Binding and quantification in monolingual and bilingual language acquisition

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Margreet van Koert

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This thesis investigates monolingual and bilingual children's understanding of the interaction between quantifiers and binding. The quantifiers that are examined in the present studies are *all*, *each* and especially *every* in Dutch and in English. The binding phenomena studied in this dissertation pertain to reflexives and pronouns and their antecedents. These antecedents are either referential NP expressions, such as *the kangaroo*, or quantified NP expressions, such as *every sheep*.

A new explanation is presented to convey monolingual Dutch and English children's behaviour on binding tasks. Whereas the standard binding account can only partly explain English children's performance, the current explanation can account for both the English children's and the Dutch children's performance. Monolingual Dutch children are revealed to have a distributive interpretation preference of the quantifiers, while English children prefer the collective reading of *every*. The present thesis shows that their diverging quantifier preferences affect their binding performance on sentences containing local quantified NP antecedents.

This new explanation also holds for bilingual children. The studies conducted in this dissertation found that English-Dutch bilingual children differ from their monolingual peers regarding their quantifier interpretation preferences. In line with the proposed explanation, these bilingual children also behave differently from their monolingual peers with regard to sentences containing local quantified NP antecedents. Thus, this thesis shows that there is an interaction between children's understanding of binding and their preferential quantifier interpretations.

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My interest in linguistics was sparked long ago – was it when I explained *'t kofschip* to a friend? Or was it when I discovered that Latin had cool suffixes to mark case? – and at the end of this four-year project, it feels like I started my PhD a long time ago, too. There are lots of people who helped me succeed in applying for this PhD, who supported me throughout the course of this project and who encouraged me at the end of it. I want to thank all of you for your help, support and inspiration. I am truly sorry if I left someone out.

First of all, I would like to express my gratitude to Fred Weerman, Aafke Hulk and Olaf Koeneman, who supervised this PhD project. Aafke, it was you who first thought that I was the right candidate for this project. We met at the *TiN-dag* in Utrecht and you immediately introduced me to Olaf and Fred. I have since found out that this is your work method: you do things right away. I will admit that I sometimes felt discouraged by your immediate feedback on my work, but I will also gladly acknowledge that your comments improved my writing. On a meta-level you made sure I gave myself a time-out when I needed it. Thank you, Aafke, for implicitly teaching me all of this and much more. Olaf, in the beginning of this project I did not know much about binding. It was our weekly meetings that spurred me on to read more articles and to understand them better. Despite the distance between Nijmegen and Amsterdam, we kept meeting regularly to discuss things. You always made sure that I had students to collect data with, which made testing a lot easier, but which also created an opportunity for me to learn how to supervise. Skills that will likely come in handy for my further career. Thank you for giving me critical feedback and making me aim higher. Fred, whenever I had the tendency of losing myself in all the details, you were the one who advised me to take on a more efficient approach. This applied to my writing, my experiments, my analyses and my presentations. You also provided me with the opportunity to teach. Moreover, you ensured that I felt like being part of the Dutch department. I am thankful for all of that.

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These past four years I have been part of the Dutch department. There are so many things I learnt there; hence, I owe a great thanks to my senior (former) colleagues at the Dutch department: Suzanne Aalberse, Sible Andringa, Catherine van Beuningen, Elma Blom, Jan Don, Lotte Hogeweg, Folkert Kuiken, Jeannette Schaeffer, Nada Vasic and Hedde Zeijlstra for their scientific and education-related input. I think I have spoken to each and every one of you at some point during my PhD; either because I needed help with my statistical

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List of abbreviations

2L1	simultaneous/early sequential bilingual acquisition
3	third person
ACC	accusative
ADV	adverb
CDPH	collective / distributive preference hypothesis
DPBE	delay of Principle B effect
GEN	genitive
INF	infinitive
IQA	inversed quantificational asymmetry
L1	first or monolingual language
L2	second language
NP	noun phrase
OBJ	object
PAST	past
POSS	possessive
PP	prepositional phrase
PRES	present
PST	picture selection task
PVT	picture verification task
QA	quantificational asymmetry
QP	quantified noun phrase
SE	simple expression
SES	social economic status
SG	singular
SUBJ	subject
TVJT	truth value judgment task

Author contributions

Chapter 1
van Koert, Margreet.

Chapter 2
van Koert, Margreet, Olaf Koeneman, Fred Weerman & Aafke Hulk. 2015. The quantificational asymmetry: A comparative look. *Lingua* 155. 140-154.

Van Koert, Koeneman, Weerman and Hulk posed the research question of whether Dutch children show the same behaviour on binding tasks as English children. In order to answer this research question, Van Koert carried out an experimental study, which was a replication study based on Marinis & Chondrogianni (2011). Van Koert applied for approval from the Ethical Committee and recruited the participants. Van Koert ran the experiment. The results were statistically analysed by Van Koert. Van Koert wrote the first version of the text. This was discussed during several supervision meetings. On the basis of valuable feedback from Koeneman, Weerman and Hulk, Van Koert rewrote and revised this manuscript into its final, published form.

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Van Koert, Hulk, Koeneman and Weerman posed the research question of whether Turkish-Dutch bilingual children resemble their monolingual Dutch peers or whether they resemble their Turkish-English bilingual peers in a binding task. In order to answer this research question, Van Koert carried out an experimental study, which was a replication study based on Marinis & Chondrogianni (2011). Van Koert applied for approval from the Ethical Committee and recruited the participants. Van Koert ran the experiment. The results were statistically analysed by Van Koert. Van Koert wrote the first version of the text. This was discussed during several supervision meetings. On the basis of valuable feedback from Koeneman, Weerman and Hulk, Van Koert

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Chapter 5

van Koert, Margreet, Olaf Koeneman, Aafke Hulk & Fred Weerman. (to appear). Revisiting binding in Turkish-Dutch bilingual children: comprehension and production. In Sabrina Mossman (ed.), *Proceedings of the 13th Generative Approaches to Second Language Acquisition* [GASLA 13]. Cascadilla Press, Somerville, MA.

Van Koert, Koeneman, Hulk and Weerman posed the research question of whether younger Turkish-Dutch bilingual children would show a delay in comparison to their monolingual Dutch age-matched peers. These children are younger than the children tested in Chapters 2 and 4. Furthermore, Van Koert wondered whether Turkish-Dutch bilingual children would behave differently from their monolingual Dutch peers on a production task. With valuable input from Koeneman, Hulk and Weerman, Van Koert designed the stimuli for the comprehension and the elicited production task. Van Koert applied for approval from the Ethical Committee and recruited the participants. Van Koert ran the experiment. In addition, Koeneman and Van Koert supervised a MA student, who is a native speaker of Turkish and who carried out a Turkish replication study of the experiments reported on in Chapters 2 and 4. The results of these three experiments were statistically analysed by Van Koert. Van Koert wrote the first version of the text. This was discussed during several supervision meetings. On the basis of valuable feedback from Koeneman, Weerman and Hulk, Van Koert rewrote and revised this manuscript into its final, accepted form.

