoun Resolution in L2 Discourse. *Studies in Second Language Acquisition*, 333–357.

Roberts, L., & Siyanova-Chanturia, A. (2013). Using Eye-Tracking To Investigate Topics in L2 Acquisition and L2 Processing. *Studies in Second Language Acquisition*, *35*(2), 213–235. doi: 10.1017/S0272263112000861

Rudnev, P. (2008). Some syntax and semantics of long distance reflexives in Turkish and elsewhere. *Ural-Altaic Studies*, *4*(1), 76–92.

Rudnev, P. (2011). Why Turkish kendisi is a pronominal. *Ural-Altaic Studies*, *4*, 76–92.

Runner, J. T., & Head, K. D. L. (2014). What Can Visual World Eye-tracking Tell Us About the Binding Theory ? In C. Piñón (Ed.), *Empirical Issues in Syntax and Semantics* (Vol. 10, pp. 269–286).

Runner, J. T., Sussman, R. S., & Tanenhaus, M. K. (2006). Processing Reflexives and Pronouns in Picture Noun Phrases. *Cognitive Science*, *30*, 193–241.

Sánchez-Alonso, S., Deo, A., & Pinango, M. M. (2016). *Variation in Copula Use*

in Spanish: Implications for the Study of Spanish as a Heritage Language. Presentation at Workshop: Heritage Language Acquisition, Tromsø, Norway.

Schimke, S., & Colonna, S. (2015). Native and Nonnative Interpretation of Pronominal Forms. *Studies in Second Language Acquisition*, 1–32. doi: 10.1017/S0272263115000303

Schlenter, J. (2013). *Sprache, Kausalität und Kohärenz: Der Einfluss von Kohärenzrelationen auf die implizite Kausalität interpersonaler Verben* (Unpublished master's thesis). Georg-August-Universität Göttingen.

Schlyter = Nilsson, B. (1978). Speaker, text, and the Turkish reflexive kendisi. In *Papers from the Fourth Scandinavian Conference of Linguistics* (pp. 255–261). Odense: (translated to Russian in Novoe v zarube'noj lingvistike XIX, Moskva 1987, pp. 444–454).

Schmid, M. S. (2016). *How does age of onset affect L1 attrition in bilinguals?* Presentation at Workshop: Heritage Language Acquisition, Tromsø, Norway.

Schmitz, K., Di Venanzio, L., & Scherger, A.-L. (2016). Null and overt subjects in Italian and Spanish heritage speakers in Germany. *Lingua*, *180*. doi: 10.1016/j.lingua.2016.04.004

Schwieter, J. W. (2008). The effects of bilingual type on language selectivity. In *Readings in Language Studies* (Vol. 1, pp. 417–432). Chicago.

Scontras, G., Fuchs, Z., & Polinsky, M. (2015). Heritage Language and Linguistic Theory. *Frontiers in Psychology*, *6*(1545). doi: 10.3389/fpsyg.2015.01545

Sezer, E. (1979). On reflexivization in Turkish. *Harvard Ukrainian Studies*, *3/4*(2), 748–759.

Slabakova, R. (2013). Adult second language acquisition: A selective overview with a focus on the learner linguistic system. *Linguistic Approaches to Bilingualism*, *3*(1), 48–72. doi: 10.1075/lab.3.1.03sla

Sloggett, S., & Dillon, B. W. (2015). *Reflexive interference is the result of a logophoric interpretation.* Poster presented at CUNY 2015, Los Angeles, USA.

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., & Filiaci, F. (2006). Anaphora resolution in near-native speakers of Italian. *Second Language Research*, *22*(3), 339–368. doi: 10.1191/0267658306sr271oa

Sorace, A., & Serratrice, L. (2009). Internal and external interfaces in bilingual language development: Beyond structural overlap. *International Journal of Bilingualism*, *13*(339810), 195–210. doi: 10.1177/1367006909339810

Sorace, A., Serratrice, L., Filiaci, F., & Baldo, M. (2009). Discourse conditions on subject pronoun realization: Testing the linguistic intuitions of older bilingual children. *Lingua*, *119*(3), 460–477. doi: 10.1016/j.lingua.2008.09.008

Sturt, P. (2003). The time-course of the application of binding constraints in reference resolution. *Journal of Memory and Language*, *48*, 542–562. doi: 10.1016/S0749-596X(02)00536-3

Tanenhaus, M. K., Spivey-Knowlton, M. J., Eberhard, K. M., & Sedivy, J. C. (1995). Integration of Visual and Linguistic Information in Spoken Language Comprehension. *Science*, *268*(5217), 1632 – 1634.

Taraldsen, K. (1978). The scope of wh movement in Norwegian. *Linguistic Inquiry*, *9*(4), 623–640.

telc GmbH. (2012). *telc Türkçe C1, Mock Examination version 1, booklet.*

Tsimpli, I. M., 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: 10.1177/13670069040080030601

Ullman, M. T. (2001). The neural basis of lexicon and grammar in first and second language: the declarative/procedural model. *Bilingualism: Language and Cognition*, *4*(2), 105–122. doi: 10.1017/S1366728901000220

Ullman, M. T. (2005). A Cognitive Neuroscience Perspective on Second Language Acquisition: The Declarative/Procedural Model. In C. Sanz (Ed.), *Mind and Context in Adult Second Language Acquisition: Methods, Theory, and Practice* (pp. 141–178). Washington: Georgetown University Press.

Ullman, M. T. (2015). The Declarative/Procedural Model: A Neurobiologically Motivated Theory of First and Second Language. In J. VanPatten, B., Williams (Ed.), *Theories in Second Language Acquisition: An Introduction* (2nd ed., pp. 135–158). New York and London: Routledge.

Underhill, R. (1976). *Turkish grammar.* Cambridge, MA: MIT Press.

Van Dyke, J. A., & McElree, B. (2011). Cue-dependent interference in comprehension. *Journal of Memory and Language*, *65*(3), 247–263. doi: 10.1016/j.jml.2011.05.002

Van Herten, M., Kolk, H. H. J., & Chwilla, D. J. (2005). An ERP study of P600 effects elicited by semantic anomalies. *Cognitive Brain Research*, *22*(2), 241–255. doi: 10.1016/j.cogbrainres.2004.09.002

Wartenburger, I., Heekeren, H. R., Abutalebi, J., Cappa, S. F., Villringer, A., & Perani, D. (2003). Early setting of grammatical processing in the bilingual brain. *Neuron*, *37*(1), 159–170. doi: 10.1016/S0896-6273(02)01150-9

Wilson, F. (2009). *Processing at the syntax-discourse interface in second lan-*

guage acquisition (Unpublished doctoral dissertation). University of Edinburgh.

Xiang, M., Dillon, B. W., & Phillips, C. (2009). Illusory licensing effects across dependency types: ERP evidence. *Brain and Language*, *108*(1), 40–55. doi: 10.1016/j.bandl.2008.10.002

Yakut, A. B. (2015). The logophoric behavior of the strict local anaphor kendi 'self' in Turkish. In A. J. &. E. Predolac (Ed.), *Proceedings of the 9th Workshop on Altaic Formal Linguistics, MIT Working Papers in Linguistics #76* (pp. 3–4). Cambridge, MA: MITWPL.

Zifonun, G. (2003). Grammatik des Deutschen im europäischen Vergleich: Das Pronomen. *amades Arbeitspapiere und Materialien zur deutschen Sprache*, *1*, 5–125.

Appendices

A.1 Experimental and filler sentences

A.1.1 Experimental sentences of Exp. 1

1. Die Nachbarin glaubte, dass Klara sich/sich selbst absichtlich verletzt hatte. (Wen hatte Klara absichtlich verletzt?)
2. Heiko dachte, dass Michael viel über sich/sich selbst sprach. (Über wen sprach Michael viel?)
3. Anna wollte, dass Silke sich/sich selbst die Haare machte. (Wem sollte Silke die Haare machen?)
4. Bruno war erfreut, dass Jan sich/sich selbst eine neue Stelle beschafft hatte. (Wem hatte Jan eine neue Stelle beschafft?)
5. Das kleine Mädchen fand es lustig, dass Tina sich/sich selbst versteckte. (Wen versteckte Tina?)
6. Wiebke merkte, dass Jeanette sich/sich selbst mit ihrem unstrukturierten Vortrag verwirrte. (Wen verwirrte Jeanette?)
7. Judith war froh, dass Vanessa sich/sich selbst ein Kleid gekauft hatte. (Wem hatte Vanessa ein Kleid gekauft?)
8. Mario sah, dass André sich/sich selbst im Spiegel betrachtete. (Wen betrachtete André im Spiegel?)
9. Florian fand es nicht gut, dass Jakob sich/sich selbst immer den Vorrang gab. (Wem gab Jakob immer den Vorrang?)
10. Friederike wusste, dass die Großmutter sich/sich selbst ein leckeres Essen

zubereitet hatte. (Wem hatte die Großmutter ein leckeres Essen zubereitet?)

11. Der Polizist realisierte, dass Georg sich/sich selbst während der Verfolgungsjagd verletzt hatte. (Wen hatte Elias verletzt?)

12. Der Lehrer wollte, dass Elias sich/sich selbst beschrieb. (Wen sollte Elias beschreiben?)

13. Christina sah, dass Miriam sich/sich selbst heimlich Frühstück machte. (Wem machte Miriam heimlich Frühstück?)

14. Julius mochte nicht, dass der kleine Junge sich/sich selbst anmalte. (Wen malte der kleine Junge an?)

15. Patricia war verwundert, dass die Künstlerin sich/sich selbst malen wollte. (Wen wollte die Künstlerin malen?)

16. Sarah war glücklich, dass Renate sich/sich selbst einen guten Laptop gekauft hatte. (Wem hatte Renate einen guten Laptop gekauft?)

17. Tim sagte, dass der Zauberer sich/sich selbst manchmal überrascht. (Wen überrascht der Zauberer?)

18. Alexander merkte, dass Hugo sich/sich selbst in den Finger geschnitten hatte. (Wem hatte Hugo in den Finger geschnitten?)

19. Philipp bemerkte, dass der Mann sich/sich selbst fotografierte. (Wen fotografierte der Mann?)

20. Der alte Mann wusste, dass Niko sich/sich selbst einen Anzug bestellt hatte. (Für wen hatte Niko den Anzug bestellt?)

21. David erfuhr, dass Patrick sich/sich selbst ein spannendes Buch gekauft hatte. (Wem hatte Patrick ein Buch gekauft?)

22. Sabine las, dass die Prinzessin sich/sich selbst eine neue Yacht gekauft hat. (Wem hat die Prinzessin eine neue Yacht gekauft?)

23. Marie sah, dass Nina sich/sich selbst ein großes Eis kaufte. (Wem kaufte Nina ein großes Eis?)

24. Das kleine Mädchen wollte nicht, dass Mareike sich/sich selbst die Haare bürstete. (Wem sollte Mareike nicht die Haare bürsten?)

A.1.2 Experimental sentences of Exp. 2

1. Stefan und Erik unterhielten sich. Nachdem Erik einen Witz erzählt hatte, sah er auf die Uhr. (Wer sah auf die Uhr?)

2. Bernd und Holger sind Lehrer. Nachdem Holger eine Unterrichtsstunde beendet hatte, bereitete er das Klassenzimmer für die nächste Stunde vor. (Wer bereitete das Klassenzimmer für die nächste Stunde vor?)

3. Johannes und Fabian sind beste Freunde. Nachdem Fabian die Uni abgeschlossen hatte, wollte er eine große Party organisieren. (Wer wollte eine große Party organisieren?)

4. Constanze und Lena sind Schwestern. Als Lena das Abitur schaffte, war sie sehr stolz. (Wer war sehr stolz?)

5. Antonia und Jasmin sind Kindheitsfreunde. Als Jasmin die Bühne verließ, lachte sie erfreut. (Wer lachte erfreut?)

6. Felicitas und Leonie lebten im gleichen Haus. Als Leonie eines Abends nach Hause kam, nahm sie einen seltsamen Geruch wahr. (Wer nahm einen seltsamen Geruch wahr?)

7. Eva und Nicole brauchten Gemüse. Während Nicole auf dem Markt einkaufte, sah sie am Himmel ein Gewitter heraufziehen. (Wer sah ein Gewitter heraufziehen?)

8. Anne und Charlotte waren sehr beschäftigt. Während Charlotte auf dem Weg zu einem wichtigen Treffen war, schrieb sie einige E-Mails. (Wer schrieb einige E-Mails?)

9. Sina und Heike gingen spazieren. Während Heike eine Geschichte erzählte, stolperte sie. (Wer stolperte?)

10. Bianca und Lisa gingen morgens zur Schule. Während Lisa einer Katze folgte, fand sie auf dem Boden Geld. (Wer fand auf dem Boden Geld?)

11. Lukas und Felix sind Studenten. Als Felix das Universitätsgebäude betrat, trug er einen großen Rucksack. (Wer trug einen großen Rucksack?)

12. Dominik und Julian waren Schulfreunde. Als Julian sitzenblieb, war er sehr traurig. (Wer war sehr traurig?)

13. Klaus und Ralf arbeiteten bei der Post. Als Ralf aus dem Urlaub zurückkam, hatte er viel zugenommen. (Wer hatte viel zugenommen?)

14. Birgit und Emma waren sehr müde. Nachdem Emma das Kinderzimmer aufgeräumt hatte, konnte sie endlich schlafen gehen. (Wer konnte endlich schlafen gehen?)

15. Inga und Josefine lieben Filme. Nachdem Josefine von der Arbeit nach Hause gekommen war, wollte sie ins Kino gehen. (Wer wollte ins Kino gehen?)

16. Esther und Karolin fuhren mit der Bahn. Nachdem Karolin einen Unfall gebaut hatte, wollte sie nicht mehr Auto fahren. (Wer wollte nicht mehr Auto zu fahren?)

17. Saskia und Marina sind Arbeitskolleginnen. Als Marina ins Büro kam, schaltete sie den Computer an. (Wer schaltete den Computer an?)

18. Bettina und Nora gingen tanzen. Als Nora Getränke bestellte, wurde sie plötzlich hungrig. (Wer wurde plötzlich hungrig?)

19. Jessica und Nadja waren nicht besonders eng befreundet. Als Nadja in die Grundschule ging, hatte sie einen schlimmen Unfall. (Wer hatte einen schlimmen Unfall?)

20. Viktor und Moritz wohnten zusammen. Während Moritz von der Arbeit nach Hause kam, erledigte er ein paar Einkäufe. (Wer erledigte ein paar Einkäufe?)

21. Peter und Anton sind Geschwister. Während Anton Radio hörte, spielte er mit Spielzeugautos. (Wer spielte mit Spielzeugautos?)

22. Simon und Manuel lebten in Berlin. Während Manuel sich zum Ausgehen anzog, dachte er an die schöne Katja. (Wer dachte an die schöne Katja?)

23. Jacqueline und Pia freuten sich auf das gemeinsame Abendessen. Nachdem Pia das Telefon aufgelegt hatte, schaltete sie das Radio an. (Wer schaltete das Radio an?)

24. Ilka und Natalie wohnen zusammen. Nachdem Natalie geduscht hatte, wollte sie das Badezimmer putzen. (Wer wollte das Badezimmer putzen?)