Chapter 6

van Koert, Margreet, Olaf Koeneman, Aafke Hulk & Fred Weerman. (submitted). English-Dutch bilingual children's interpretation of object pronouns and reflexives and their interpretation of quantified subjects.

Van Koert, Koeneman, Hulk and Weerman posed the research question of whether English-Dutch bilingual children would behave similarly to or differently from their monolingual Dutch and English peers on the binding task and on their quantifier interpretation preferences. With valuable input from Koeneman, Hulk and Weerman, Van Koert designed the stimuli for the task measuring children's quantifier interpretation preferences. In order to answer the question regarding binding, Van Koert carried out the same comprehension study as reported on in Chapters 2 and 4. Van Koert applied for approval from the Ethical Committee and recruited the participants. Van Koert ran the experiment. The results were statistically analysed by Van Koert. Van Koert wrote the first version of the text. This was discussed during several supervision meetings. On the basis of valuable feedback from Koeneman, Weerman and Hulk, Van Koert rewrote and revised this manuscript into its

current form.

Chapter 7
van Koert, Margreet.

The first letter was a ‘w’, the second an ‘e’. Then there was a gap. An ‘a’ followed, then a ‘p’, an ‘o’ and an ‘l’. Marvin paused for a rest. After a few moments they resumed and let him see the ‘o’, the ‘g’, the ‘i’, the ‘s’ and the ‘e’. The next two words were ‘for’ and ‘the’. The last one was a long one, and Marvin needed another rest before he could tackle it. It started with ‘i’, then ‘n’ then a ‘c’. Next came an ‘o’ and an ‘n’, followed by a ‘v’, an ‘e’, another ‘n’ and an ‘i’. After a final pause, Marvin gather his strength for the last stretch. He read the ‘e’, the ‘n’, the ‘c’ and at last the final ‘e’, and staggered back into their arms.

(From: Douglas Adams, *The Hitchhiker’s guide to the galaxy*,
Revised and reset omnibus edition, 2002, pp. 762-763)

Chapter 1
Introduction

Children acquire one, two or even multiple languages effortlessly. One of the tasks they face in performing this feat is learning the interpretation of words. Words can contain much lexical content, such as the referential expression *Tom* that points to a specific person, or little, such as the reflexive *himself* or the pronoun *him*, which are unspecific. At first glance, it might seem surprising that natural languages contain words that do not carry much meaning. However, to avoid continuous repetition of the same referential expressions, elements such as reflexives and pronouns are necessary, because they can refer to those expressions. Compare (1) and (2).

(1) Tom congratulated Tom with the victory but Harry avoided Tom.

(2) Tom congratulated himself with the victory but Harry avoided him.

The example given in (1) is more difficult to understand than the example in (2), precisely because of the repetitions of referential expressions.

In addition, children need to learn that words can denote specific individuals, such as *driver*, as well as quantities of individuals, such as *every driver*. Again this is useful, as listing each member of a group is quite time-consuming, compare (3) and (4).

(3) Lewis, Nico, Sebastian, Valtteri, Kimi, Felipe, etc. entered the race.

(4) Every driver entered the race.

The example presented in (3) is more cumbersome than the one given in (4), due to the list of names, which is summarised by a quantifier, *every*, in (4).

The focus of this dissertation is on monolingual and bilingual children's understanding of reflexives, pronouns and quantifiers. Section 1.1 briefly discusses reflexives and pronouns and Section 1.2 relates the relevant findings and unanswered questions regarding quantifiers. Whilst the first sections only consider monolingual language acquisition, Section 1.3 discusses child bilingualism. The research questions of this dissertation are listed in Section 1.4. Finally, Section 1.5 provides an outline of the dissertation.

1.1. Binding

Binding concerns the part of grammar that assigns appropriate interpretations to reflexives, pronouns and referential expressions. Referential expressions are also known as noun phrases (NPs). Since reflexives and pronouns have less

referential content than NPs, they receive their interpretation from NP antecedents, i.e. referential expressions that occur earlier in the sentence or in the ongoing discourse. *Himself*, for example, carries no precise referential information apart from that it refers to a single male person; it could refer to any Tom, Dick or Harry. Likewise, *him* by itself does not specify a particular person; it is only in context, such as in (2), reprised here in (5), that it receives an exact meaning.

(5) Tom congratulated himself with the victory but Harry avoided him.

In (5) both *himself* and *him* refer to the NP antecedent *Tom*.

To capture the behaviour of reflexives and pronouns the Binding Theory was formulated in the 1980s (Chomsky, 1981). Simplistically put, reflexives refer to the NP antecedent within the same finite clause (Principle A).[1] Hence, in (5) *himself* refers to *Tom*, because *Tom* appears in the same clause as *himself*. Pronouns, by contrast, cannot refer to an NP antecedent that occurs in the same clause (Principle B); thus, *him* in (5) cannot refer to *Harry*, because it is too close to *him*. On this analysis, reflexives and pronouns are in complementary distribution, which is what (5) shows. This is, however, not always the case, as there are contexts in which both the reflexive as well as the pronoun can occur in the same position. More importantly, all things being equal, the Binding Theory does not expect any differences between the acquisition of pronouns and reflexives, as it considers Principles A and B to be similar in complexity. Child language research in the 1980s and 1990s revealed that this premise could not be upheld, as it was found that:

(a) Children acquiring languages such as Dutch, English, Icelandic and Russian comprehend pronouns more poorly than they do reflexives; this is called the delay of Principle B effect (Avrutin & Wexler, 1992; Chien & Wexler, 1990; Deutsch & Koster, 1982; Deutsch, Koster & Koster, 1986; Grimshaw & Rosen, 1990; Koster, 1993; McDaniel, Cairns & Hsu, 1990; Philip & Coopmans, 1996; Sigurjónsdóttir & Hyams, 1992; Spenader, Smits & Hendriks, 2009; Wexler & Chien, 1986, *inter alios*).

(b) Children from certain language backgrounds, e.g. children acquiring Romance languages, do not show the delay of Principle B effect; thus, they perform differently from children acquiring languages such as Dutch, English, Icelandic and Russian, (Avrutin & Wexler, 1992; Baauw, 2002; Hestvik & Philip, 1999/2000; Jakubowicz, 1993; McKee, 1992; Ruigendijk, Friedmann, Novogrodsky & Balaban, 2010; Ruigendijk, Baauw, Zuckerman, Vasić, de Lange & Avrutin, 2011, *inter alios*).

[1] A very simplified version of Principles A and B is given here for ease of exposition. For a more truthful description, see Section 2.2 of Chapter 2. For all the details, see Chomsky (1981).

Hence, there are language-specific differences in the acquisition of binding that cannot be explained straightforwardly by Principles A and B.

The acquisition of binding is language-specific to the extent that children in some languages show no delay of the acquisition of pronouns, e.g. children acquiring Romance languages, and children acquiring other languages do. The delay in the acquisition of pronouns is considered relative to children's acquisition of reflexives: hence, the term *the delay of Principle B effect*.[2] Explanations for why children acquiring some languages show a delay of Principle B effect typically entail language-internal aspects: complementarity of reflexives and pronouns (Ruigendijk et al., 2010), morphological transparency (Rooryck & Vanden Wyngaerd, 2011; Rooryck & Vanden Wyngaerd, 2014), difficulty with morphosyntactic features (Baauw, 2002; Baauw & Cuetos, 2003), et cetera.

Asymmetries are not only observed between reflexives and pronouns, they are also seen between NP antecedents and antecedents containing a quantifier, viz. QP antecedents. Chien and Wexler (1990) found that children performed more target-like on sentences such as (6), which contains a QP antecedent *every bear*, than on sentences such as (7), which has an NP antecedent *Mama Bear*.

(6) These are the bears; this is Goldilocks. Is every bear touching her?

(7) This is Mama Bear; this is Goldilocks. Is Mama Bear touching her?
(Chien & Wexler, 1990, p. 262-263)

Languages in which children perform well on (7) cannot show this asymmetry, as it is only those languages that show a delay of Principle B effect, i.e. languages in which children perform much worse on pronouns than on reflexives, in which children are supposedly aided by the quantifier and, hence, show an asymmetry between (6) and (7). This asymmetry is referred to as the quantificational asymmetry (Elbourne, 2005), as it is an asymmetry between NP and QP antecedents. Although it is often implied that all delay of Principle B languages should show a quantificational asymmetry, experimental studies into other languages than English have found mixed results (for Dutch: Drozd & Koster, 1999; Philip & Coopmans, 1996; for Russian: Avrutin & Wexler, 1992). The question that is addressed in this dissertation is whether the quantificational asymmetry can be found in a delay of Principle B effect language like Dutch.

Finally, the acquisition of binding has been studied within a wide range of experimental methods. Several offline methods, such as the act-out task (cf. Chien & Wexler, 1990, Experiments 1-3; Koster, 1993), the truth value judgment task (cf. Conroy, Takahashi, Lidz & Phillips, 2009; Thornton & Wexler,

[2] The delay of Principle B effect is sometimes referred to as the pronoun interpretation problem (Baauw & Cuetos, 2003; Spenader et al., 2009; Koster, Hoeks & Hendriks, 2011, *inter alios*). Throughout this dissertation the term delay of Principle B effect or its abbreviation DPBE will be used.

1999), the picture selection task (cf. Ruigendijk et al., 2010) and the picture verification task (cf. Chien & Wexler, 1990, Experiment 4; van der Lely & Stollwerck, 1997), have been used to measure children's comprehension of reflexives and pronouns. Yet, it is not just the elicitation method that differed across studies, the saliency of the referents and the discourse structure of the test sentences also varied. It has been claimed that the delay of Principle B effect and the quantificational asymmetry are methodological artefacts (Conroy et al., 2009; Spenader et al., 2009), but if the same task reveals these effects in one language but not in the other, then methodology can at most be a secondary issue but not the core explanation. The present dissertation employs the same picture verification task in Dutch and English and compares and contrasts the children's results.

1.2. Quantifiers

Some of the children acquiring delay of Principle B effect languages behave differently on sentences containing QP antecedents than on sentences with NP antecedents; in other words, they show the quantificational asymmetry. For instance, English children display more target-like behaviour on sentences with QP antecedents and object pronouns, as in (6), than on sentences containing NP antecedents and object pronouns, as in (7) (Chien & Wexler, 1990). Yet, Dutch and Russian children do not seem to show a quantificational asymmetry (Avrutin & Wexler, 1992; Drozd & Koster, 1999; Philip & Coopmans, 1996). In this dissertation, we wonder whether there are language-specific aspects to quantification that may clarify when the quantificational asymmetry arises, similar to the language-specific characteristics that can explain why some languages show a delay of Principle B effect and others do not.

Quantifiers are words such as *every*, *a* and *some* (Beghelli & Stowell, 1996; Heim & Kratzer, 1998). They do not select a specific referent but refer to the whole of a certain set in a given context. For example, in (4) the quantified expression *every driver* does not denote one specific driver but instead refers to the whole of the set of drivers in that particular race. When two quantified expressions appear in one sentence, they interact, causing two interpretations of the predicate to be available. For instance, in (8) there is the universal quantified expression *every driver* and the existential quantified expression *a car*.

(8) Every driver built a car.

The predicate *built a car* is ambiguous between a collective and a distributive interpretation. Simply put, a collective interpretation of (8) entails that the whole set of drivers (in that particular context) together built one car. This reading comes about when the existential quantified expression *a car* receives a singleton interpretation. In that case, there is one joint building event (May, 1982; Tunstall, 1998). By contrast, the distributive interpretation of (8) entails that each single driver built one car, as there are multiple building events (May,

1982; Tunstall, 1998). This reading occurs when *a car* receives a distributed interpretation.

Many languages have universal and existential quantified expressions, meaning that both the collective and distributive interpretation (of the translation equivalent) of (8) are in principle possible. Indeed, English adults and children accept collective as well as distributive interpretations of sentences such as (8) (Crain, Thornton, Boster, Conway, Lillo-Martin & Woodams, 1996; Ionin, 2010). Likewise, Dutch adults and children accept both the collective and the distributive readings of sentences such as (9) (Hendriks, Koops van 't Jagt & Hoeks, 2012).

(9) Elke coureur heeft een auto in elkaar gezet.
Each/every driver has a car in one another put
' Every driver built a car.'

Thus, it would seem that there are no language-specific characteristics to quantification that could explain why English children perform differently from Dutch children on QP conditions in binding tasks. Yet, there are. It certainly is not the case that every quantifier is as liable to receive a distributive or a collective interpretation. Each quantifier has inherent characteristics that make it more or less likely to have a distributive or a collective interpretation (Ioup, 1975). Furthermore, although the collective and the distributive interpretation are in principle available for sentences such as (8) and (9), where the predicate is ambiguous, one interpretation is typically preferred to the other. The question pursued in this dissertation is whether English favours a different interpretation from Dutch.

Much research has been done into children's comprehension of quantifiers. It was found that children as young as four understand collective and distributive interpretations of plural, numeral and quantificational expressions (Avrutin & Thornton, 1994; Guasti, 2002; Philip, 2005; Roeper & de Villiers, 1993; Syrett & Musolino, 2013). Despite there being such a bulk of research into children's understanding of quantifiers, only a few studies examined their quantifier interpretation preferences (e.g. for English: Achimova, Crosby, Syrett, Déprez & Musolino, 2013; Brooks & Braine, 1996; Novogrodsky, Yamakoshi & Roeper, 2013). These studies found that English children behave adult-like concerning their preferences for *all* but not for *each* (e.g. Brooks & Braine, 1996). It is unclear which interpretation they prefer for *every*. No studies have been carried out on Dutch; hence, the question addressed in this dissertation is which quantifier interpretation preferences Dutch children show and how they compare to English children.

Like reflexives and pronouns, quantified expressions are devoid of much lexical content and are typically ambiguous in their reference. Thus, when quantified expressions and reflexives or pronouns occur in a sentence together, they pose a challenge to children's comprehension. There are two ways to interpret a QP antecedent: either distributively or collectively. It may well be that the choice for one of these interpretations has repercussions for the

understanding of the reflexive or the pronoun. The question that is relevant to this dissertation is whether there is an interaction between the interpretation that children assign to quantifiers and the reflexive or pronoun occurring in the same clause.