25. Lina und Jennifer waren am Abend verabredet. Nachdem Jennifer mit der Arbeit fertig war, sagte sie per SMS ab. (Wer sagte per SMS ab?)

26. Matthias und Christian trafen sich in einem Café. Nachdem Christian sich auf den Weg nach Hause gemacht hatte, kaufte er eine Kleinigkeit zu Essen. (Wer kaufte eine Kleinigkeit zu essen?)

27. Karsten und Tobias langweilten sich. Nachdem Tobias mit dem Fernsehen angefangen hatte, schlief er ein. (Wer schlief ein?)

28. Yannick und Max spielten Fußball. Nachdem Max ein Tor geschossen hatte, umarmte er die ganze Mannschaft. (Wer umarmte die ganze Mannschaft?)

29. Kathrin und Lydia warteten auf den Bus. Während Lydia Kaffee trank, telefonierte sie mit dem Handy. (Wer telefonierte mit dem Handy?)

30. Nadine und Ilona waren Nachbarn. Während Ilona am Fenster vorbeiging, sah sie den Postboten. (Wer sah den Postboten?)

31. Jürgen und Leon gingen aufs Volksfest. Während Leon Riesenrad fuhr, träumte er vom Fliegen. (Wer träumte vom Fliegen?)

32. Andreas und Martin waren sehr gut befreundet. Während Martin viele Getränke kaufte, dachte er an die Party am Abend. (Wer dachte an die Party am Abend?)

33. Marco und Sebastian waren abends zuhause. Während Sebastian fernsah, spielte er mit dem Handy. (Wer spielte mit dem Handy?)

34. Marvin und Finn spielten gerne Streiche. Als Finn jemanden zu erschrecken versuchte, musste er plötzlich lachen. (Wer musste plötzlich lachen?)

35. Walther und Karl verabschiedeten sich voneinander. Als Karl die Tür öffnete, sah er das Taxi kommen. (Wer sah das Taxi kommen?)

36. Gustav und Harry hatten einander seit langem nicht gesehen. Als Harry in den Bus stieg, hörte er einen Ruf. (Wer hörte einen Ruf?)

A.1.3 Filler sentences of Exps. 1 and 2

1. Sandra sagte, dass Christoph sie beleidigt hatte. (Wen hatte Christoph beleidigt?)

2. Henry erzählte, dass Louisa ihm gefiel. (Wem gefiel Louisa?)

3. Konrad erfuhr, dass das Mädchen von ihrer eigenen Familie ausgeschlossen wurde. (Von wessen Familie wurde das Mädchen ausgeschlossen?)

4. Thomas erinnerte sich, dass Yvonne ihn zu spät geweckt hatte. (Wen hatte Yvonne zu spät geweckt?)

5. Nachdem Adam die teure Vase kaputtmachte, schimpfte Sophie mit ihm. (Mit wem schimpfte Sophie?)

6. Die Oma merkte, dass Paul sie nervte. (Wen nervte Paul?)

7. Susanne erinnerte sich daran, dass Mark sie erkannt hatte. (Wen hatte Mark erkannt?)

8. Robert beschwert sich bei Axel darüber, dass er ihn geweckt hatte. (Wen hatte Axel geweckt?)

9. Paula tröstete Elena, weil ihr Computer kaputt war. (Wessen Computer war kaputt?)

10. Die Frau war sehr dankbar, dass Torsten sie über den Streik informiert hatte. (Wen hatte Torsten über den Streik informiert?)

11. Sabrina wusste, dass Corinna sie sofort erkannte. (Wen erkannte Corinna sofort?) Während der König sich der Menge vorstellte, sah Ingo zu. (Wen stellte der König vor?)

A.1.4 Experimental sentences of Exp. 3

1. Yasin sihirbaz'ın kendisine/kendine bazen hayret ettiğini söyledi. (Sihirbaz kime hayret etti?)

2. Ebru, Ceyda'nın kendisine/kendine bir elbise almasına sevindi. (Ceyda kime elbise aldı?)

3. Hatice Elif'in düzensiz sunumu ile kendisini/kendini şaşırttığını görüyordu. (Elif kimi şaşırttı?)

4. Semanur prensesin kendisine/kendine yeni bir yat aldığını okudu. (Prenses kime yeni bir yat aldı?)

5. Yaşlı adam Önder'in kendisine/ kendine bir takım elbise ısmarladığını biliyordu. (Önder kime takım elbise ısmarladı?)

6. Küçük kız Eda'nın kendisini/kendini gizlediğini komik buldu. (Eda kimi gizledi?)

7. Gülten ninenin kendisine/kendine lezzetli bir yemek pişirdiğini biliyordu. (Nine kime lezzetli bir yemek pişirdi?)

8. Polis Hamza'nın araba kovalarken kendisini/kendini yaraladığını farketti. (Hamza kimi yaraladı?)

9. Sertap Tülay'ın kendisine/kendine gizlice kahvaltı hazırladığını gördü. (Tülay kime gizlice kahvaltı hazırladı?)

10. Ömür Davut'un kendisine/kendine yeni bir iş bulmasına sevindi. (Davut kime yeni bir iş buldu?)

11. Savaş Aziz'in kendisine/kendine heyecan dolu bir kitap aldığını öğrendi. (Aziz kime heyecan dolu bir kitap aldı?)

12. Cüneyt küçük oğlanın kendisini/kendini boyamasını sevmedi. (Küçük oğlan kimi boyadı?)

13. Korkut Boran'ın aynada kendisine/kendine baktığını gördü. (Boran aynada kime baktı?)

14. Komşu Nihan'ın kendisini/kendini kasten yaraladığını düşündü. (Nihan kimi kasten yaralamış?)

15. Seda Dilek'in kendisine/kendine büyük bir dondurma aldığını gördü. (Dilek kime büyük bir dondurma aldı?)

16. Doğukan Fethi'nin her zaman en çok kendisine/kendine imkan vermesini uygun görmedi. (Fethi kime her zaman en çok imkan verdi?)

17. Canan Buse'nin kendisine/kendine güzel bir bilgisayar aldığına sevindi. (Buse kime bilgisayar aldı?)

18. Ufuk, Cihan'ın kendisini/kendini oyalamasını istedi. (Cihan kimi oyalamalıydı?)

19. Öğretmen Kemal'ın kendisini/kendini tarif etmesini istedi. (Kemal kimi tarif etmeliydi?)

20. Küçük kız, Ece'nin kendisine/kendine kağıttan güzel bir taç yapmasına sevindi. (Ece kime güzel bir taç yaptı?)

21. Orhan, adamın kendisine/kendine yalan söylediğini fark etti. (Adam kime yalan söyledi?)

22. Kadir Ismail'in kendisi/kendi hakkında çok konuştuğunu düşünüyordu. (Ismail kimin hakkında çok konuşuyordu?)

23. Pınar, Gülşen'in kendisini/kendini oyun için hazırlamasını istedi. (Gülşen kimi oyun için hazırlamalıydı?)

24. Filiz, sanatçının kendisine/kendine sık sık engel olmasına kızdı. (Sanatçı kime engel oldu?)

A.1.5 Experimental sentences of Exp. 4

1. Sedat ve Hakan akşam evdeydi. Hakan televizyon seyrediyorken, o/kendisi/pro cep telefonu ile oynuyordu. (Kim cep telefonu ile oynuyordu?)

2. Gülbahar ve Zeynep geziyorlardı. Zeynep bir fıkra anlatırken, o/kendisi/pro tökezledi. (Kim tökezledi?)

3. Koray ve Umur ev arkadaşları. Umur işten eve gelirken, o/kendisi/pro alışveriş yaptı. (Kim alışveriş yaptı?)

4. Buket ve Yeşim komşular. Yeşim pencerenin önünden geçerken, o/kendisi/pro postacıyı gördü. (Kim postacıyı gördü?)

5. Ela ve Melike sabah okula gidiyordu. Melike bir kediye takip ederken, o/kendisi/pro yerde para buldu. (Kim yerde para buldu?)

6. Mehmet ve Onur kardeşler. Onur radyo dinlerken, o/kendisi/pro oyuncak arabalarla oynuyordu. (Kim oyuncak arabalarla oynuyordu?)

7. Senem ve Hasret çok meşguldü. Hasret önemli bir toplantı için yoldayken, o/kendisi/pro birçok e-mail yazıyordu. (Kim birçok e-mail yazıyordu?)

8. Yahya ve Bülent İstanbul'da oturuyordu. Bülent çıkmak için giyinirken, o/kendisi/pro güzel Nilüfer'i düşünüyordu. (Kim güzel Nilüfer'i düşünüyordu?)

9. Cafer ve Kutay yaz şenliğ ine gittiler. Kutay dönme dolapta dönüyorken, o/kendisi/pro uçmayı hayal etti. (Kim uçmayı hayal etti?)

10. Selim ve Edip yakın arkadaşlardır. Edip içecek çok şey alırken, o/kendisi/pro akşamki partiyi düşünüyordu. (Kim akşamki partiyi düşünüyordu?)

11. Saadet ve Ülviye'ye sebze gerekiyordu. Ülviye çarşıda alışveriş yaparken, o/kendisi/pro gökyüzünde fırtınanın geldiğ ini gördü. (Kim fırtınanın geldiğ ini gördü?)

12. Yasemin ve Fatoş otobüs bekliyorlardı. Fatoş ayran içerken, o/kendisi/pro cep telefonu ile konuşuyordu. (Kim cep telefonu ile konuşuyordu?)

13. Emre ve Burak futbol oynuyorlardı. Emre gol attıktan sonra, o/kendisi/pro bütün takımla kucaklaştı. (Kim bütün takımla kucaklaştı?)

14. Nihal ve Pelin akşam sözleştiler. Pelin işten çıktıktan sonra, o/kendisi/pro kısa mesaj yazıp buluşmayı iptal etti. (Kim buluşmayı iptal etti?)

15. Mesut ve Zeki en iyi arkadaşlar. Zeki üniversiteyi bitirdikten sonra, o/kendisi/pro büyük bir parti düzenlemek istedi. (Kim büyük bir parti düzenlemek istedi?)

16. Feridun ve Baha buluştu. Baha bir şaka yaptıktan sonra, o/kendisi/pro saate baktı. (Kim saate baktı?)

17. Orkan ve Bahri sıkılıyorlardı. Bahri televizyon seyretmeye başladıktan sonra, o/kendisi/pro uykuya daldı. (Kim uykuya daldı?)

18. Kiraz ve Ayşegül akşam yemeğ ini birlikte yiyecekleri için sevindiler. Ayşegül telefonu kapattıktan sonra, o/kendisi/pro radyoyu açtı. (Kim radyoyu açtı?)

19. Merve ve Necla ev arkadaşları. Necla duştan çıktıktan sonra, o/kendisi/pro banyoyu temizlemek istedi. (Kim banyoyu temizlemek istedi?)

20. Fahriye ve Derya trendeydi. Derya araba kazası yaptıktan sonra, o/kendisi/pro artık araba kullanmak istemiyordu. (Kim artık araba kullanmak istemiyordu?)

21. Levent ve Yakup bir cafede buluştular. Yakup eve dönmek için yola çıktıktan sonra, o/kendisi/pro atıştırmalık yemek aldı. (Kim atıştırmalık yemek aldı?)

22. Yusuf ve Serdar öğ retmenler. Serdar dersi bitirdikten sonra, o/kendisi/pro sınıfı sonraki ders için hazırlıyordu. (Kim sınıfı sonraki ders için hazırlıyordu?)

23. Gökçe ve Amine film seviyordu. Amine işten eve vardıktan sonra, o/kendisi/pro sinemaya gitmek istedi. (Kim sinemaya gitmek istedi?)

24. Safiye ve Füsun çok yorgundu. Füsun çocuk odasını topladıktan sonra, o/kendisi/pro sonunda uyuyabildi. (Kim sonunda uyuyabildi?)

25. Damla ve Zehra aynı evde oturuyorlardı. Zehra bir akşam eve geldiğ i zaman, o/kendisi/pro tuhaf bir koku duydu. (Kim tuhaf bir koku duydu?)

26. Vural ve Tayfun postanede çalışıyorlar. Tayfun tatilden döndüğ ü zaman, o/kendisi/pro çok kilo almıştı. (Kim çok kilo almıştı?)

27. Güzin ve Bade iş arkadaşları. Bade ofise girdiğ i anda, o/kendisi/pro bilgisayarı açtı. (Kim bilgisayarı açtı?)

28. Hülya ve Meral çocukluktan beri arkadaştı. Meral sahneyi terk ettiğ i zaman, o/kendisi/pro göbek attı. (Kim göbek attı?)

29. Kaya ve Harun vedalaştı. Harun kapıyı açtığ ı anda, o/kendisi/pro taksinin geldiğ ini gördü. (Kim taksinin geldiğ ini gördü?)

30. Selin ve Kamer dans etmeye gittiler. Kamer içki ısmarladığ ı zaman, o/kendisi/pro birdenbire acıktı. (Kim birdenbire acıktı?)

31. Şafak ve Öznur üniversite öğ rencileridir. Öznur üniversite binasına girdiğ i zaman, o/kendisi/pro büyük bir sırt çantası taşıyordu. (Kim büyük bir sırt çantası taşıyordu?)

32. Ilknur ve Meryem kardeşler. Meryem liseyi bitirdiğ i zaman, o/kendisi/pro çok gurur duydu. (Kim çok gurur duydu?)

33. Rüştü ve Kurtuluş okul arkadaşlarıydı. Kurtuluş sınıfta kaldığ ı zaman, o/kendisi/pro çok üzüldü. (Kim çok üzüldü?)

34. Ümmühan ve Melek yakın arkadaş değ illerdi. Melek ilkokula gittiğ i zaman, o/kendisi/pro kötü bir kaza geçirdi. (Kim kötü bir kaza geçirdi?)

35. Sinan ve Remzi birlikte oyun oynamayı seviyorlardı. Remzi birini korkutmak istediğ i anda, o/kendisi/pro birdenbire gülmeye başladı. (Kim birdenbire gülmeye başladı?)

36. Güner ve Erol çoktan beri görüşmüyorlardı. Erol otobüse bindiğ i anda, o/kendisi/pro bir bağ ırış duydu. (Kim bir bağ ırış duydu?)

A.1.6 Filler sentences of Exps. 3 and 4

1. Ümit kızın kendi ailesinden dışlandığını öğrendi. (Kız kimin ailesinden dışlandı?)

2. Kadın, Ziya'nın kendisini grev hakkında bilgilendirdiği için çok müteşekkir oldu. (Ziya kimi bilgilendirdi?)

3. Evren Nesrin'i, kendi bilgisayarı bozulduğu için avuttu. (Kimin bilgisayarı bozuldu?)

4. Kral kendini kalabalığa tanıtırken, Samir seyrediyordu. (Kral kimi tanıttı?)

5. Sude Cem'in onu aşağıladığını söyledi. (Cem kimi aşağılamış?)

6. Ünal Sibel'in onu geç uyandırdığını hatırladı. (Sibel kimi geç uyandırdı?)