1.3. Child bilingualism

The previous sections listed several issues for the acquisition of binding and that of quantifiers. Both binding and quantification involve theoretical and acquisitional questions, since delays, asymmetries and sensitivity to methodology have been found in experimental studies and these findings need to be incorporated by theories concerning binding and quantification. Up until this section these issues have been discussed within the context of monolingual language (L1) acquisition. In this dissertation we also explore what happens if another L1 is added. The question is whether our hypotheses for L1 acquisition also hold for bilingual children.[3] In other words, we wonder if the same interaction between binding and quantification will be found for bilingual children. And if so, the next question is whether it matters which language the other L1 is.

Having two languages from a very early age onwards adds to the complexity of acquiring language. Although bilingual children have been found to separate their languages from early onwards, if not from the beginning, (De Houwer, 1990; Genessee, 1989, *inter alios*), they have also been shown to display influence from one language onto the other in some domains (Hulk & Müller, 2000; Kupisch, 2007; Müller & Hulk, 2001; Nicoladis, 2002; Nicoladis & Gavrila, 2014; Serratrice, Sorace & Paoli, 2004; Serratrice, Sorace, Filiaci & Baldo, 2009; Sorace, Serratrice, Filiaci & Baldo, 2009; Yip & Matthews, 2007, *inter alios*). This type of influence is commonly labelled *cross-linguistic influence*. It can be found when a structure shows overlap in the two languages (Hulk & Müller, 2000; Müller & Hulk, 2001) and in areas of language where monolingual children display optionality (Foroodi-Nejad & Paradis, 2009).

Another explanation for the differences found between bilingual and monolingual children may be the quantity of input children receive. Input quantity is a much-debated topic with studies finding support for it (Sorace et al., 2009; Serratrice et al., 2009), studies finding no effect of it (Serratrice et al., 2004) and studies finding mixed results (Argyri & Sorace, 2007; Unsworth, Argyri, Cornips, Hulk, Sorace & Tsimpli, 2014).

The languages under investigation in this dissertation are Dutch, English and Turkish. The bilingual pair Turkish-Dutch is studied with regard to binding and is compared to a previous study investigating Turkish-English bilingual

[3] This dissertation does not distinguish between simultaneous bilingualism, viz. the child is exposed to two languages from birth onwards, and early sequential bilingualism, i.e. the child is exposed to one of the languages from birth and additionally to the other language from somewhere between his first and fourth birthday onwards (De Houwer, 2009). Whereas most of the English-Dutch bilingual children tested in this dissertation belong to the group of simultaneous bilingual children, most of the Turkish-Dutch bilingual children reported on in this dissertation belong to the group of early sequential bilingual children.

children (Marinis & Chondrogianni, 2011). Previously no differences were found between monolingual English and Turkish-English bilingual children; we examine whether this holds for Dutch, too, in a comparable bilingual setting with Turkish as the other language. Furthermore, Turkish-Dutch bilingual children receive less exposure to Dutch than their Dutch monolingual peers; hence, the question is whether they show a delay regarding their comprehension of binding in comparison to Dutch monolingual children.

The bilingual pair English-Dutch is examined within the contexts of binding and quantification. Since monolingual Dutch and English children have been shown to yield such diverging results with regard to QP antecedents in binding tasks, English-Dutch bilingual children are also an intriguing group to examine. The question is whether the English-Dutch bilingual children perform similarly to or different from their monolingual peers: if they behave differently, the question is whether this is due to cross-linguistic influence. This dissertation investigates whether there is a relation between children's quantifier interpretation preferences and their behaviour on binding tasks. If this holds for Dutch and English monolingual children, then it should be found for English-Dutch bilingual children as well. In other words, if their monolingual peers show a correlation, then English-Dutch bilingual children should also show correspondences between their quantifier interpretation preferences and their behaviour on QP antecedents and object pronouns.

1.4. Research questions

The main issue of this dissertation concerns language-specific preferences of quantifier interpretations in relation to a general binding theory and what role they play in (bilingual) language acquisition. Hence, the research questions addressed in this dissertation comprise:

(i) Do we find a quantificational asymmetry in Dutch children and how do we account for its presence or absence? (Chapter 2)

(ii) What are the quantifier interpretation preferences in monolingual Dutch and monolingual English? (Chapter 3)

(iii) What kind of interaction is there between binding and quantifier interpretation preferences? (Chapters 2 and 3)

(iv) What kind of interaction is there between binding and quantifier interpretation preferences in bilingual children? (Chapters 4, 5 and 6)

Research question (i) concerns the quantificational asymmetry. The aim is to determine whether the quantificational asymmetry can be found in monolingual Dutch and how it compares to the quantificational asymmetry in monolingual English. In order to directly compare the two languages an existing picture verification task (Marinis & Chondrogianni, 2011) is used. The presence

or absence of the quantificational asymmetry needs to be accounted for in a binding theory. Investigating the quantificational asymmetry may establish whether delay of Principle B effect languages, such as Dutch and English, show differences between them, which may be due to language-specific characteristics.

Research question (ii) involves children's quantifier interpretation preferences. It is investigated whether children show a preference for a certain interpretation, and if so whether they prefer the collective or the distributive reading, which is measured with a picture selection task. The purpose of this question is to establish monolingual Dutch and English children's behaviour regarding quantifier interpretation preferences. The answer provides insight into the acquisition of quantification from a perspective that has typically been overlooked: preferential interpretations.

Research question (iii) aims to investigate whether children's quantifier interpretation preferences influence their comprehension of binding. Specifically, this dissertation examines whether children acquiring different languages (Dutch and English) show diverging behaviours on QP antecedents and reflexives and on QP antecedents and pronouns. Addressing this question may help understand the similarities and differences between the delay of Principle B effect languages with regard to QP antecedents.

Research question (iv) considers binding from a different perspective, as it explores how Turkish-Dutch bilingual children fare on the comprehension of Dutch binding. The aim is to determine whether these Turkish-Dutch bilingual children behave similarly to or differently from their monolingual Dutch peers on the binding tasks. In addition, this research question concerns the interaction between binding and quantification from an English-Dutch bilingual perspective. It aims to examine whether and how the nature of the interaction changes for English-Dutch bilingual children. Answering this question may shed light on how input quantity relates to children's comprehension of binding and also on how children's acquisition of binding and their acquisition of quantifier interpretation preferences are interconnected.

1.5. Outline

The core of this dissertation consists of five empirical studies, the main conclusions of which are provided in the final chapter. Chapter 2 reports the findings of a binding study investigating the similarities and differences between Dutch and English. This study tests the classical binding approach and finds that interpretation preferences of quantified antecedents should be taken into account. Hence, Chapter 3 investigates the interpretation preferences of quantified subjects in a study testing monolingual Dutch and monolingual English children and adults. The results reveal that there are indeed differences between the monolingual Dutch children and the monolingual English children that can explain the previously found binding results. Diving into the intricacies involved with child bilingualism, Chapter 4 reports the findings of a Dutch binding study examining the similarities and differences between monolingual

Dutch and Turkish-Dutch bilingual children. Since these Turkish-Dutch bilingual children show similar behaviour to their monolingual Dutch peers, Chapter 5 contains a comprehension and production study that investigates the behaviour of significantly younger Turkish-Dutch bilingual and monolingual Dutch children. In addition, it describes the outcomes of a Turkish binding study into another group of Turkish-Dutch bilingual children. Chapter 6, then, presents the findings of two studies in which English-Dutch bilingual children are tested on binding and on their interpretative preferences regarding quantified subjects. Here, the results indicate that bidirectional cross-linguistic influence causes these bilingual children to perform very differently from their monolingual peers. Finally, Chapter 7 presents the overall conclusions of this dissertation.

Chapter 2

The quantificational asymmetry: a comparative look*

Abstract

The traditional account of the delay of Principle B effect (DPBE) predicts that all languages that show a DPBE will also reveal a quantificational asymmetry (QA). Children's performance on object-pronouns must therefore improve when a QP subject replaces the NP subject. These QA results have been obtained in English (modulo methodological differences), but none of the few Dutch studies reliably revealed this effect. We used similar materials to Marinis and Chondrogianni (2011) who used a test that induced both a DBPE and a QA in English; hence, we compared their results (n=33, 6;0-9;0) to ours (n=29, 6;3-9;1) on the same task. The comprehension experiment consists of biclausal sentences with noun phrase (NP) and quantified noun phrase (QP) antecedents and object pronouns and reflexives. Both Dutch and English children show a DPBE, i.e. they have problems with correctly interpreting object-pronouns, because they frequently accept interpretations in which the object pronoun is co-identified with the NP subject. However, only English children's performance reveals a QA, which the Dutch children do not show, as they perform similarly on NP and QP subjects. Interestingly, a similar contrast is found for object reflexives: where the English children's performance worsens when a QP subject replaces the NP subject, the Dutch children's scores are target-like on both subject types. These contrasts suggest that all children allow locally bound pronouns and reflexives (as suggested by Spenader, Smits & Hendriks, 2009) and that it is their quantifier reading preferences that determine how the object pronoun or object reflexive is understood. We hypothesise that these quantifier readings are language-specific: Dutch children prefer a distributive reading for QPs, which induces a bound pronoun interpretation; English children prefer a collective reading, which forbids a bound pronoun interpretation.

2.1. Introduction

In the 1990s several studies showed that English-speaking children often incorrectly accept co-identification between object pronouns and local c-commanding referential noun phrase antecedents (1). These same children correctly reject co-identification between object pronouns and local c-

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commanding quantified noun phrase antecedents (2). The ameliorating effect of QP subjects is known as the quantificational asymmetry (Elbourne, 2005).

(1) The boy$_i$ scratched him$_i$. [incorrect acceptance]

(2) Every boy$_i$ scratched him$_i$. [correct rejection]

Explanations of the quantificational asymmetry predict that this phenomenon should be found in all languages in which children perform poorly on (1) (cf. Chien & Wexler, 1990). In the literature, several indications can be found that this prediction does not hold (for Russian: Avrutin & Wexler, 1992; for Dutch: Drozd & Koster, 1999), but until now a systematic comparison of the quantificational asymmetry in two different languages has not been made. In this chapter we will do exactly that: we will present experimental evidence from Dutch children, who show a significantly different behaviour from English children tested in precisely the same way (Marinis & Chondrogianni, 2011) and we will discuss in detail the theoretical consequences of the apparent language-specific character of the quantificational asymmetry.

The chapter is organised as follows: in Section 2.2, we report the main empirical findings with regard to the acquisition of reflexives and pronouns. The research questions are formulated in Section 2.3 and the present study is described together with its participants, method and procedures. Subsequently, in Section 2.4 the statistical results are presented. Then, in Section 2.5, we provide an account for these results by hypothesizing that children have preferred readings for universal quantifiers, with English children preferring a collective interpretation for *every* and Dutch children preferring a distributive interpretation for *elk* ('every'). These preferences explain the differences between these two learner groups. Section 2.6 concludes the chapter and offers some suggestions on where these different preferences may come from.

2.2. Acquisition of the binding principles

Generally, object reflexives show a different distribution from object pronouns (cf. (3) and (4)) and their different behaviour is captured by the binding principles (Chomsky, 1981). Whereas Principle A states that reflexives must be bound by their local c-commanding antecedents, as in (3), Principle B states that pronominals cannot be bound by their local c-commanding antecedents, as in (4).

(3) The hippo$_i$ says the seahorse$_j$ is washing himself$_{*i/j}$.

(4) The hippo$_i$ says that the seahorse$_j$ is washing him$_{i/*j/k}$.

In (3), the reflexive *himself* can only be bound by its local antecedent, *the seahorse*, but not by the subject of the matrix clause, *the hippo*. In (4), on the other hand, the pronoun *him* cannot be bound by its local antecedent, *the*

seahorse, but can be co-identified with the subject in the matrix clause or with an antecedent outside of the sentence. The possible co-identification relations for *himself* and *him* are expressed by co-indexation.

In Section 2.2.1 we will look at the basic empirical results obtained in previous studies on the acquisition of binding. Subsequently, Section 2.2.2 will discuss the experiments that induced these findings.

2.2.1. Basic empirical findings

Language acquisition studies found two remarkable phenomena whilst investigating children's comprehension of the binding principles: the delay of Principle B effect (DPBE) and the quantificational asymmetry (QA).

The term *DPBE* covers the finding that in some languages – such as English and Dutch – 4-year-olds perform well on Principle A conditions but that problems with Principle B persist until these children are 7 years old (cf. for English: Chien & Wexler, 1990; van der Lely & Stollwerck, 1997; Wexler & Chien, 1985; cf. for Dutch: Koster, 1993; Philip & Coopmans, 1996). For sentences such as (3), 4-year-olds correctly reject a non-local antecedent and correctly accept a local antecedent. For (4), children from 4 years onwards correctly accept a non-local antecedent and one occurring outside of the sentence; yet, rejecting the local antecedent for the pronoun is often problematic until they are 7. The acquisition of Principle B, in relation to Principle A, seems to be delayed by a few years, hence the coinage of the term DPBE. It refers to the errors children make on Principle B conditions, whilst at the same time performing correctly on Principle A. The standard explanation for the DPBE (cf. Chien & Wexler 1990) is to assume that children do know Principle B but that they use semantics to override Principle B. Children, in contrast to adults, have the antecedent and pronoun accidentally refer to the same individual. This difference between Principles A and B in performance is not found for children acquiring Romance languages (cf. for French: Jakubowicz, 1993; for Spanish: Baauw, 2002), German (Ruigendijk, Friedmann, Novogrodsky & Balaban, 2010), or Norwegian (Hestvik & Philip, 1999). In these languages, young children perform equally well on reflexives and pronouns, often scoring above 80% correct. This highlights the fact that the DPBE is a language-specific phenomenon that must be influenced by morpho-syntactic features of a particular language.