7. Emrah değerli vazoyu kırdıktan sonra, Nazlı ona çıkıştı. (Nazlı kime çıkıştı?)

8. Halil Asya'nın onu tanıdığını hatırladı. (Asya kimi tanıdı?)
9. Ayhan Deniz'e, kendisini uyandırdığı için şikayet etti. (Deniz kimi uyandırdı?)
10. Aslı Tuğba'nın kendisini hemen tanıdığını bildi. (Tuğba kimi hemen tanıdı?)
11. Arif Betül'ün kendisinin hoşuna gittiğini söyledi. (Betül kimin hoşuna gitti?)
12. Nine İskenderin kendisini sinirlendirdiğini farketti. (İskender kimi sinirlendirdi?)

A.1.7 Experimental sentences of Exp. 5

1. Der Großvater wollte, dass der Tierforscher aus Kasachstan sich/ihn aufmerksam föhnte. (Wen sollte der Tierforscher föhnen?)
2. Der Ritter wollte, dass der Müllmann aus Paderborn sich/ihn ganz spontan fotografierte. (Wen sollte der Müllmann fotografieren?)
3. Der Indianer sah, dass der Wanderer aus Lüneburg sich/ihm eine Suppe kochte. (Wem kochte der Wanderer eine Suppe?)
4. Der Koch wollte, dass der Astronaut aus Neuseeland sich/ihn von der Arbeit ablenkte. (Wer sollte abgelenkt werden?)
5. Der Arzt fand, dass der Fußballer aus Frankreich sich/ihn nicht ausreichend informierte. (Wer wurde nicht ausreichend informiert?)
6. Der Reiter sah, dass der Bauer aus Saarbrücken sich/ihn heftig am Arm verletzte. (Wer wurde am Arm verletzt?)
7. Der Wanderer wollte, dass der Bauarbeiter aus Wuppertal sich/ihn sorgfältig bürstete. (Wen sollte der Bauarbeiter bürsten?)
8. Der Prinz wollte, dass der Pilot aus Norwegen sich/ihn vorsichtig verarztete. (Wen sollte der Pilot verarzten?)
9. Der Reiter sah, dass der Großvater aus Krefeld sich/ihn großzügig beschenkte. (Wer wurde großzügig beschenkt?)
10. Der Bräutigam wollte, dass der Zauberer aus Pakistan sich/ihn ganz langsam beruhigte. (Wer sollte beruhigt werden?)

11. Der Bauarbeiter sah, dass der Arzt aus Karlsruhe sich/ihm einen Apfel kaufte. (Wem wurde ein Apfel gekauft?)

12. Der Pirat wollte, dass der Clown aus Brandenburg sich/ihn hinter der Tür versteckte. (Wen sollte der Clown verstecken?)

13. Der Feuerwehrmann wollte, dass der Pirat aus Bangladesch sich/ihn äußerst kunstvoll malte. (Wen sollte der Pirat malen?)

14. Der Großvater wollte, dass der Feuerwehrmann aus Hamburg sich/ihn behutsam abtrocknete. (Wen sollte der Feuerwehrmann abtrocknen?)

15. Der Ritter wollte, dass der Arzt aus Karlsruhe sich/ihn auf das Bett legte. (Wer sollte auf dem Bett liegen?)

16. Der Wanderer wollte, dass der Pilot aus Norwegen sich/ihm das Tanzen beibrachte. (Wer sollte das Tanzen lernen?)

17. Der Fußballer merkte, dass der Polizist aus Bielefeld sich/ihn im Spiegel musterte. (Wen musterte der Polizist?)

18. Der Müllmann merkte, dass der König aus Monaco sich/ihn ziemlich stark ärgerte. (Wer wurde geärgert?)

19. Der Feuerwehrmann merkte, dass der Zauberer aus Pakistan sich/ihn etwas Wichtiges fragte. (Wen fragte der Zauberer?)

20. Der Clown wollte, dass der Cowboy aus Mexiko sich/ihn einmal genau ansah. (Wen sollte der Cowboy ansehen?)

21. Der Müllmann wollte, dass der Großvater aus Krefeld sich/ihn sehr gründlich rasierte. (Wer sollte rasiert werden?)

22. Der König wollte, dass der Prinz aus Spanien sich/ihm den Fahrtweg aufschrieb. (Wem sollte der Prinz den Fahrtweg aufschreiben?)

23. Der Tierforscher sah, dass der König aus Monaco sich/ihn aufmerksam betrachtete. (Wen betrachtete der König?)

24. Der Clown merkte, dass der Tierforscher aus Kasachstan sich/ihn ausgesprochen ängstigte. (Wer war verängstigt?)

25. Der Astronaut dachte, dass der Fußballer aus Frankreich sich/ihn den ganzen Tag langweilte. (Wer war gelangweilt?)

26. Der Pilot wollte, dass der Cowboy aus Mexiko sich/ihm ein Glas Wasser einschenkte. (Wem sollte der Cowboy Wasser einschenken?)

27. Der Cowboy wollte, dass der Wanderer aus Lüneburg sich/ihn ganz bewusst zurückhielt. (Wen sollte der Wanderer zurückhalten?)

28. Der Polizist merkte, dass der Reiter aus Indien sich/ihn äußerst gründlich täuschte. (Wer wurde getäuscht?)

29. Der Zauberer wusste, dass der Schwimmer aus Island sich/ihm ein neues Buch kaufte. (Wem kaufte der Schwimmer ein Buch?)

30. Der Zauberer wollte, dass der Astronaut aus Neuseeland sich/ihm eine Pizza machte. (Wem sollte der Astronaut eine Pizza machen?)

31. Der Bauarbeiter fand, dass der Koch aus Osnabrück sich/ihn sehr umständlich bürstete. (Wer wurde gebürstet?)

32. Der Schwimmer merkte, dass der Bräutigam aus Kanada sich/ihn über die Jahre verändert hatte. (Wer wurde verändert?)

33. Der Pirat merkte, dass der Polizist aus Bielefeld sich/ihn ausgesprochen ängstigte. (Wer war verängstigt?)

34. Der Bauer wollte nicht, dass der Indianer aus Ecuador sich/ihn mit einem Stift anmalte. (Wer sollte nicht angemalt werden?)

35. Der Bräutigam wollte, dass der Ritter aus Hannover sich/ihn für die Feier ankleidete. (Wen sollte der Ritter ankleiden?)

36. Der Fußballer wollte, dass der Schwimmer aus Island sich/ihn auf den Wettkampf vorbereitete. (Wer sollte auf den Wettkampf vorbereitet werden?)

37. Der König wollte, dass der Prinz aus Spanien sich/ihn für die Feier zurechtmachte. (Wen sollte der Prinz zurechtmachen?)

38. Der Tierforscher wollte, dass der Bauer aus Saarbrücken sich/ihn am Rücken kratzte. (Wer sollte gekratzt werden?)

39. Der Koch wollte, dass der Bräutigam aus Kanada sich/ihn über den Ablauf des Abends informierte. (Wer sollte informiert werden?)

40. Der Polizist wollte, dass der Feuerwehrmann aus Hamburg sich/ihn nach dem Einsatz beruhigte. (Wer sollte beruhigt werden?)

41. Der Pilot dachte, dass der Bauarbeiter aus Wuppertal sich/ihn vor lauter Scham belog. (Wen belog der Bauarbeiter?)

42. Der Schwimmer merkte, dass der Indianer aus Ecuador sich/ihn ganz langsam beruhigte. (Wen beruhigte der Indianer?)

43. Der Astronaut wollte, dass der Müllmann aus Paderborn sich/ihn an den Termin erinnerte. (Wer sollte erinnert werden?)

44. Der Arzt wollte, dass der Reiter aus Indien sich/ihm das große Buch herausholte. (Wem sollte der Reiter das Buch herausholen?)

45. Der Cowboy sah, dass der Pirat aus Bangladesch sich/ihn schon wieder fotografierte. (Wer wurde fotografiert?)

46. Der Bauer wollte, dass der Clown aus Brandenburg sich/ihm ein schönes Bild zeichnete. (Wem sollte der Clown ein Bild zeichnen?)

47. Der Prinz wollte, dass der Ritter aus Hannover sich/ihn wöchentlich rasierte. (Wer sollte rasiert werden?)

48. Der Indianer sah, dass der Koch aus Osnabrück sich/ihm ein Frühstück machte. (Wem machte der Koch ein Frühstück?)

A.1.8 Experimental sentences of Exp. 6

1. Der Tierforscher, den der Großvater mochte, wollte sich/ihn aufmerksam föhnen. (Wen wollte der Tierforscher föhnen?)

2. Der Müllmann, den der Ritter kannte, wollte sich/ihn ganz spontan fotografieren. (Wen wollte der Müllmann fotografieren?)

3. Der Wanderer, den der Indianer mochte, wollte sich/ihm eine Suppe kochen. (Wem wollte der Wanderer eine Suppe kochen?)

4. Der Astronaut, den der Koch mochte, wollte sich/ihn von der Arbeit ablenken. (Wer sollte abgelenkt werden?)

5. Der Fußballer, den der Arzt sah, hatte sich/ihn nicht ausreichend informiert. (Wer wurde nicht ausreichend informiert?)

6. Der Bauer, den der Reiter kannte, hatte sich/ihn heftig am Arm verletzt. (Wer wurde am Arm verletzt?)

7. Der Bauarbeiter, den der Wanderer mochte, wollte sich/ihn sorgfältig bürsten. (Wen wollte der Bauarbeiter bürsten?)

8. Der Pilot, den der Prinz schätzte, wollte sich/ihn vorsichtig verarzten. (Wen wollte der Pilot verarzten?)

9. Der Großvater, den der Reiter sah, wollte sich/ihn großzügig beschenken. (Wer wurde großzügig beschenkt?)

10. Der Zauberer, den der Bräutigam schätzte, sollte sich/ihn ganz langsam beruhigen. (Wer sollte beruhigt werden?)

11. Der Arzt, den der Bauarbeiter mochte, wollte sich/ihm einen Apfel kaufen. (Wem wurde ein Apfel gekauft?)

12. Der Clown, den der Pirat schätzte, wollte sich/ihn hinter der Tür verstecken. (Wen wollte der Clown verstecken?)

13. Der Pirat, den den Feuerwehrmann kannte, wollte sich/ihn äußerst kunstvoll malen. (Wen wollte der Pirat malen?)

14. Der Feuerwehrmann, den der Großvater sah, wollte sich/ihn behutsam abtrocknen. (Wen wollte der Feuerwehrmann abtrocknen?)

15. Der Arzt, den der Ritter schätzte, wollte sich/ihn auf das Bett legen. (Wer sollte auf dem Bett liegen?)

16. Der Pilot, den der Wanderer mochte, wollte sich/ihm das Tanzen beibringen. (Wer sollte das Tanzen lernen?)

17. Der Polizist, den der Fußballer kannte, konnte sich/ihn im Spiegel mustern. (Wen musterte der Polizist?)

18. Der König, den der Müllmann kannte, hatte sich/ihn ziemlich stark geärgert. (Wer wurde geärgert?)

19. Der Zauberer, den der Feuerwehrmann kannte, hatte sich/ihn etwas Wichtiges gefragt. (Wen fragte der Zauberer?)

20. Der Cowboy, den der Clown mochte, wollte sich/ihn einmal genau angesehen. (Wen wollte der Cowboy ansehen?)

21. Der Großvater, den der Müllmann sah, wollte sich/ihn sehr gründlich rasieren. (Wer sollte rasiert werden?)

22. Der Prinz, den der König kannte, wollte sich/ihm den Fahrtweg aufschreiben. (Wem wollte der Prinz den Fahrtweg aufschreiben?)

23. Der König, den der Tierforscher mochte, hatte sich/ihn aufmerksam betrachtet. (Wen hatte der König betrachtet?)

24. Der Tierforscher, den der Clown kannte, hatte sich/ihn ausgesprochen geängstigt. (Wer war verängstigt?)

25. Der Fußballer, den der Astronaut sah, hatte sich/ihn den ganzen Tag gelangweilt. (Wer war gelangweilt?)

26. Der Cowboy, den der Pilot mochte, wollte sich/ihm ein Glas Wasser einschenken. (Wem wollte der Cowboy Wasser einschenken?)

27. Der Wanderer, den der Cowboy mochte, sollte sich/ihn ganz bewusst zurückhalten. (Wen sollte der Wanderer zurückhalten?)

28. Der Reiter, den der Polizist kannte, hatte sich/ihn äußerst gründlich getäuscht. (Wer wurde getäuscht?)

29. Der Schwimmer, den der Zauberer mochte, wollte sich/ihm ein neues Buch kaufen. (Wem wollte der Schwimmer ein Buch kaufen?)

30. Der Austronaut, den der Zauberer schätzte, wollte sich/ihm eine Pizza machen. (Wem wollte der Astronaut eine Pizza machen?)

31. Der Koch, den der Bauarbeitet mochte, hatte sich/ihn sehr umständlich gebürstet. (Wer wurde gebürstet?)

32. Der Bräutigam, den der Schwimmer mochte, hatte sich/ihn über die Jahre verändert. (Wer wurde verändert?)

33. Der Polizist, den der Pirat kannte, hatte sich/ihn ausgesprochen geängstigt. (Wer war verängstigt?)

34. Der Indianer, den der Bauer kannte, sollte sich/ihn nicht mit einem Stift anmalte. (Wer sollte nicht angemalt werden?)

35. Der Ritter, den der Bräutigam schätzte, wollte sich/ihn für die Feier ankleiden. (Wen wollte der Ritter ankleiden?)

36. Der Schwimmer, den der Fußballer sah, sollte sich/ihn auf den Wettkampf vorbereiten. (Wer sollte auf den Wettkampf vorbereitet werden?)

37. Der Prinz, den der König mochte, wollte sich/ihn für die Feier zurechtmachen. (Wen wollte der Prinz zurechtmachen?)

38. Der Bauer, den der Tierforscher mochte, wollte sich/ihn am Rücken kratzen. (Wer sollte gekratzt werden?)

39. Der Bräutigam, den der Koch kannte, wollte sich/ihn über den Ablauf des Abends informierten. (Wer sollte informiert werden?)

40. Der Feuerwehrmann, den der Polizist sah, musste sich/ihn nach dem Einsatz beruhigen. (Wer sollte beruhigt werden?)

41. Der Bauarbeiter, den der Pilot kannte, wollte sich/ihn vor lauter Scham belügen. (Wen wollte der Bauarbeiter belügen?)

42. Der Indianer, den der Schwimmer kannte, hatte sich/ihn ganz langsam beruhigt. (Wen beruhigte der Indianer?)

43. Der Müllmann, den der Astronaut sah, sollte sich/ihn an den Termin erinnern. (Wer sollte erinnert werden?)

44. Der Reiter, den der Arzt schätzte, wollte sich/ihm das große Buch herausholen. (Wem wollte der Reiter das Buch herausholen?)

45. Der Pirat, den der Cowboy kannte, hatte sich/ihn schon wieder fotografiert. (Wer wurde fotografiert?)

46. Der Clown, den der Bauer mochte, wollte sich/ihm ein schönes Bild zeichnen. (Wem wollte der Clown ein Bild zeichnen?)