The QA is related to the DPBE, i.e. languages that show a DPBE are predicted to display a QA, too, see (1) and (2). The type of antecedent causes this asymmetry with respect to pronouns: whereas children incorrectly allow co-identification between the object pronoun *him* and the NP subject, they disallow co-identification when the local subject is a QP. The QA appears in many studies on the acquisition of English (Chien & Wexler, 1990; van der Lely & Stollwerck, 1997; Marinis & Chondrogianni, 2011), so that it is a relatively robust finding for English. The QA follows from Chien and Wexler's suggestion that children use semantics (accidental coreference) to override Principle B. Since QPs cannot refer to a unique referent, in contrast to object pronouns

(Baauw, 2002; Grodzinsky & Reinhart, 1993; Koster, 1993), children cannot use semantics (accidental coreference) to override Principle B when the antecedent is a QP. If so, the quantifier conditions show more clearly than the referential conditions that children reject a local antecedent for pronouns and therefore must have knowledge of Principle B. The details of such an analysis, as well as its implications, will be discussed in Section 2.5.1.

This analysis predicts that the QA is part of the acquisition of any language displaying a DPBE. However, the QA is much less robustly attested in Dutch. Although Philip and Coopmans (1996) claim that they found an asymmetry, the difference was small and the percentages of correct rejection much lower than found in the studies on English (36% correct rejection for NP vs. 53% correct rejection for QP antecedents). It is questionable how representative this result is (Baauw, 2002; Elbourne, 2005; Hamann, 2011). Drozd and Koster (1999) tested 7-year-olds on a Picture Verification Task and found no asymmetry and again very poor results on the two mismatch conditions (18% correct rejection for NP antecedents vs. 21% correct rejection for QP antecedents). They concluded that the interpretation of quantifiers plays a role in QA findings; yet, their evidence could not reveal which factor in the interpretation was vital. Given these conflicting results, the status of a QA in the acquisition of Dutch is unclear. If among the DPBE-languages the QA turns out to be a language-specific phenomenon (and we will argue that it indeed is), it falsifies the standard account's prediction that a DPBE in a language automatically leads to a QA, thereby casting doubt on the correctness of this proposal.

To sum up, whilst the DPBE is considered to be a language-specific phenomenon – occurring in some languages, but not in others – the status of the QA is less clear. We therefore aim to make a more direct comparison between English and Dutch children by looking at results yielded by the same test.

2.2.2. Tests inducing a DPBE and QA

Test design has played a pivotal role in discussions on the acquisition of binding. There is much debate on this in the acquisition literature on binding, focusing on such factors as elicitation method, saliency of the referents and the discourse structure. All in all, each methodology has its merits and its drawbacks. In the following we discuss two contemporary methodologies before we explain our choice.

Although a number of tests have elicited the DPBE (see Elbourne, 2005; Conroy, Takahashi, Lidz & Phillips, 2009 for overviews and discussion), Spenader, Smits and Hendriks (2009) show that in Dutch the DPBE disappears when the discourse is maximally transparent. They argue that ideally a pronoun refers to the active discourse topic. An example of such a discourse is given in (5) where *the crocodile* is the active discourse topic and the pronoun can therefore refer to it:

(5) This is the crocodile. The elephant is hitting him.

It is plausible, however, that the discourse set-up in (5) strongly biases co-identification with the non-local antecedent. If *him* does not refer to *the crocodile*, *the crocodile* would only be introduced but not be part of the event, which is pragmatically infelicitous. Co-identification between *the crocodile* and *him* would be a way of involving the former, so that each actor is included in the event. It might well be that this biasing discourse set-up leads children to correctly reject a mismatching sentence-picture pair but that it does not reveal children's knowledge about co-identification possibilities. Interestingly, when Spenader *et al.* included the introduction of *the elephant*, as in (6), they again found the classical DPBE results.

(6) This is the elephant. This is the crocodile. The elephant is hitting him.

Since both discourse set-ups in (5) and (6) are transparent, i.e. *the crocodile* is the active discourse topic when the child reaches the pronoun *him*, there should not be a difference regarding children's behaviour between (5) and (6). The fact that there is a difference seems to underpin the biasing effect of (5).

The QA in English is a disputed finding and it is elaborately discussed in Elbourne (2005), Conroy *et al.* (2009), and references in there. According to Conroy *et al.*, the research methodology is flawed in many of the binding studies, because in conditions such as (1), reprised in (7), the non-local antecedent is not sufficiently salient in the context and in conditions such as (2), repeated in (8), the non-local antecedent is too salient in the story.

(7) The boy_i scratched him_i.

(8) Every boy_i scratched him_i.

This means that children incorrectly accept (7), because they cannot have *him* refer to any other character than the local subject. For (8) children interpret *him* as referring not to the local subject but to the protagonist, who is typically a highly prominent character; hence, they correctly reject (8). These critiques are mainly aimed at stories in truth value judgment tasks, not at picture verification tasks (PVT), in which children have to judge whether the picture matches the sentence, because these lack context. In fact, Elbourne points out that the absence of context in PVTs prevents the creation of a bias toward an interpretation involving the protagonist.

In their own study (Experiment 1), Conroy *et al.* used a truth value judgment task in which children heard stories that were simultaneously acted out by the experimenter about three dwarves and three Smurfs who, for example, had to get painted. The same story was used for the NP and QP conditions; thus, there was no difference between the contexts for (7) and (8). According to Conroy *et al.* their test comprised the ideal methodology, for there was no bias towards any character in their set-up. Since they found neither a DPBE nor a QA, they concluded that children essentially apply Principles A and B correctly. Yet, close scrutiny of their test materials reveals that no explicit

reflexives were used in the stories, nor were there any test sentences probing the children's knowledge of reflexives. Moreover, the actions uttered in the stories were always disjoint (*I can paint you* or *Can you paint me?*) and expressed by the salient, disjoint pronouns: *I*, *me* and *you*. Together, these factors make it likely that the children in Conroy *et al.*'s study never fully activated reflexive actions. This may have created a significant bias against a non-reflexive interpretation of *him*, leading to apparent target-like behaviour. Since the DPBE essentially displays children's misunderstanding of pronouns as reflexives, a fair test should include both pronouns and reflexives, so that equal activation is guaranteed. Thus, we can tap into children's knowledge of pronouns and reflexives.

Overall it is unclear whether the criticisms raised against the PVT are warranted. In addition, it seems likely that the alternative tests proposed by Spenader *et al.* and Conroy *et al.* contained biases themselves and that because of these biases no DPBE or QA showed up.

If our aim is to compare English and Dutch children on the DPBE and QA in a direct way, i.e. by using the same test, we need a picture-based methodology that is known to elicit these effects at least in English. One such test is the A-STOP-R test (van der Lely, 1997).[1] Using this test, Marinis and Chondrogianni (2011) recently obtained QA results with test sentences in which two plausible antecedents for the object reflexives and object pronouns are introduced. Conditions for NP and QP antecedents were similar, as in (3) and (4) which are reprised in (9) and (10), so that there was no difference other than the use of the NP or QP.

(9) The hippo$_i$ says the seahorse$_j$ is washing himself$_{*i/j}$.

(10) The hippo$_i$ says that the seahorse$_j$ is washing him$_{i/*j/k}$.

Apart from the QA findings, Marinis and Chondrogianni found that children performed more poorly on mismatching sentences with QP subjects and object reflexives (11) than on NP subjects and object reflexives (9).

(11) The hippo$_i$ says every seahorse$_j$ is washing himself$_{*i/j}$.

They labelled this result the *inversed quantificational asymmetry* (IQA), because here the quantifier hinders rather than stimulates an adult-like interpretation. This finding was somewhat unexpected, as Principle A is assumed to be firmly in place in children; hence, they should show target-like behaviour on reflexives across all types of antecedents. Nevertheless, this IQA had been found by Van der Lely and Stollwerck (1997) in an earlier study. In fact, Chien and Wexler's

[1] Both Conroy *et al.* (2009) and Elbourne (2005) indicate that the pictures used in a PVT should not interfere with saliency, i.e. one character should not be displayed in a larger size than the other character(s) in the test materials, as was the case in Chien and Wexler's study (1990). This was a second reason for using the A-STOP-R test, as this bias is largely absent.

results show a similar pattern. Marinis and Chondrogianni, following Grimshaw and Rosen (1990), suggest that the result stems from "the complexity of constructing a distributive reading in combination with task effects" (p. 210). If this is the case, we expect the IQA to show up with Dutch children as well. As we will see, this is not borne out.

2.3. A replication study with Dutch-speaking children

The present study investigates the interpretation of pronouns and reflexives in object position in biclausal sentences in a group of Dutch monolingual children, who were age-matched to the English monolingual children from Marinis and Chondrogianni's (henceforth M&C) study. The overall question is whether the standard account, which directly links the DPBE to a QA, can be maintained. Hence, the questions addressed in this study are:

(i) Whether on the same test the Dutch children show a similar DPBE to the English children documented in M&C.

(ii) Whether the Dutch children, like the English children, show a QA on the same test.

(iii) Whether the Dutch children, like English children, show an IQA on the same task.

2.3.1. Participants

Twenty-nine typically developing Dutch monolingual children participated in the study and thirty-three typically developing English monolingual children participated in M&C's study. The two groups were matched as closely as possible on age. The Dutch children had a mean age of 7;0 (SD: 9 months; range: 6;3–9;1) and the English children had a mean age of 7;5 (SD: 9 months; range: 6;0–9;0).

The Dutch children attended schools in Volendam and Huizen. None of the children had any history of speech and/or language delay or impairment, and their parents were not concerned about their language development. All children understood the standard variety of Dutch that they were tested in. All the children were individually tested by two experimenters in a quiet room at school.

2.3.2. Material and procedures

The Dutch children were administered a Dutch translation – made by the authors – of the Advanced Syntactic Test of Pronominal Reference-Revised (A-STOP-R), the same test M&C used. The A-STOP-R is a sentence-picture verification task involving a *yes/no* judgment and consists of two practice and 96 test sentences.

There are two Dutch translation equivalents for the English quantifier *every*: *elk* and *ieder*. According to the literature, *elk* and *ieder* are synonymous in

meaning (cf. Drozd & van Loosbroek, 2006; Philip, 2005; van der Ziel, 2008, 2011), but in production both children and adults prefer *elk* to *ieder* (Hendriks et al., 2012). Hence, in the A-STOP-R the English quantifier *every* was translated with the Dutch quantifier *elk*.

The test sentences were biclausal containing a matrix clause with the verb *zeggen* 'say' and a subordinate clause with a finite action verb. Thus, there was an antecedent in the matrix clause for the pronoun to refer to; otherwise sentences would have been rejected for the wrong reasons. Two characters were introduced, one as the subject NP of the matrix clause and one as the subject NP of the subordinate clause. The object of the embedded clause was either a reflexive or a pronoun. Characters were only introduced in the test sentence itself and not separately beforehand.[2] The experimenter showed the picture first and then read out the sentence. Subsequently, the child answered *yes* or *no*, which was noted down on the score form by one of the experimenters. Occasionally, children requested a repetition of the sentence; in such a case, it was provided only once.

The test included twelve experimental and four control conditions with six sentences per condition. Four of the experimental conditions (Mismatch-Syntax) are beyond the scope of this dissertation. The control conditions were designed to test whether the children could determine the reference of reflexives and pronouns by matching semantic gender (mean accuracy > 84% for both groups). For half of the eight remaining experimental conditions the subject of the subordinate clause was a referential, definite NP, as in examples (12) and (14), and for the other half the subject was a QP, as in examples (13) and (15). The object NP in the subordinate clause was either a reflexive, as in examples (12) and (13), or a pronoun, as in examples (14) and (15).

(12) Mismatching NP/Reflexive condition

Het paard	zegt	dat	het konijn	zichzelf	krabt.
The horse	says	that	the rabbit	SE-self	scratches

'The horse says the rabbit is scratching himself.'

(13) Mismatching QP/Reflexive condition

Het paard	zegt	dat	elk konijn	zichzelf	krabt.
The horse	says	that	every rabbit	SE-self	scratches

'The horse says every rabbit is scratching himself.'

[2] The animals in this test are personified (had beards, sported bows, used sponges to wash themselves); thus, the use of *him* and *himself*, rather than *it* and *itself*, is valid. Moreover, item analyses showed that there was no difference in performance between items with animal characters and reflexives or pronouns and items with human characters and reflexives or pronouns. In Dutch the pronouns *hem* ('him') and *haar* ('her') are the default forms to refer to animate referents (van Hout, Veenstra & Berends, 2011).

(14) Mismatching NP/Pronoun condition

De kangoeroe	zegt	dat	het schaap	hem	krabt.
The kangaroo	says	that	the sheep	him	scratches

'The kangaroo says the sheep is scratching him.'

(15) Mismatch QP/Pronoun condition

De kangoeroe	zegt	dat	elk schaap	hem	krabt.
The kangaroo	says	that	every sheep	him	scratches

'The kangaroo says every sheep is scratching him.'

The picture matched the sentence (Match) in four experimental conditions, whereas in the other four conditions there was a mismatch between the picture and the sentence (Mismatch), as shown in (12) – (15). The A-STOP-R test sentences were randomized and presented in a set order.

2.4. Results

The children's performance on reflexives and pronouns was analysed separately using repeated measures ANCOVAs with the between factor Language (English, Dutch), and the within factors NP type (referential, quantificational), and Matching (match, mismatch). [3] Since the children's mean ages in both groups differed significantly (F (1, 61)= 4.141, p = 0.046), Age in Months was used as a covariate. It turned out that the covariate Age was significant in all analyses for all groups, meaning that the older children outperformed the younger children on all conditions in both groups. The main effects of and interactions with Age will not be further mentioned in detail. Interactions were followed up using pairwise comparisons with Bonferroni correction. One-sample t-tests were used to ascertain chance level performance.

[3] We kindly want to thank Theo Marinis and Vicky Chondrogianni for sharing their English data with us.