47. Der Ritter, den der Prinz kannte, sollte sich/ihn wöchtenlich rasieren. (Wer sollte rasiert werden?)

48. Der Koch, den der Indianer mochte, wollte sich/ihm ein Frühstück machen. (Wem wollte der Koch ein Frühstück machen?)

A.1.9 Filler sentences of Exps. 5 and 6

1. Die Piratenbraut hatte der Schwimmerin versprochen, sie vor ihrer Abreise noch einmal zu besuchen. (Wen wollte die Piratenbraut besuchen?)

2. Weil die Großmutter zusah, wollte die Schwimmerin aus Oldenburg sich heute besonders anstrengen. (Wer wollte sich besonders anstrengen?)

3. Die Braut hatte schon lange geplant, der Reiterin aus Dänemark einen Kuchen zu backen. (Wem wollte die Braut einen Kuchen backen?)

4. Für die Bäuerin war klar, dass sie die Fußballerin aus Portugal nicht wiedersehen würde. (Wen würde die Bäuerin nicht wiedersehen?)

5. Immer wieder verspätete sich die Piratenbraut, was die Fee aus Marokko ärgerte. (Wer verspätete sich?)

6. Für die Polizistin war es enttäuschend, dass die Indianerin aus Panama sich ohne Grund verabschiedete. (Wer wurde enttäuscht?)

7. Die Feuerwehrfrau hatte der Fußballerin aus Portugal leider die falsche Adresse genannt. (Wer hatte die falsche Adresse bekommen?)

8. Die Ärztin und die Sanitäterin hatten es endlich wieder geschafft, sich auch privat zu verabreden. (Mit wem hatte die Ärztin sich verabredet?)

9. Die Köchin aus Belgien versteckte ihren geliebten Schokopudding vor der Königin. (Vor wem versteckte die Köchin den Schokopudding?)

10. Es ärgerte die Großmutter sehr, dass die Fee aus Marokko ihr komischerweise Angst einjagte. (Wem jagte die Fee Angst ein?)

11. Aus Sicht der Königin konnte der Fußballer sich nicht schnell genug entscheiden. (Wer konnte sich nicht entscheiden?)

12. Gerade dem Indianer wollte die Kellnerin aus Offenbach lieber aus dem Weg gehen. (Wem wollte die Kellnerin aus dem Weg gehen?)

13. Gestern wollte der Schwimmer die Fotografin aus Heidelberg mit einer Torte überraschen. (Wer sollte überrascht werden?)

14. Die Schwimmerin kannte den Piloten aus Neuseeland schon seit frühester Kindheit. (Wen kannte die Schwimmerin schon seit frühester Kindheit?)

15. Im Gegensatz zum Polizisten aus Bielefeld war die Wirtin auf dem Land aufgewachsen. (Wer war auf dem Land aufgewachsen?)

16. Der Feuerwehrmann traute sich nicht, sich zu der Königin aus Luxemburg zu setzen. (Wer traute sich nicht?)

17. Obwohl sie den Koch aus Osnabrück außerordentlich beleidigt hatte, war dieser der Köchin nicht böse. (Wen hatte die Köchin beleidigt?)

18. Die Schwimmerin konnte ihr neues Auto schon von weitem sehen. (Was konnte die Schwimmerin schon von weitem sehen?)

19. Die Tierforscherin aus Litauen las ihr Lieblingsbuch schon zum fünften Mal. (Was las die Tierforscherin aus Litauen?)

20. Die Köchin kannte so viele Rezepte, dass sie seit Jahren in kein Kochbuch gesehen hatte. (Wer kannte sehr viele Rezepte?)

21. Die Fußballerin dachte ununterbrochen über das letzte Spiel nach, das ihre Mannschaft verloren hatte. (Wer hatte das Spiel verloren?)

22. Die Sanitäterin wünschte sich zum Geburtstag von ihrem Freund eine Handtasche. (Wer wünschte sich eine Handtasche?)

23. Die Polizistin aus Göttingen lieh sich übers Wochenende ein Zelt zum Campen. (Was wurde übers Wochenende verliehen?)

24. Die Prinzessin hatte schreckliche Angst vor Messern, weil sie sich einmal schlimm geschnitten hatte. (Wovor hatte die Prinzessin Angst?)

25. Die Ärztin aus Griechenland freute sich riesig über ihr Geburtstagsgeschenk. (Wer freute sich über das Geschenk?)

26. Die Großmutter wollte nicht mehr am Stock laufen, obwohl sie ihn brauchte. (Wer brauchte den Stock zum Laufen?)

27. Nach langer Überlegung kaufte sich die Indianerin aus Panama schließlich ein Abendkleid. (Was hatte sich die Indianerin gekauft?)

28. Zehn Kilo wollte der Bräutigam bis zur Hochzeit abnehmen und aß deshalb keine Pizza mehr. (Was aß der Bräutigam nicht mehr?)

29. In Deutschland vermisste der Reiter aus Indien vor allem die schönen Pferde aus seiner Heimat. (Was vermisste der Reiter aus Indien?)

30. Weil er in seinem Leben noch nie zuvor Schnee gesehen hatte, tanzte der Indianer begeistert umher. (Was hatte der Indianer noch nie zuvor gesehen?)

31. Leider konnte der Großvater die Kekse, die er geschenkt bekommen hatte, nicht aufessen. (Was hatte der Großvater geschenkt bekommen?)

32. Aus Sicht des Piraten aus Bangladesch gab es in Deutschland viel zu viele Autos. (Wer fand, dass es in Deutschland zu viele Autos gab?)

33. Der Clown beobachtete verwundert, wie der Bauer den Hund trat. (Wer wurde getreten?)

34. Der Schwimmer war sehr enttäuscht, weil er sich wegen der Verletzung einen anderen Beruf suchen musste. (Weswegen musste der Schwimmer sich einen neuen Beruf suchen?)

35. Der Feuerwehrmann aus Hamburg dachte darüber nach, sich einen Hund zu kaufen. (Was wollte der Feuerwehrmann kaufen?)

36. Seitdem der Hund auf den Bauernhof gekommen war, wurde das Pferd etwas vernachlässigt. (Wer wurde vernachlässigt?)

37. Die Königin dachte, dass die Reiterin aus Dänemark sich unangemessen angezogen hatte. (Wer war unangemessen angezogen?)

38. Die Sanitäterin sah, dass die Tierforscherin aus Litauen sich fotografiert hatte. (Wer wurde fotografiert?)

39. Die Köchin, der die Großmutter aus Düsseldorf zusah, hatte ihr ein echtes Festessen zubereitet. (Wem wurde ein Festessen zubereitet?)

40. Die Indianerin wollte, dass die Braut aus Ungarn sich nicht mehr so sehr ärgerte. (Wer war verärgert?)

41. Die Indianerin, die der Ärztin aus Griechenland sehr nahestand, wollte sich für die Verspätung entschuldigen. (Wen wollte die Indianerin entschuldigen?)

42. Die Prinzessin ahnte bereits, dass die Piratenbraut aus Wiesbaden ihr ausgesprochen böse war. (Wem war die Piratenbraut böse?)

43. Die Fee sah, dass die Köchin aus Belgien sich einen Silberlöffel in die Hosentasche steckte. (Wem steckte die Köchin einen Löffel in die Hosentasche?)

44. Die Fee sah, dass die Tierforscherin aus Litauen sich ausgesprochen freute. (Wer war erfreut?)

45. Die Fußballerin, die der Feuerwehrmann aus Hamburg sehr mochte, hatte sich die ganze Zeit abgelenkt. (Wen hatte die Fußballerin abgelenkt?)

46. Der Cowboy wusste, dass die Piratenbraut aus Wiesbaden ihm aus Angst etwas verschwieg. (Wem verschwieg die Piratenbraut etwas?)

47. Die Fußballerin, der der Pirat half, wollte ihm als Dankeschön eine Karte schenken. (Wer wurde mit einer Karte beschenkt?)

48. Die Fotografin, die der Ritter mochte, hatte sich ein leckeres Essen gemacht. (Wem hatte die Fotografin ein Essen gemacht?)

49. Die Ärztin, die der Prinz aus Spanien kannte, wollte sich Medikamente kaufen. (Wem wollte die Ärztin Medikamente kaufen?)

50. Der Pirat wusste, dass die Prinzessin aus Kuwait ihn hinterlistig verraten hatte. (Wen hatte die Prinzessin verraten?)

51. Die Prinzessin dachte, dass der Arzt aus Karlsruhe ihr schon lange nicht mehr Blut abgenommen hatte. (Wem wurde schon lange kein Blut mehr abgenommen?)

52. Die Tierforscherin, die der Polizist aus Bielefeld kannte, hatte ihm einen Brief geschrieben. (Wem wurde ein Brief geschrieben?)

53. Die Bäuerin, die der Müllmann aus Paderborn schätzte, wollte ihn bald wieder besuchen. (Wer sollte besucht werden?)

54. Der Bräutigam, den die Braut aus Ungarn sehr liebte, hatte ihr ein Gedicht geschrieben. (Wem hatte der Bräutigam ein Gedicht geschrieben?)

55. Die Wirtin sah, wie die Sanitäterin aus Serbien genüsslich ein Kuchenstück aß. (Wer aß das Kuchenstück?)

56. Die Reiterin merkte, dass die Ärztin aus Griechenland sehr unsicher war. (Wer war sehr unsicher?)

57. Die Feuerwehrfrau merkte, dass die Polizistin aus Göttingen sehr gut ausgebildet war. (Wer war sehr gut ausgebildet?)

58. Die Reiterin aus Dänemark merkte, dass sie eifersüchtig auf die Prinzessin aus Kuwait war. (Auf wen war die Reiterin eifersüchtig?)

59. Die Polizistin wusste, dass die Feuerwehrfrau aus Dortmund noch nicht lange arbeitete. (Wer arbeitete noch nicht lange?)

60. Die Sanitäterin wusste, dass die Großmutter aus Düsseldorf nicht mehr lange zu leben hatte. (Wer hatte nicht mehr lange zu leben?)

61. Die Kellnerin, die der Indianerin ein Buch gekauft hatte, musste noch Geschenkpapier besorgen. (Wer hatte ein Buch gekauft?)

62. Die Kellnerin wusste, dass sie der Bäuerin aus Magdeburg noch eine Menge Geld schuldete. (Wem schuldete die Kellnerin Geld?)

63. Die Braut wusste, dass die Feuerwehrfrau aus Dortmund heute zum ersten Mal in Berlin war. (Wer war zum ersten Mal in Berlin?)

64. Die Wirtin wollte, dass die Kellnerin aus Offenbach von der Suppe probierte. (Wer wollte, dass die Kellnerin von der Suppe probierte?)

65. Die Fotografin merkte, dass sie die Bäuerin aus Magdeburg versehentlich getreten hatte. (Wer hatte die Fotografin getreten?)

66. Der Großvater dachte, dass er die Fotografin aus Heidelberg schon einmal getroffen hatte. (Wen hatte der Großvater schon einmal getroffen?)

67. Der Prinz, den die Polizistin aus Göttingen anhielt, sollte ganz langsam aus seinem Auto steigen. (Wer sollte aus dem Auto steigen?)

68. Der Ritter dachte, dass die Wirtin aus Österreich heute besonders hart arbeitete. (Wer arbeitete besonders hart?)

69. Die Schwimmerin, die der Bräutigam gut kannte, sollte auf der Hochzeit singen. (Wer sollte auf der Hochzeit singen?)

70. Die Fotografin wusste, dass sie ihren Hut zuhause vergessen hatte. (Was hatte die Fotografin vergessen?)

71. Die Braut aus Ungarn dachte, dass sie ihre Hochzeitsschuhe schon wieder verloren hatte. (Was hatte die Braut schon wieder verloren?)

72. Die Piratenbraut wusste, dass sie die Hundehütte noch bis Ende der Woche fertig bauen musste. (Was musste die Piratenbraut bauen?)

A.1.10 Experimental sentences of Exp. 7

1. Garson, sihirbazın Amerika'dalarken ona/kendisine/kendine bazı gösterilerde hala hayret ettiğini söyledi. (Sihirbaz kime hayret ediyordu?)

2. Peri, gelinin Norveç'e döndüklerinde ona/kendisine/kendine havalimanı mağazasında bir elbise almasına sevindi. (Gelin kime elbise aldı?)

3. Kızılderili, gezginin, İspanya'dalarken, ona/kendine/kendisine bir çorba pişirdiğini gördü. (Gezgin kime bir çorba pişirdi?)

4. Aşçı, astronotun, Japonya'dalarken, onu/kendini/kendisini oyalamasını istedi. (Astronot kime oyalamalıydı?)

5. Doktor, futbolcunun, Irak'a vardıklarında, onu/kendini/kendisini Malta'nın tarihi hakkında çok az bilgilendirdiğini düşündü. (Futbolcu kimi çok az bilgilendirdi?)

6. Atlı, çiftçinin, Gana'yı gezdiklerinde, onu/kendini/kendisini istemeyerek biraz yaraladığını fark etti. (Çiftçi kimi biraz yaraladı?)

7. Fotoğrafçı, çöpçünün İngiltere'delerken onu/kendisini/kendini kötü sunum ile şaşırttığını fark etti. (Çöpçü kimi şaşırttı?)

8. Sağlık memuru, prensesin Avustralya'dalarken ona/kendisine/kendine limanda yeni bir yat aldığını gördü. (Prenses kime yeni bir yat aldı?)

9. Dede, mühendisin İtalya'dan döndüklerinde ona/kendisine/ kendine internette bir takım elbise ısmarladığını görüyordu. (Mühendis kime takım elbise ısmarladı?)

10. Çöpçü, korsanın Kıbrıs'ta tatildelerken onu/kendisini/kendini çarşafla gizlemesini komik buldu. (Korsan kimi gizledi?)

11. Mühendis, doktorun Fransa'yı dolaşırlarken, ona/kendine/kendisine bir elma aldığını gördü. (Doktor kime bir elma aldı?)

12. Korsan, palyaçonun, İsveç'i gezerlerken, onu/kendini/kendisini kapının arkasına gizlemesini istedi. (Palyaço kimi gizlemeliydi?)

13. Gelin, ninenin Rusya'dan döndüklerinde ona/kendisine/kendine lezzetli bir yemek pişirmeye başladığını gördü. (Nine kime lezzetli bir yemek pişirmek başladı?)

14. Dede, itfaiyecinin, Lübnan'da tatildelerken, onu/kendini/kendisini denizden çıktıktan sonra kurulamasını istedi. (İtfaiyeci kimi kurulamalıydı?)

15. Polis, fotoğrafçının Jamaika'dalarken onu/kendisini/kendini kovalamacada yaraladığını fark etti. (Fotoğrafçı kimi yaraladı?)

16. Gezgin, atlının, Fas'tan döndükleri zaman, ona/kendine/kendisine dans etmeyi öğretmesini istedi. (Atlı kime dans etmeyi öğretmeliydi?)

17. Nine, polisin, Ukrayna'ya giderlerken, onu/kendini/kendisini havalimanında aynada gördüğünü fark etti. (Polis aynada kimi gördü?)

18. Şövalye, sağlık memurunun İspanya'da tatildelerken kalkıp ona/kendisine/kendine gizlice kahvaltı hazırladığını gördü. (Sağlık memuru kime gizlice kahvaltı hazırladı?)

19. İtfaiyeci, sihirbazın, Amerika'dalarken, onu/kendini/kendisini oyalamasını istedi. (Sihirbaz kimi oyalamalıydı?)

20. Palyaço, kovboyun, Ukrayna'ya uçarlarken, onu/kendini/kendisini incelemesini istedi. (Kovboy kimi incelemeliydi?)

21. Gelin, garsonun Fransa'dan döndüklerinde ona/kendisine/kendine lokantada yeni bir iş bulmasına sevindi. (Garson kime yeni bir iş buldu?)

22. Kral, prensin Norveç'te dolaşırlarken ona/kendisine/kendine yol tarifini not etmesini istedi. (Prens kime yol tarifini not etmeliydi?)

23. Hayvan araştırıcısı, kralın, Portekiz'delerken, ona/kendisine/kendine dikkatle baktığını gördü. (Kral kime baktı?)

24. Palyaço, hayvan araştırıcısının, Jamaika'dalarken, onu/kendisini/kendini oyundan sonra utandırdığını düşündü. (Hayvan araştırıcısı kimi utandırdı?)

25. Astronot, futbolcunun, Kanada'yı gezerlerken, onu/kendisini/kendini tüm gün boyunca sıktığını düşündü. (Futbolcu kimi sıktı?)

26. Pilot, kovboyun, Güney Kore'delerken, ona/kendisine/kendine güğümle su koyduğunu gördü. (Kovboy kime su koymalıydı?)

27. Kovboy, gezginin, Almanya'dalarken, onu/kendisini/kendini yürüyüşte kasıtlı durdurmasını istedi. (Gezgin kimi durdurmalıydı?)

28. Kraliçe, kızılderilinin Kanada'yı gezerlerken ona/kendisine/kendine sürükleyici bir kitap aldığını öğrendi. (Kızılderili kime heyecan dolu bir kitap aldı?)

29. Yüzücü, kraliçenin, İngiltere'delerken, ona/kendisine/kendine yeni bir kitap almasını istedi. (Kraliçe kime bir kitap almalıydı?)

30. Sihirbaz, sağlık memurunun, Kıbrıs'ı gezerlerken, ona/kendisine/kendine mutfakta bir pizza hazırlamasını istedi. (Sağlık memuru kime bir pizza hazırlamalıydı?)

31. Yüzücü, perinin Güney Kore'deylerken onu/kendisini/kendini keçeli kalem ile boyamasını istemedi. (Peri kimi boyamamalıydı?)

32. Nine, dedenin Lübnan'dan döndüklerinde ona/kendisine/kendine aynada baktığını gördü. (Dede aynada kime baktı?)

33. Peri, prensesin Japonya'ya giderlerken onu/kendisini/kendini bıçakla kasten yaraladığını düşündü. (Prenses kimi kasten yaralamış?)

34. Çiftçi, kızılderilinin, Brezilya'dalarken, onu/kendisini/kendini renkli kalemle boyamasını istemedi. (Kızılderili kimi boyamamalıydı?)

35. Damat, şövalyenin, Türkiye'delerken, onu/kendisini/kendini tören için hazırlamasını istedi. (Şövalye kimi hazırlamalıydı?)

36. Futbolcu, yüzücünün, Rusya'ya vardıklarında, onu/kendisini/kendini müsabakaya hazırlamasını istedi. (Yüzücü kimi müsabakaya hazırlamalıydı?)

37. Prens, kralın, Avustralya'dalarken, onu/kendisini/kendini şölene hazırlamasını istedi. (Prens kimi şölene hazırlamalıydı?)

38. İtfaiyeci, kraliçenin Fas'ta tatil yaparlarken ona/kendisine/kendine büyük bir dondurma aldığını gördü. (Kraliçe kime büyük bir dondurma aldı?)

39. Aşçı, damadın, Arjantin'e gelirlerken, onu/kendisini/kendini toplantı hakkında bilgilendirmesini istedi. (Damat kimi bilgilendirmeliydi?)

40. Şövalye, pilotun Türkiye'delerken en çok ona/kendisine/kendine fırsat vermesini uygun bulmadı. (Pilot kime her zaman en çok fırsatı verdi?)

41. Pilot, mühendisin İtalya'dan döndüklerinde ona/kendisine/kendine utanarak büyük bir yalan söylediğini düşündü. (Mühendis kime yalan

söyledi?)

42. Garson, çiftçinin İsveç'i gezerlerken ona/kendisine/kendine ucuz bir bilgisayar aldığına sevindi. (Çiftçi kime bilgisayar aldı?)

43. Astronot, çöpçünün Gana'dan döndüklerinde ona/kendisine/kendine randevuyu bir alarm ile hatırlatmasını istedi. (Çöpçü kimi hatırlatmalıydı?)

44. Doktor, atlının Irak'tan döndüklerinde ona/kendisine/kendine evde raftan ağır kitabı çıkarmasını istedi. (Atlı kime kitabı çıkarmalıydı?)

45. Prenses, prensin Portekiz'e varırlarken ona/kendisine/kendine kağıttan güzel bir taç yapmasına sevindi. (Prens kime güzel bir taç yaptı?)

46. Damat, hayvan araştırıcısının Arjantin'delerken ona/kendisine/kendine suluboyalarla güzel bir resim çizmesini istedi. (Hayvan araştırıcısı kime resim çizmeliydi?)

47. Polis, fotoğrafçının Brezilya'yı gezerlerken onu/kendisini/kendini bir yazıda tarif etmesini istedi. (Fotoğrafçı kimi tarif etmeliydi?)

48. Korsan, aşçının Almanya'yı gezerlerken ona/kendisine/kendine kahvaltı hazırladığını gördü. (Aşçı kime kahvaltı hazırladı?)

A.1.11 Experimental sentences of Exp. 8

1. Sihirbaz, garson ile Amerika'dayken ona/kendisine/kendine bazı gösterilerde hala hayret ediyordu. (Sihirbaz kime hayret ediyordu?)

2. Gelin, peri ile Norveç'e döndüğünde önce ona/kendisine/kendine havalimanı mağazasında bir elbise aldı. (Gelin kime elbise aldı?)

3. Gezgin, kızılderili ile İspanya'dayken, ona/kendine/kendisine bir çorba pişirmek istedi. (Gezgin kime bir çorba pişirmek istedi?)

4. Astronot, aşçı ile Japonya'dayken, onu/kendini/kendisini oyalamak istedi. (Astronot kime oyalamak istedi?)

5. Futbolcu, doktor ile Irak'a vardığında, onu/kendini/kendisini Malta'nın tarihi hakkında çok az bilgilendirdi. (Futbolcu kimi çok az bilgilendirdi?)

6. Çiftçi, atlı ile Gana'yı gezdiğinde, onu/kendini/kendisini istemeyerek biraz yaralamıştı. (Çiftçi kimi biraz yaralamıştı?)

7. Çöpçü, fotoğrafçı ile İngiltere'deyken onu/kendisini/kendini kötü sunum ile şaşırttığını fark etti. (Çöpçü kimi şaşırttı?)

8. Prenses, sağlık memuru ile Avustralya'dayken ona/kendisine/kendine limanda yeni bir yat aldı. (Prenses kime yeni bir yat aldı?)

9. Mühendis, dede ile İtalya'dan döndüğünde ona/kendisine/ kendine internette bir takım elbise ısmarlamak istedi. (Mühendis kime takım elbise ısmarladı?)

10. Korsan, çöpçü ile Kıbrıs'ta tatildeyken onu/kendisini/kendini çarşafla gizledi. (Korsan kimi gizledi?)

11. Doktor, mühendis ile Fransa'yı dolaşırken, ona/kendine/kendisine bir elma almak istedi. (Doktor kime bir elma almak istedi?)

12. Palyaço, korsan ile İsveç'i gezerken, onu/kendini/kendisini kapının arkasına gizlemek istedi. (Palyaço kimi gizlemek istedi?)

13. Nine, gelin ile Rusya'dan döndüğünde ona/kendisine/kendine lezzetli bir yemek pişirmeye başladı. (Nine kime lezzetli bir yemek pişirmek başladı?)

14. İtfaiyeci, dede ile Lübnan'da tatildeyken, onu/kendini/kendisini denizden çıktıktan sonra kurulamak istedi. (İtfaiyeci kimi kurulamak istedi?)

15. Fotoğrafçı, polis ile Jamaika'dayken onu/kendisini/kendini kovalamacada yaraladı. (Fotoğrafçı kimi yaraladı?)

16. Atlı, gezgin ile Fas'tan döndüğü zaman, ona/kendine/kendisine dans etmeyi öğretmek istedi. (Atlı kime dans etmeyi öğretmek istedi?)

17. Polis, nine ile Ukrayna'ya giderken, onu/kendini/kendisini havalimanında aynada gördü. (Polis aynada kimi gördü?)

18. Sağlık memuru, şövalye ile İspanya'da tatildeyken ona/kendisine/kendine gizlice kahvaltı hazırladı. (Sağlık memuru kime gizlice kahvaltı hazırladı?)

19. Sihirbaz, itfaiyeci ile Amerika'dayken, onu/kendini/kendisini oyalamak istedi. (Sihirbaz kimi oyalamak istedi?)

20. Kovboy, palyaço ile Ukranya'ya uçarken, onu/kendini/kendisini incelemek istedi. (Kovboy kimi incelemek istedi?)

21. Garson, gelin ile Fransa'dan döndüğünde ona/kendisine/kendine lokantada yeni bir iş buldu. (Garson kime yeni bir iş buldu?)

22. Prens, kral ile Norveç'te dolaşırken ona/kendisine/kendine yol tarifini not etmek istedi. (Prens kime yol tarifini not etmek istedi?)

23. Kral, hayvan araştırıcısı ile Portekiz'deyken, ona/kendisine/kendine dikkatle bakmıştı. (Kral kime bakmıştı?)

24. Hayvan araştırıcısı, palyaço ile Jamaika'dayken, onu/kendisini/kendini oyundan sonra utandırdı. (Hayvan araştırıcısı kimi utandırdı?)

25. Futbolcu, astronot ile Kanada'yı gezerken, onu/kendisini/kendini tüm gün boyunca sıkmıştı. (Futbolcu kimi sıkmıştı?)

26. Kovboy, pilot ile Güney Kore'deyken, ona/kendisine/kendine güğümle su koymak istedi. (Kovboy kime su koymak istedi?)

27. Gezgin, kovboy ile Almanya'dayken, onu/kendisini/kendini yürüyüşte kasıtlı durdurması gerekti. (Gezgin kimi durdurmalıydı?)

28. Kızılderili, kraliçe ile Kanada'yı gezerken ona/kendisine/kendine sürükleyici bir kitap aldı. (Kızılderili kime heyecan dolu bir kitap aldı?)

29. Kraliçe, yüzücü ile İngiltere'deyken, ona/kendisine/kendine yeni bir kitap almak istedi. (Kraliçe kime bir kitap almak istedi?)

30. Sağlık memuru, sihirbaz ile Kıbrıs'ı gezerken, ona/kendisine/kendine mutfakta bir pizza hazırlamak istedi. (Sağlık memuru kime bir pizza hazırlamak istedi?)

31. Peri, yüzücü ile Güney Kore'deyken onu/kendisini/kendini keçeli kalem ile boyamak istedi. (Peri kimi boyamak istedi?)

32. Dede, nine ile Lübnan'dan döndüğünde ona/kendisine/kendine aynada baktı. (Dede aynada kime baktı?)

33. Prenses, peri ile Japonya'ya giderken onu/kendisini/kendini bıçakla kasten yaraladı. (Prenses kimi kasten yaraladi?)

34. Kızılderili, çiftçi ile Brezilya'dayken, onu/kendisini/kendini renkli kalemle boyamamalıydı. (Kızılderili kimi boyamamalıydı?)

35. Şövalye, damat ile Türkiye'deyken, onu/kendisini/kendini tören için hazırlamak istedi. (Şövalye kimi hazırlamak istedi?)

36. Yüzücü, futbolcu ile Rusya'ya vardığında, onu/kendisini/kendini müsabakaya hazırlamalıydı. (Yüzücü kimi müsabakaya hazırlamalıydı?)

37. Kral, prens ile Avustralya'dayken, onu/kendisini/kendini şölene hazırlamak istedi. (Prens kimi şölene hazırlamak istedi?)

38. Kraliçe, itfaiyeci ile Fas'ta tatil yaparken ona/kendisine/kendine büyük bir dondurma aldı. (Kraliçe kime büyük bir dondurma aldı?)

39. Damat, aşçı ile Arjantin'e gelirken, onu/kendisini/kendini toplantı hakkında bilgilendirmek istedi. (Damat kimi bilgilendirmeliydi?)

40. Pilot, şövalye ile Türkiye'deyken en çok ona/kendisine/kendine fırsat verdi. (Pilot kime her zaman en çok fırsatı verdi?)

41. Mühendis, pilot ile İtalya'dan döndüğünde ona/kendisine/kendine utanarak büyük bir yalan söylemişti. (Mühendis kime yalan söylemişti?)

42. Çiftçi, garson ile İsveç'i gezerken ona/kendisine/kendine ucuz bir bilgisayar aldı. (Çiftçi kime bilgisayar aldı?)

43. Çöpçü, astronot ile Gana'dan döndüğünde ona/kendisine/kendine bir alarm ile randevuyu hatırlattı. (Çöpçü kimi hatırlattı?)

44. Atlı, doktor ile Irak'tan döndüğünde ona/kendisine/kendine evde raftan ağır kitabı çıkarmak istedi. (Atlı kime kitabı çıkarmak istedi?)

45. Prens, prenses ile Portekiz'e varırken ona/kendisine/kendine kağıttan güzel bir taç yaptı. (Prens kime güzel bir taç yaptı?)

46. Hayvan araştırıcısı, damat ile Arjantin'deyken ona/kendisine/kendine suluboyalarla güzel bir resim çizmek istedi. (Hayvan araştırıcısı kime resim çizmek istedi?)

47. Fotoğrafçı, polis ile Brezilya'yı gezerken onu/kendisini/kendini bir yazıda tarif etti. (Fotoğrafçı kimi tarif etti?)

48. Aşçı, korsan ile Almanya'yı gezerken önce ona/kendisine/kendine kahvaltı hazırlamak istedi. (Aşçı kime kahvaltı hazırlamak istedi?)

A.1.12 Filler sentences of Exps. 7 and 8

1. Garson tam aksine kızılderiliden köşe bucak kaçmak istedi. Garson kimden köşe bucak kaçmak istedi?

2. Yüzücü ninesinin seyrettiğini bildiği için bugün özellikle çok çaba göstermek istedi. Kim özellikle çok çaba göstermek istedi?

3. Kraliçeye göre, Güney Kore'de yaşayan futbolcu yeterince çabuk karar veremiyordu. Kim yeterince çabuk karar veremiyordu?

4. Mühendisi çok incitmesine rağmen, fotoğrafçıya darılmadı. Fotoğrafçı kimi incitti?

5. Doktor ve sağlık memuru nihayet iş saatleri dışında yine buluşmayı başardılar. Doktor kimle buluştu?

6. Gezgin, fotoğrafçıya dün yaş pasta ile sürpriz yapmak istedi. Gezgin kime sürpriz yapmak istedi?

7. Korsan, yüzücüye yola çıkmadan önce, onu bir kere daha ziyaret etmeye söz verdi. Korsan kimi ziyaret etmeye söz verdi?

8. Gelin, atlıya bir pasta yapmayı uzun zamandan beri planlıyordu. Gelin kime bir pasta yapmak istedi?

9. Yüzücü yeni arabasına uzaktan bakıp sevinç çığlıkları attı. Yüzücü neye uzaktan baktı?

10. Nineyi, perinin onu nedensiz korkutması kızdırdı. Peri kimi korkuttu?

11. Mühendis, sihirbaza maalesef yanlış adresi tarif etti. Mühendis kime yanlış adresi tarif etti?

12. Palyaço, çiftçinin köpeğini tekmelediğini görüp şaşırdı. Çiftçi neyi tekmeledi?

13. Prens, kızılderilinin sebepsiz veda etmesine şaşkındı. Kızılderili kimi şaşırttı?

14. Köpek çiftliğe geldiğinden beri, at biraz ihmal edildi. Ne ihmal edildi?

15. Kovboy, damatla tekrar görüşmeyeceğini biliyordu. Kovboy kimle tekrar görüşmeyecekti?

16. Pilot tekrar tekrar geç kaldı ve bu kralıyı kızdırdı. Kim geç kaldı?

17. Aşçı, astronottan kendisinin sevdiği çikolatalı pudingini gizledi. Aşçı kimden çikolatalı pudingini gizledi?

18. İsveç'teyken, peri, kraliçenin yanında oturmaya cesaret edemedi. Kim cesaret edemedi?

19. Palyaçonun aksine, gezgin Lübnan'da köyde yetişti. Gezgin hangi ülkede yetişti?

20. Astronot, pilotu çocukluğundan beri tanıyordu. Astronot kimi çocukluğundan beri tanıyordu?

21. Polis hafta sonunda kamp yapmak için bir çadır ödünç aldı. Ne ödünç alındı?

22. Hayvan araştırıcısı en çok sevdiği kitabini bile beşinci defa okuyordu. Hayvan araştırıcısı ne okuyordu?

23. Uzun uzun düşündükten sonra, kızılderili sonunda bir elbise aldı. Kızılderili ne aldı?

24. Doğum günü için, sağlık memuru, erkek arkadaşından bir el çantası hediye etmesini istedi. Kim el çantası istedi?

25. Bastona ihtiyacı olmasına rağmen, nine artık baston ile yürümek istemiyordu. Bastona kimin ihtiyacı vardı?

26. Prenses bıçaklardan çok korkuyordu, çünkü bir keresinde elini fena kesmişti. Prenses nelerden çok korkuyordu?

27. Aşçı öyle çok yemek tarifi biliyordu ki yıllardan beri hiç yemek kitabı okumadı. Kim çok yemek tarifi biliyordu?

28. Kral, Kıbrıs'tan döndükten sonra doğum günü hediyesine çok sevindi. Kim hediyeye çok sevindi?

29. Futbolcu durmadan takımının kaybettiği maçı düşünüyordu. (Kim maçı kaybetti?)

30. İtfaiyeci kendine bir köpek almayı düşündü. (İtfaiyeci ne almayı düşündü?)

31. Damat düğüne kadar on kilo vermek istediği için artık pizza yemedi. (Damat artık ne yemedi?)

32. Almanya'daki Arjantinli atlı, her şeyden önce anayurdunda yaşayan güzel atların yokluğunu hissetti. (Arjantinli atlı ne hissetti?)

33. Çünkü hayatında o zamana kadar hiç kar görmemişti, kızılderili coşkuyla kendi etrafında dans etti. (Kızılderili o zamana kadar neyi görmemişti?)

34. Kovboy hayal kırıklığına uğramıştı, çünkü yarasından dolayı yeni bir iş araması gerekiyordu. (Neden dolayı kovboyun yeni bir iş araması gerekiyordu?)

35. Maalesef dede hediye edilen bisküvilerden çok yiyemedi. (Dedeye ne hediye edildi?)

36. Gezgine göre Almanya'da çok fazla araba vardı. (Kime göre Almanya'da çok fazla araba vardı?)

37. Peri, hayvan araştırıcısının Kanada'dalarken kendini bir kursta geliştirdiğini duydu. (Hayvan araştırıcısı neredeydi?)

38. Fotoğrafçı, şövalye ile Tunus'ta tatil yaparken kendine lezzetli bir yemek yapmıştı. (Nerede tatil yaptılar?)

39. Sihirbaz, gelinin Rusya'ya gittiklerinde kendisini daha fazla kızdırmamasını istedi. (Gelin kimi kızdırmamalıydı?)

40. Sağlık memuru, hayvan araştırıcısının Amerika'dalarken kendi fotoğrafını çektiğini gördü. (Kimin fotoğrafı çekildi?)

41. İtfaiyeci, futbolcu ile İspanya'ya yoldayken kendisini sürekli oyaladı. (Futbolcu nereye gitti?)

42. Prenses, doktor ile Fas'tan döndüğündan beri kendisinin kanını almadığını düşündü. (Kimin kanını almadı?)

43. Peri, aşçının Avustralya'dalarken gümüş bir kaşığı kendi pantolonun cebine koyduğunu gördü. (Aşçı, kaşığı kimin pantolon cebine koydu?)

44. Kızılderili, çöpçü ile Kanada'yı gezerken kendisinin tekrar edilen gecikmesinden dolayı özür diledi. (Nereyi gezdiler?)

45. Korsan, prensesin Irak'a giderlerken onu sinsice ele verdiğini biliyordu. (Prenses nereye gitti?)

46. Hayvan araştırıcısı, polis ile Portekiz'i gezdikten sonra ona bir mektup yazmıştı. (Kime bir mektup yazıldı?)

47. Kovboy, mühendisin Brezilya'da tatildelerken korkudan ondan bir şeyler sakladığını biliyordu. (Tatilde neredeydi?)

48. Aşçı, astronot ile Fransa'dan döndüktan sonra kendine gerçek bir ziyafet hazırladı. (Aşçı kime gerçek bir ziyafet hazırladı?)

49. Kraliçe, atlının Arjantin'delerken kendisine uygun bir şeyler giymediğini düşündü. (Atlı neredeydi?)

50. Gezgin, dedenin Japonya'dalarken ona gizlice çok darıldığını çoktan sezinledi. (Neredeyken dede çok darıldı?)

51. Damat, gelin ile Türkiye'yi gezerken ona bir şiir yazmıştı. (Damat gelinle nereyi geziyordu?)

52. Doktor, prens ile İngiltere'deyken kendisine ilaç almak istedi. (Doktor prensle neredeydi?)

53. Futbolcu, korsan ile Almanya'dayken ona teşekkür olarak bir kart hediye etmek istedi. (Futbolcu kime bir kart hediye etmek istedi?)

54. Çiftçi, çöpçü ile Jamaika'ya gitmeden önce kendini bilgilendirmek istedi. (Çiftçi, çöpçüyle nereye gidecekti?)

55. Damadın iyi tanıdığı yüzücü düğünde şarkı söylemeliydi. (Kim düğünde şarkı söylemeliydi?)

56. Prens, palyaçonun güvenilir olmadığını fark etti. (Kim güvenilir değildi?)

57. Pilot, ninenin o kadar çok hayatta kalamayacağını biliyordu. (Kim çok hayatta kalamayacaktı?)

58. Şövalyeye bir kitap alan pilot daha çok hediye kâğıdı almalıydı. (Kim kitap almıştı?)

59. Fotoğrafçı şapkasını evinde unuttuğunu biliyordu. (Fotoğrafçı ne unuttu?)

60. Polisin durdurduğu prensin yavaş yavaş arabasından inmesi gerekiyordu. (Kimin arabasından inmesi gerekiyordu?)

61. Sihirbaz, garsonun çorbanın tadına bakmasını istedi. (Kim garsonun çorbanın tadına bakmasını istedi?)

62. Fotoğrafçı, dedeyi yanlışlıkla tekmelediğini fark etti. (Kim dedeyi yanlışlıkla tekmeledi?)

63. Astronot, palyaçonun zevkle pastadan bir parça yediğini gördü. (Kim pastadan bir parça yedi?)

64. Çöpçü, itfaiyecinin bu yıl ilk defa İtalya'ya geldiğini biliyordu. (Kim ilk defa İtalya'ya geldi?)

65. Garson, çiftçiye daha çok para borçlu olduğunu biliyordu. (Garson kime para borçlu oldu?

66. İtfaiyeci, şövalyenin çok iyi eğitim aldığını fark etti. Kim çok iyi eğitim aldı?)

67. Şövalye, mühendisin bugün özellikle çok çalıştığını düşündü. (Kim özellikle çok çalıştı?)

68. Dede, kovboyla önceden bir kere karşılaştığını düşündü. (Dede kimle önceden karşılaştı?)

69. Atlı, prensesi kıskandığını fark etti. (Atlı kimi kıskandı?)

70. Gelin düğün ayakkabılarını Gana'yı gezerken kaybettiğini düşündü. (Gelin nereyi geziyordu?)

71. Çöpçü, köpek kulübesini hafta sonuna kadar inşa etmesi gerektiğini biliyordu. (Korsanın ne inşa etmesi gerekti?)

72. Kral, itfaiyecinin Norveç'teyken uzun süreden beri çalışmadığını anladı. (Kim uzun süreden beri çalışmadı?)

A.2 Full results tables for Ch. 6

A.2.1 Exp. 7: Eye-movement analysis of the full time window analysis with Group effect (for each anaphor and antecedent)

Table A.1 *Results from the between-group analysis of the eye-movement data over the full time window for the local antecedent in the kendi condition of Exp. 7*

Effect	Estimate (SE)	t-value
Intercept	1.18(0.10)	**11.70**
$\text{Group}_{\text{HSs}}$	0.06(0.20)	0.29
Linear	0.83(0.27)	**3.03**
Quadratic	0.04(0.20)	0.21
Cubic	0.14(0.14)	1.02
Quartic	0.16(0.09)	**1.80**
$\text{Group}_{\text{HSs}}$ * Linear	1.10(0.56)	**1.95**
$\text{Group}_{\text{HSs}}$ * Quadratic	-0.50(0.41)	-1.21
$\text{Group}_{\text{HSs}}$ * Cubic	0.10(0.27)	0.36
$\text{Group}_{\text{HSs}}$ * Quartic	-0.26(0.17)	-1.49

Table A.2 *Results from the between-group analysis of the eye-movement data over the full time window for the non-local antecedent in the kendi condition of Exp. 7*

Effect	Estimate (SE)	t-value
Intercept	1.40(0.08)	**18.04**
$\text{Group}_{\text{HSs}}$	0.02(0.15)	0.13
Linear	1.53(0.27)	**5.66**
Quadratic	-0.25(0.14)	**-1.78**
Cubic	-0.00(0.08)	-0.02
Quartic	-0.03(0.03)	-0.99
$\text{Group}_{\text{HSs}}$ * Linear	-0.19(0.49)	0.40
$\text{Group}_{\text{HSs}}$ * Quadratic	-0.61(0.27)	**-2.27**
$\text{Group}_{\text{HSs}}$ * Cubic	0.46(0.18)	**2.52**
$\text{Group}_{\text{HSs}}$ * Quartic	-0.04(0.06)	-0.79

Table A.3 *Results from the between-group analysis of the eye-movement data over the full time window for the local antecedent in the kendisi condition of Exp. 7*

Effect	Estimate (SE)	t-value
Intercept	1.35(0.06)	**21.83**
$\text{Group}_{\text{HSs}}$	-0.30(-0.13)	**-2.35**
Linear	0.93(0.28)	**3.37**
Quadratic	-0.37(0.17)	**-2.15**
Cubic	-0.16(0.13)	-1.17
Quartic	-0.02(0.07)	-0.17
$\text{Group}_{\text{HSs}}$ * Linear	0.71(0.52)	1.37
$\text{Group}_{\text{HSs}}$ * Quadratic	0.23(0.33)	0.70
$\text{Group}_{\text{HSs}}$ * Cubic	-0.45(0.30)	-1.51
$\text{Group}_{\text{HSs}}$ * Quartic	-0.15(0.14)	-1.07

Table A.4 *Results from the between-group analysis of the eye-movement data over the full time window for the non-local antecedent in the kendisi condition of Exp. 7*

Effect	Estimate (SE)	t-value
Intercept	1.46(0.06)	**23.16**
$\text{Group}_{\text{HSs}}$	-0.09(0.12)	-0.76
Linear	1.37(0.27)	**5.11**
Quadratic	-0.33(0.12)	**-2.81**
Cubic	-0.04(0.10)	-0.40
Quartic	0.10(0.05)	**1.81**
$\text{Group}_{\text{HSs}}$ * Linear	0.53(0.51)	1.04
$\text{Group}_{\text{HSs}}$ * Quadratic	0.14(0.23)	0.63
$\text{Group}_{\text{HSs}}$ * Cubic	-0.11(0.21)	-0.55
$\text{Group}_{\text{HSs}}$ * Quartic	-0.05(0.11)	-0.44

Table A.5 *Results from the between-group analysis of the eye-movement data over the full time window for the local antecedent in the o condition of Exp. 7*

Effect	Estimate (SE)	t-value
Intercept	1.20(0.09)	**13.73**
$\text{Group}_{\text{HSs}}$	-0.17(0.18)	-0.92
Linear	1.20(0.29)	**4.05**
Quadratic	-0.10(0.22)	-0.44
Cubic	-0.15(0.13)	-1.16
Quartic	0.18(0.08)	**2.27**
$\text{Group}_{\text{HSs}}$ * Linear	0.54(0.60)	0.90
$\text{Group}_{\text{HSs}}$ * Quadratic	-0.48(0.44)	-1.09
$\text{Group}_{\text{HSs}}$ * Cubic	0.28(0.24)	1.16
$\text{Group}_{\text{HSs}}$ * Quartic	0.09(0.16)	0.55

Table A.6 *Results from the between-group analysis of the eye-movement data over the full time window for the non-local antecedent in the o condition of Exp. 7*

Effect	Estimate (SE)	t-value
Intercept	1.37(0.08)	**18.28**
$\text{Group}_{\text{HSs}}$	0.05(0.15)	0.39
Linear	1.43(0.25)	**5.78**
Quadratic	-0.13(0.19)	-0.70
Cubic	0.38(0.11)	**3.37**
Quartic	-0.28(0.09)	**-3.31**
$\text{Group}_{\text{HSs}}$ * Linear	-0.26(0.47)	-0.56
$\text{Group}_{\text{HSs}}$ * Quadratic	-0.25(0.37)	-0.69
$\text{Group}_{\text{HSs}}$ * Cubic	0.02(0.22)	0.09
$\text{Group}_{\text{HSs}}$ * Quartic	0.22(0.16)	1.31

A.2.2 Exp. 7: Eye-movement analysis of the full time window analysis separately for group, anaphor and antecedent

Table A.7 *Results from the analysis of the eye-movement data over the full time window for the local antecedent in the kendi condition in monolinguals, Exp. 7*

Effect	Estimate (SE)	t-value
Intercept	1.20(0.12)	**9.94**
Linear	1.45(0.43)	**3.33**
Quadratic	-0.11(0.34)	-0.32
Cubic	0.24(0.24)	1.03
Quartic	0.10(0.16)	0.64

Table A.8 *Results from the analysis of the eye-movement data over the full time window for the non-local antecedent in the kendi condition in monolinguals, Exp. 7*

Effect	Estimate (SE)	t-value
Intercept	1.41(0.10)	**15.19**
Linear	1.63(0.35)	**4.62**
Quadratic	-0.54(0.25)	**-2.17**
Cubic	0.23(0.14)	1.64
Quartic	-0.07(0.05)	-1.46

Table A.9 *Results from the analysis of the eye-movement data over the full time window for the local antecedent in the kendisi condition in monolinguals, Exp. 7*

Effect	Estimate (SE)	t-value
Intercept	1.16(0.11)	**10.28**
Linear	1.30(0.46)	**2.85**
Quadratic	-0.19(0.30)	-0.61
Cubic	-0.36(0.28)	-1.32
Quartic	-0.07(0.18)	-0.40

Table A.10 *Results from the analysis of the eye-movement data over the full time window for the non-local antecedent in the kendisi condition in monolinguals, Exp. 7*

Effect	Estimate (SE)	t-value
Intercept	1.35(0.11)	**12.66**
Linear	1.98(0.42)	**4.74**
Quadratic	-0.24(0.21)	-1.13
Cubic	-0.15(0.16)	-0.90
Quartic	0.08(0.11)	0.77

Table A.11 *Results from the analysis of the eye-movement data over the full time window for the local antecedent in the o condition in monolinguals, Exp. 7*

Effect	Estimate (SE)	t-value
Intercept	1.06(0.13)	**8.45**
Linear	1.70(0.51)	**3.33**
Quadratic	-0.34(0.36)	-0.95
Cubic	-0.09(0.22)	-0.42
Quartic	0.36(0.21)	**1.71**

Table A.12 *Results from the analysis of the eye-movement data over the full time window for the non-local antecedent in the o condition in monolinguals, Exp. 7*

Effect	Estimate (SE)	t-value
Intercept	1.34(0.10)	**12.74**
Linear	1.68(0.38)	**4.48**
Quadratic	-0.57(0.27)	**-2.11**
Cubic	0.53(0.21)	**2.48**
Quartic	-0.15(0.11)	-1.32

Table A.13 *Results from the analysis of the eye-movement data over the full time window for the local antecedent in the kendi condition in HSs, Exp. 7*

Effect	Estimate (SE)	t-value
Intercept	1.14(0.16)	**6.99**
Linear	0.22(0.33)	0.66
Quadratic	0.30(0.22)	1.37
Cubic	-0.04(0.13)	-0.30
Quartic	0.22(0.12)	**1.89**

Table A.14 *Results from the analysis of the eye-movement data over the full time window for the non-local antecedent in the kendi condition in HSs, Exp. 7*

Effect	Estimate (SE)	t-value
Intercept	1.38(0.12)	**11.46**
Linear	1.42(0.38)	**3.76**
Quadratic	0.12(0.14)	0.86
Cubic	-0.35(0.12)	**-2.82**
Quartic	0.05(0.07)	0.66

Table A.15 *Results from the analysis of the eye-movement data over the full time window for the local antecedent in the kendisi condition in HSs, Exp. 7*

Effect	Estimate (SE)	t-value
Intercept	1.52(0.06)	**23.70**
Linear	0.53(0.32)	**1.68**
Quadratic	-0.49(0.15)	**-3.18**
Cubic	0.10(0.14)	0.71
Quartic	0.22(0.07)	**3.24**

Table A.16 *Results from the analysis of the eye-movement data over the full time window for the non-local antecedent in the kendisi condition in HSs, Exp. 7*

Effect	Estimate (SE)	t-value
Intercept	1.16(0.41)	**17.96**
Linear	1.16(0.41)	**2.82**
Quadratic	-0.53(0.16)	**-3.35**
Cubic	-0.07(0.12)	-0.57
Quartic	0.27(0.10)	**2.73**

Table A.17 *Results from the analysis of the eye-movement data over the full time window for the local antecedent in the o condition in HSs, Exp. 7*

Effect	Estimate (SE)	t-value
Intercept	1.28(0.13)	**9.64**
Linear	0.42(0.35)	**2.64**
Quadratic	0.42(0.29)	1.45
Cubic	-0.39(0.17)	**-2.27**
Quartic	0.34(0.15)	**2.21**

Table A.18 *Results from the analysis of the eye-movement data over the full time window for the non-local antecedent in the o condition in HSs, Exp. 7*

Effect	Estimate (SE)	t-value
Intercept	1.30(0.12)	**11.28**
Linear	1.88(0.41)	**4.64**
Quadratic	0.02(0.30)	0.51
Cubic	0.27(0.13)	**2.01**
Quartic	-0.42(0.14)	**-3.09**

A.2.3 Exp. 7: Eye-movement analysis of 500 ms time windows separately for group, anaphor and antecedent

Table A.19 *Results from the empirical logit analysis of the eye-movement data with 500 ms time windows in monolinguals, Exp. 7*

	Local				Non-local			
Anaphor and time window	Intercept		Linear		Intercept		Linear	
kendi	Estimate(SE)	t	Estimate(SE)	t	Estimate(SE)	t	Estimate(SE)	t
200-700ms	1.14(0.31)	**3.71**	1.29(1.30)	1.00	1.57(0.19)	**8.33**	2.98(1.07)	**2.78**
700-1200ms	1.24(0.16)	**7.93**	1.70(0.54)	**3.15**	1.36(0.15)	**9.31**	0.64(0.40)	1.59
1200-1700ms	1.19(0.18)	**6.78**	1.01(1.14)	0.89	1.53(0.11)	**14.50**	0.57(0.36)	1.57
1700-2200ms	0.81(0.34)	**2.37**	3.22(1.18)	**2.73**	1.78(0.08)	**22.89**	0.03(0.35)	0.08
kendisi	Estimate(SE)	t	Estimate(SE)	t	Estimate(SE)	t	Estimate(SE)	t
200-700ms	1.31(0.29)	**4.56**	2.15(1.41)	1.53	1.16(0.35)	**3.33**	1.40(1.50)	0.93
700-1200ms	1.01(0.20)	**5.16**	2.01(1.65)	1.22	1.41(0.14)	**10.22**	2.48(0.64)	**3.85**
1200-1700ms	1.07(0.18)	**5.89**	3.68(1.05)	**3.51**	1.34(0.14)	**9.64**	2.47(0.78)	**3.16**
1700-2200ms	1.55(0.12)	**12.79**	-0.32(0.41)	-0.78	1.71(0.08)	**21.99**	0.35(0.36)	0.98
o	Estimate(SE)	t	Estimate(SE)	t	Estimate(SE)	t	Estimate(SE)	t
200-700ms	0.06(0.36)	0.17	-2.50(1.00)	**-2.51**	2.35(0.27)	**8.67**	7.29(1.86)	**3.93**
700-1200ms	0.89(0.22)	**4.09**	0.87(1.79)	0.48	1.12(0.19)	**5.90**	-1.40(0.65)	**-2.15**
1200-1700ms	1.35(0.12)	**10.94**	0.63(0.47)	1.33	1.50(0.11)	**13.93**	0.24(0.39)	0.63
1700-2200ms	0.86(0.24)	**3.61**	2.45(0.73)	**3.36**	1.35(0.18)	**7.51**	1.45(0.63)	**2.29**

Note. Marginal or significant effects are boldfaced.

Table A.20 *Results from the empirical logit analysis of the eye-movement data with 500 ms time windows in HSs, Exp. 7*

	Local				Non-local			
Anaphor and time window	Intercept		Linear		Intercept		Linear	
kendi	Estimate(SE)	t	Estimate(SE)	t	Estimate(SE)	t	Estimate(SE)	t
200-700ms	0.70(0.31)	**2.29**	-2.05(0.71)	**-2.88**	1.23(0.18)	**6.90**	0.47(0.39)	1.21
700-1200ms	1.09(0.19)	**5.87**	0.56(0.49)	1.14	1.17(0.18)	**6.42**	0.75(0.36)	**2.07**
1200-1700ms	1.24(0.16)	**7.82**	-1.08(0.48)	**-2.26**	1.43(0.13)	**10.71**	1.60(0.56)	**2.83**
1700-2200ms	0.74(0.29)	**2.54**	2.30(0.69)	**3.33**	1.76(0.08)	**21.93**	0.06(0.35)	0.17
kendisi	Estimate(SE)	t	Estimate(SE)	t	Estimate(SE)	t	Estimate(SE)	t
200-700ms	1.87(0.08)	**23.53**	2.72(0.75)	**3.62**	1.63(0.10)	**15.72**	2.71(0.71)	**3.81**
700-1200ms	1.57(0.08)	**19.63**	0.11(0.41)	0.27	1.66(0.06)	**29.87**	3.51(0.97)	**3.60**
1200-1700ms	1.71(0.04)	**39.91**	-0.10(0.40)	-0.25	1.66(0.05)	**32.95**	0.79(0.42)	**1.91**
1700-2200ms	0.74(0.28)	**2.68**	3.48(0.93)	**3.76**	1.63(0.11)	**15.01**	-0.06(0.34)	-0.19
o	Estimate(SE)	t	Estimate(SE)	t	Estimate(SE)	t	Estimate(SE)	t
200-700ms	1.14(0.20)	**5.74**	-0.17(0.44)	-0.38	1.93(0.17)	**11.31**	4.54(1.04)	**4.36**
700-1200ms	1.19(0.19)	**6.42**	1.77(0.80)	**2.22**	1.09(0.19)	**5.61**	0.09(0.41)	0.22
1200-1700ms	1.43(0.13)	**10.76**	0.16(0.40)	0.41	1.32(0.15)	**8.90**	0.22(0.38)	0.59
1700-2200ms	1.57(0.11)	**13.67**	0.14(0.43)	0.32	1.76(0.08)	**22.29**	0.13(0.36)	0.37

Note. Marginal or significant effects are boldfaced.

A.2.4 Exp. 7: Between-group click analysis with *kendi* as the baseline anaphor

Table A.21 *Results from the between-group analysis of the comprehension questions in Exp. 7*

Fixed Effect	Estimate(SE)	z-value
Intercept	0.65(0.24)	**2.73**
AnaphorType$_{kendisi}$	0.50(0.19)	**2.65**
AnaphorType$_{o}$	2.47(0.26)	**9.60**
Group$_{\text{HSs}}$	-0.90(0.23)	**-3.98**
AnaphorType$_{kendisi}$ * Group$_{\text{HSs}}$	0.34(0.26)	1.29
AnaphorType$_{o}$ * Group$_{\text{HSs}}$	-0.12(0.33)	-0.38

Note. The baseline condition was *kendi* in the monolingual group. Marginal or significant effects are boldfaced.

A.2.5 Exp. 7: Between-group click analysis with HSs as the baseline group

Table A.22 *Results from the between-group analysis of the comprehension questions in Exp. 7*

Fixed Effect	Estimate (SE)	z-value
Intercept	0.59(0.24)	**2.46**
AnaphorType$_{kendi}$	-0.84(0.18)	**-4.57**
AnaphorType$_{o}$	1.51(0.21)	**7.12**
Group$_{\text{Mono}}$	0.56(0.23)	**2.44**
AnaphorType$_{kendi}$ * Group$_{\text{Mono}}$	0.34(0.26)	1.29
AnaphorType$_{o}$ * Group$_{\text{Mono}}$	0.46(0.33)	1.41

Note. The baseline condition was *kendisi* in the HS group. Marginal or significant effects are boldfaced.

A.2.6 Exp. 7: Click analysis within the HS group for each anaphor separately

Table A.23 *Results from the individual differences analysis of the comprehension questions in Exp. 7 in the kendi condition*

Fixed Effect	Estimate (SE)	z-value
Intercept	-0.29(0.25)	-1.16
TELC	-0.09(0.05)	**-1.71**

Note. Marginal or significant effects are boldfaced.

Table A.24 *Results from the analysis of the comprehension questions in Exp. 7 in the kendisi condition*

Fixed Effect	Estimate (SE)	z-value
Intercept	0.58(0.25)	**2.36**
TELC	0.03(0.05)	0.61

Note. Marginal or significant effects are boldfaced.

Table A.25 *Results from the analysis of the comprehension questions in Exp. 7 in the o condition*

Fixed Effect	Estimate (SE)	z-value
Intercept	1.82(0.23)	**7.96**
TELC	0.14(0.04)	**3.20**

Note. Marginal or significant effects are boldfaced.

A.2.7 Exp. 8: Eye-movement analysis of the full time window analysis with Group effect (for each anaphor and antecedent)

Table A.26 *Results from the between-group analysis of the eye-movement data over the full time window for the local antecedent in the kendi condition of Exp. 8*

Effect	Estimate (SE)	t-value
Intercept	1.38(0.07)	**20.83**
$\text{Group}_{\text{HSs}}$	-0.21(0.12)	**-1.76**
Linear	1.94(0.32)	**6.12**
Quadratic	-0.62(0.18)	**-3.45**
Cubic	0.13(0.15)	0.83
Quartic	-0.02(0.06)	-0.40
$\text{Group}_{\text{HSs}}$ * Linear	0.45(0.58)	0.78
$\text{Group}_{\text{HSs}}$ * Quadratic	-0.67(0.34)	**-1.96**
$\text{Group}_{\text{HSs}}$ * Cubic	0.63(0.30)	**2.08**
$\text{Group}_{\text{HSs}}$ * Quartic	-0.14(0.12)	-1.20

Table A.27 *Results from the between-group analysis of the eye-movement data over the full time window for the non-local antecedent in the kendi condition of Exp. 8*

Effect	Estimate (SE)	t-value
Intercept	1.00(0.09)	**10.80**
$\text{Group}_{\text{HSs}}$	-0.19(0.19)	-0.10
Linear	0.05(0.37)	0.12
Quadratic	-0.02(0.24)	-0.08
Cubic	0.04(0.18)	0.23
Quartic	0.04(0.10)	0.39
$\text{Group}_{\text{HSs}}$ * Linear	1.20(0.73)	1.64
$\text{Group}_{\text{HSs}}$ * Quadratic	0.67(0.43)	1.53
$\text{Group}_{\text{HSs}}$ * Cubic	0.70(0.37)	**1.92**
$\text{Group}_{\text{HSs}}$ * Quartic	0.10(0.20)	0.50

Table A.28 *Results from the between-group analysis of the eye-movement data over the full time window for the local antecedent in the kendisi condition of Exp. 8*

Effect	Estimate (SE)	t-value
Intercept	1.48(0.06)	**22.85**
$\text{Group}_{\text{HSs}}$	-0.30(0.13)	-0.24
Linear	1.20(0.25)	**4.70**
Quadratic	-0.02(0.18)	-0.11
Cubic	-0.04(0.07)	-0.62
Quartic	-0.21(0.08)	**-2.44**
$\text{Group}_{\text{HSs}}$ * Linear	-0.18(0.44)	-0.40
$\text{Group}_{\text{HSs}}$ * Quadratic	-0.30(0.34)	-0.89
$\text{Group}_{\text{HSs}}$ * Cubic	-0.03(0.16)	-0.21
$\text{Group}_{\text{HSs}}$ * Quartic	-0.05(0.17)	-0.28

Table A.29 *Results from the between-group analysis of the eye-movement data over the full time window for the non-local antecedent in the kendisi condition of Exp. 8*

Effect	Estimate (SE)	t-value
Intercept	1.09(0.09)	**12.01**
$\text{Group}_{\text{HSs}}$	-0.29(0.18)	-1.58
Linear	0.06(0.35)	0.17
Quadratic	-0.34(0.20)	**-1.71**
Cubic	0.11(0.15)	0.76
Quartic	0.09(0.08)	1.06
$\text{Group}_{\text{HSs}}$ * Linear	0.93(0.70)	1.33
$\text{Group}_{\text{HSs}}$ * Quadratic	0.09(0.36)	0.25
$\text{Group}_{\text{HSs}}$ * Cubic	0.53(0.31)	**1.71**
$\text{Group}_{\text{HSs}}$ * Quartic	-0.34(0.18)	**-1.92**

Table A.30 *Results from the between-group analysis of the eye-movement data over the full time window for the local antecedent in the o condition of Exp. 8*

Effect	Estimate (SE)	t-value
Intercept	1.29(0.08)	**15.50**
$\text{Group}_{\text{HSs}}$	-0.10(0.16)	-0.62
Linear	1.46(0.30)	**4.79**
Quadratic	-0.39(0.21)	**-1.91**
Cubic	0.30(0.12)	**2.55**
Quartic	-0.12(0.05)	**-2.39**
$\text{Group}_{\text{HSs}}$ * Linear	0.04(0.57)	0.07
$\text{Group}_{\text{HSs}}$ * Quadratic	-0.18(0.39)	-0.46
$\text{Group}_{\text{HSs}}$ * Cubic	0.08(0.22)	0.36
$\text{Group}_{\text{HSs}}$ * Quartic	-0.16(0.10)	-1.52

Table A.31 *Results from the between-group analysis of the eye-movement data over the full time window for the non-local antecedent in the o condition of Exp. 8*

Effect	Estimate (SE)	t-value
Intercept	1.16(0.09)	**12.95**
$\text{Group}_{\text{HSs}}$	0.05(0.17)	0.28
Linear	1.07(0.33)	**3.26**
Quadratic	-0.05(0.19)	-0.24
Cubic	-0.11(0.16)	-0.67
Quartic	0.15(0.09)	1.60
$\text{Group}_{\text{HSs}}$ * Linear	-0.06(0.68)	-0.09
$\text{Group}_{\text{HSs}}$ * Quadratic	0.53(0.39)	1.38
$\text{Group}_{\text{HSs}}$ * Cubic	0.13(0.29)	0.43
$\text{Group}_{\text{HSs}}$ * Quartic	-0.39(0.19)	**-2.09**

A.2.8 Exp. 8: Eye-movement analysis of the full time window analysis separately for group, anaphor and antecedent

Table A.32 *Results from the analysis of the eye-movement data over the full time window for the local antecedent in the kendi condition in monolinguals, Exp. 8*

Effect	Estimate (SE)	t-value
Intercept	1.23(0.10)	**12.50**
Linear	2.15(0.51)	**4.25**
Quadratic	-1.07(0.31)	**-3.40**
Cubic	0.53(0.27)	**1.95**
Quartic	-0.04(0.14)	-0.29

Table A.33 *Results from the analysis of the eye-movement data over the full time window for the non-local antecedent in the kendi condition in monolinguals, Exp. 8*

Effect	Estimate (SE)	t-value
Intercept	0.89(0.13)	**6.72**
Linear	0.74(0.51)	1.45
Quadratic	0.47(0.37)	1.30
Cubic	0.53(0.30)	**1.77**
Quartic	0.24(0.22)	1.07

Table A.34 *Results from the analysis of the eye-movement data over the full time window for the local antecedent in the kendisi condition in monolinguals, Exp. 8*

Effect	Estimate (SE)	t-value
Intercept	1.45(0.09)	**16.06**
Linear	1.05(0.31)	**3.43**
Quadratic	-0.31(0.22)	-1.40
Cubic	-0.03(0.15)	-0.20
Quartic	-0.32(0.15)	**-2.07**

Table A.35 *Results from the analysis of the eye-movement data over the full time window for the non-local antecedent in the kendisi condition in monolinguals, Exp. 8*

Effect	Estimate (SE)	t-value
Intercept	0.92(0.14)	**6.56**
Linear	0.57(0.58)	0.98
Quadratic	-0.27(0.36)	-0.76
Cubic	0.44(0.22)	**1.95**
Quartic	-0.21(0.18)	-1.16

Table A.36 *Results from the analysis of the eye-movement data over the full time window for the local antecedent in the o condition in monolinguals, Exp. 8*

Effect	Estimate (SE)	t-value
Intercept	1.20(0.11)	**10.74**
Linear	1.45(0.45)	**3.23**
Quadratic	-0.49(0.32)	-1.56
Cubic	0.35(0.23)	1.50
Quartic	-0.27(0.14)	**-1.93**

Table A.37 *Results from the analysis of the eye-movement data over the full time window for the non-local antecedent in the o condition in monolinguals, Exp. 8*

Effect	Estimate (SE)	t-value
Intercept	1.18(0.10)	**11.39**
Linear	1.10(0.47)	**2.37**
Quadratic	0.42(0.31)	1.38
Cubic	0.05(0.28)	0.17
Quartic	0.08(0.17)	0.44

Table A.38 *Results from the analysis of the eye-movement data over the full time window for the local antecedent in the kendi condition in HSs, Exp. 8*

Effect	Estimate (SE)	t-value
Intercept	1.49(0.08)	**17.63**
Linear	1.71(0.38)	**4.51**
Quadratic	-0.16(0.16)	-1.00
Cubic	-0.35(0.18)	**-1.88**
Quartic	0.13(0.09)	1.49

Table A.39 *Results from the analysis of the eye-movement data over the full time window for the non-local antecedent in the kendi condition in HSs, Exp. 8*

Effect	Estimate (SE)	t-value
Intercept	1.07(0.13)	**8.16**
Linear	-0.67(0.54)	-1.26
Quadratic	-0.26(0.30)	-0.89
Cubic	-0.31(0.22)	-1.37
Quartic	0.00(0.16)	0.02

Table A.40 *Results from the analysis of the eye-movement data over the full time window for the local antecedent in the kendisi condition in HSs, Exp. 8*

Effect	Estimate (SE)	t-value
Intercept	1.49(0.10)	**15.04**
Linear	1.30(0.37)	**3.48**
Quadratic	0.19(0.26)	0.75
Cubic	-0.07(0.07)	-1.00
Quartic	-0.11(0.12)	-0.97

Table A.41 *Results from the analysis of the eye-movement data over the full time window for the non-local antecedent in the kendisi condition in HSs, Exp. 8*

Effect	Estimate (SE)	t-value
Intercept	1.25(0.12)	**10.56**
Linear	-0.48(0.38)	-1.26
Quadratic	-0.35(0.17)	**2.08**
Cubic	-0.21(0.21)	-1.00
Quartic	0.32(0.11)	**2.86**

Table A.42 *Results from the analysis of the eye-movement data over the full time window for the local antecedent in the o condition in HSs, Exp. 8*

Effect	Estimate (SE)	t-value
Intercept	1.36(0.12)	**11.27**
Linear	1.40(0.40)	**3.53**
Quadratic	-0.20(0.27)	-0.76
Cubic	0.29(0.08)	**3.48**
Quartic	0.00(0.06)	0.02

Table A.43 *Results from the analysis of the eye-movement data over the full time window for the non-local antecedent in the o condition in HSs, Exp. 8*

Effect	Estimate (SE)	t-value
Intercept	1.12(0.15)	**7.57**
Linear	1.11(0.48)	**2.30**
Quadratic	-0.30(0.23)	-1.33
Cubic	-0.18(0.18)	-0.99
Quartic	0.36(0.15)	**2.39**

A.2.9 Exp. 8: Eye-movement analysis of 500 ms time windows separately for group, anaphor and antecedent

Table A.44 *Results from the empirical logit analysis of the eye-movement data with 500 ms time windows in monolinguals, Exp. 8*

	Local				Non-local			
Anaphor and time window	Intercept		Linear		Intercept		Linear	
kendi	Estimate(SE)	t	Estimate(SE)	t	Estimate(SE)	t	Estimate(SE)	t
200-700ms	1.84(0.45)	**4.12**	5.94(2.46)	**2.41**	0.18(0.47)	0.38	-2.61(1.95)	-1.34
700-1200ms	1.43(0.12)	**12.18**	1.83(0.57)	**3.22**	0.72(0.22)	**3.32**	-0.58(1.63)	-0.36
1200-1700ms	1.19(0.17)	**6.84**	3.88(1.03)	**3.76**	0.33(0.27)	1.20	1.11(2.12)	0.52
1700-2200ms	1.45(0.16)	**8.88**	0.62(0.40)	1.57	-0.40(0.50)	-0.81	7.29(1.82)	**4.01**
kendisi	Estimate(SE)	t	Estimate(SE)	t	Estimate(SE)	t	Estimate(SE)	t
200-700ms	1.59(0.13)	**12.36**	1.30(0.47)	**2.76**	0.99(0.33)	**2.96**	1.51(1.34)	1.13
700-1200ms	1.35(0.13)	**10.00**	0.30(0.38)	0.80	0.86(0.21)	**4.06**	-0.36(1.59)	-0.23
1200-1700ms	1.48(0.12)	**12.34**	1.56(0.52)	**2.99**	0.69(0.23)	**3.02**	0.41(1.21)	0.33
1700-2200ms	1.63(0.10)	**16.50**	-0.02(0.32)	-0.05	0.35(0.41)	0.85	2.99(1.51)	**1.98**
o	Estimate(SE)	t	Estimate(SE)	t	Estimate(SE)	t	Estimate(SE)	t
200-700ms	1.27(0.39)	**3.23**	2.28(1.94)	1.17	1.07(0.19)	**5.58**	-0.31(0.58)	-0.53
700-1200ms	1.22(0.16)	**7.59**	1.17(0.95)	1.24	0.69(0.24)	**2.93**	-0.58(1.67)	-0.35
1200-1700ms	0.87(0.22)	**3.97**	5.11(1.26)	**4.07**	1.16(0.16)	**7.12**	1.44(1.00)	1.43
1700-2200ms	1.71(0.10)	**17.97**	-0.95(0.49)	**-1.92**	0.82(0.27)	**3.02**	3.21(0.93)	3.44

Note. Marginal or significant effects are boldfaced.

Table A.45 *Results from the empirical logit analysis of the eye-movement data with 500 ms time windows in HSs, Exp. 8*

	Local				Non-local			
Anaphor and time window	Intercept		Linear		Intercept		Linear	
kendi	Estimate(SE)	t	Estimate(SE)	t	Estimate(SE)	t	Estimate(SE)	t
200-700ms	1.68(0.12)	**14.53**	2.45(0.60)	**4.06**	1.26(0.15)	**8.23**	0.17(0.44)	0.40
700-1200ms	1.48(0.10)	**15.07**	3.63(0.99)	**3.65**	1.03(0.18)	**5.73**	0.50(0.49)	1.02
1200-1700ms	1.80(0.03)	**61.85**	0.27(0.33)	0.81	0.95(0.19)	**5.05**	1.11(1.28)	0.87
1700-2200ms	1.82(0.07)	**27.52**	0.09(0.31)	0.30	0.85(0.25)	**3.37**	0.02(0.56)	0.03
kendisi	Estimate(SE)	t	Estimate(SE)	t	Estimate(SE)	t	Estimate(SE)	t
200-700ms	1.60(0.12)	**12.86**	1.55(0.48)	**3.21**	0.52(0.34)	1.52	-3.55(1.01)	**-3.51**
700-1200ms	1.39(0.13)	**10.49**	1.46(0.52)	**2.81**	1.52(0.08)	**18.94**	2.48(0.91)	**2.72**
1200-1700ms	1.51(0.14)	**10.71**	0.66(0.37)	**1.78**	1.26(0.15)	**8.60**	0.14(0.45)	0.31
1700-2200ms	1.83(0.06)	**29.59**	0.03(0.28)	0.12	0.86(0.38)	**2.29**	0.60(1.65)	0.36
o	Estimate(SE)	t	Estimate(SE)	t	Estimate(SE)	t	Estimate(SE)	t
200-700ms	1.46(0.13)	**11.03**	2.02(0.65)	**3.11**	0.26(0.35)	0.74	-2.74(0.95)	**-2.88**
700-1200ms	1.34(0.13)	**9.95**	-0.64(0.46)	-1.38	1.09(0.18)	**6.00**	0.40(1.13)	0.35
1200-1700ms	1.21(0.18)	**6.72**	3.79(1.09)	**3.46**	1.45(0.12)	**12.55**	-1.55(0.51)	**-3.01**
1700-2200ms	1.75(0.07)	**24.18**	0.32(0.33)	0.97	1.34(0.17)	**8.04**	0.24(0.38)	-0.64

Note. Marginal or significant effects are boldfaced.

A.2.10 Exp. 8: Click analysis within the HS group for each anaphor separately

Table A.46 *Results from the individual differences analysis of the comprehension questions in Exp. 8 in the kendi condition*

Fixed Effect	Estimate (SE)	z-value
Intercept	-1.81(0.25)	**-7.27**
TELC	0.01(0.06)	0.10

Note. Marginal or significant effects are boldfaced.

Table A.47 *Results from the individual differences analysis of the comprehension questions in Exp. 8 in the kendisi condition*

Fixed Effect	Estimate (SE)	z-value
Intercept	-0.82(0.31)	**-2.62**
TELC	0.13(0.08)	**1.70**

Note. Marginal or significant effects are boldfaced.

Table A.48 *Results from the individual differences analysis of the comprehension questions in Exp. 8 in the o condition*

Fixed Effect	Estimate (SE)	z-value
Intercept	5.01(1.40)	**3.57**
TELC	0.08(0.11)	0.74

Note. Marginal or significant effects are boldfaced.

KNOSPE, GLORIA - MONA
Name, Vorname

Erklärungen zur Dissertationsschrift mit dem Thema:

PROCESSING OF PRONOUNS AND REFLEXIVES IN TURKISH-GERMAN BILINGUALS

1. Ich erkläre, an keiner anderen Hochschule ein Promotionsverfahren eröffnet zu haben.

Datum Unterschrift

2. Ich erkläre, dass die Dissertation in der gegenwärtigen Fassung keiner anderen Hochschule zur Begutachtung vorgelegen hat oder vorliegt.

Datum Unterschrift

3. Ich erkläre, dass die Arbeit selbständig und ohne Hilfe Dritter verfasst wurde und bei der Abfassung alle Regelungen guter wissenschaftlicher Standards eingehalten wurden.

Datum Unterschrift