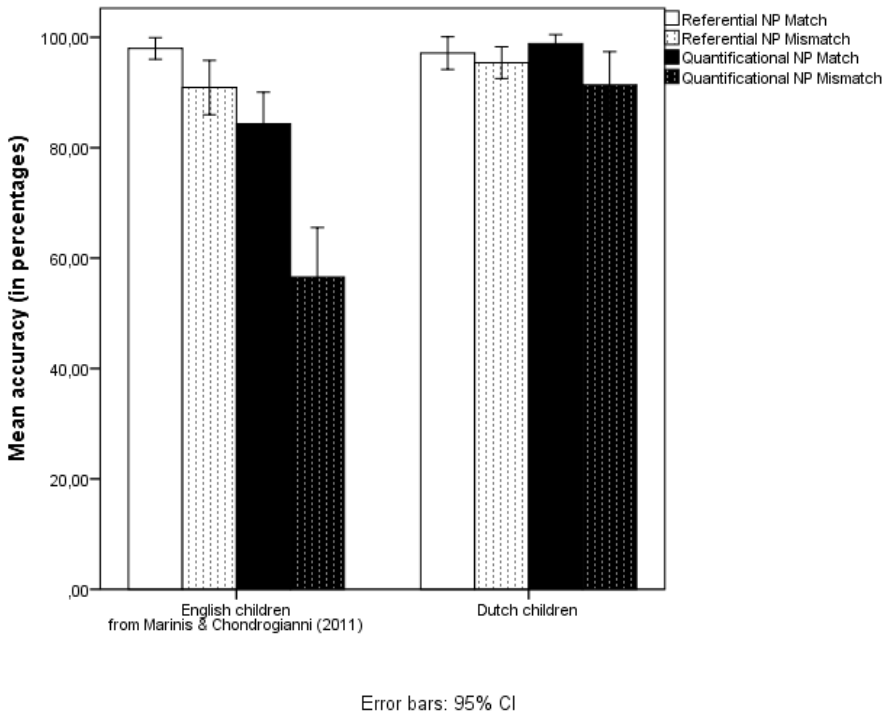

Figure 2.1. Accuracy in percentages in the comprehension of reflexives. Please note that the percentages in this graph may appear higher than in the text: this is due to the covariate Age which was included in the analyses but not in the graph.

Figure 2.1 shows the Dutch and English children's performance in the interpretation of reflexives.

The ANCOVA revealed a main effect of Language (F (1, 59) = 12.77, p = 0.001, η^2 = 0.18), a main effect of NP type (F (1, 59) = 11.81, p = 0.001, η^2 = 0.17), a main effect of Matching (F (2, 58) = 4.04, p = 0.023, η^2 = 0.12), an interaction between Language and NP type (F (1, 59) = 31.55, p < 0.001, η^2 = 0.35), an interaction between Language and Matching (F (2, 58) = 17.56, p < 0.001, η^2 = 0.38), and an interaction between Language, NP type and Matching (F (2, 58) = 16.11, p < 0.001, η^2 = 0.36).

Since there was a main effect of and interactions with Language, the groups performed differently from each other in the interpretation of reflexives on all conditions. To trace the source of the interactions separate ANCOVAs were conducted for each group, again with Age in Months as a covariate. For the English children this resulted in a main effect of NP type (F (1, 31) = 12.37, p = 0.001, η^2 = 0.29). The main effect of NP type reflected better performance in sentences with NPs compared to sentences with QPs (mean accuracy: 89.1% vs. 75.6%; p = 0.001). Matching did not yield a main effect. One-sample t-tests showed chance performance in the quantificational NP-Mismatch condition: (t (32) = 1.49, p > 0.14).

The Dutch children showed a main effect of Matching (F (2, 27) = 7.93, p = 0.001, η^2 = 0.23). The main effect of Matching reflected better performance in the Match (mean accuracy: 98.0%) compared to the Mismatch condition (mean accuracy: 93.4%; p = 0.031). NP type did not yield a main effect meaning that the Dutch children did not differentiate between the NP and QP conditions. One sample t-tests showed no chance performance.

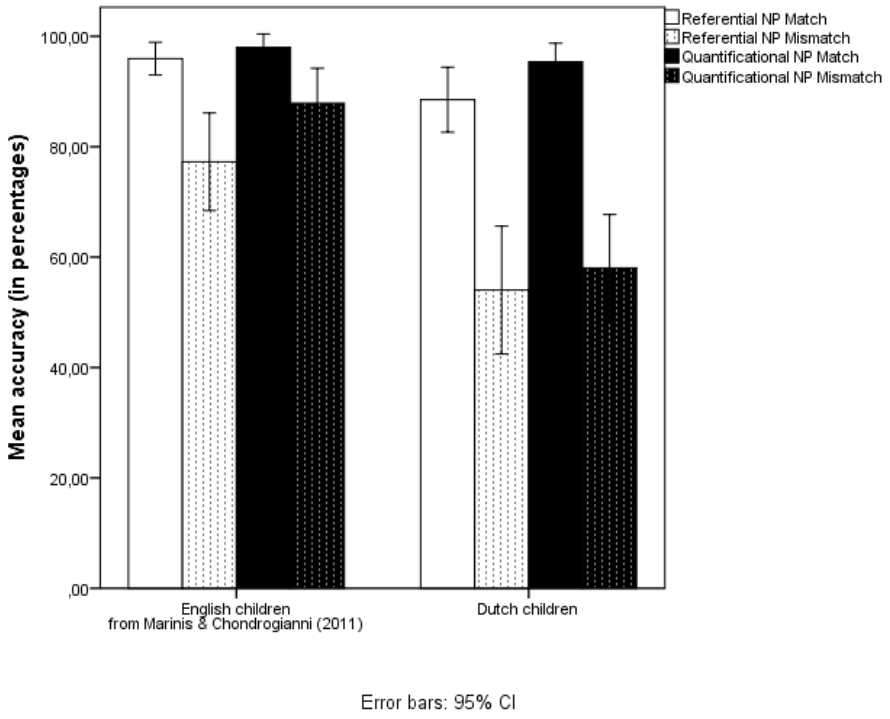

Figure 2.2. Accuracy in percentages in the comprehension of pronouns. Please note that the percentages in this graph may appear higher than in the text: this is due to the covariate Age which was included in the analyses but not in the graph.

Figure 2.2 shows the children's performance in the interpretation of pronouns.

The ANCOVAs revealed a main effect of Language (F (1, 59) = 22.39, p < 0.001, η^2 = 0.28), a main effect of Matching (F (2, 58) = 15.43, p < 0.001, η^2 = 0.35), and an interaction between Language and Matching (F (2, 58) = 4.60, p = 0.014, η^2 = 0.14). No main effects of or interactions with NP type were found.

Since the main effect of and the interaction with Language indicated that both groups performed differently on the pronouns, separate ANCOVAs were conducted for each group. In the English children this yielded a main effect of Matching (F (2, 30) = 6.96, p = 0.003, η^2 = 0.32). The main effect of Matching indicated better performance in the Match (mean accuracy: 97.0%) compared to the Mismatch condition (mean accuracy: 82.6%; p < 0.001). Although NP type did not generate a main effect – indicating that children scored similarly

on NPs and QPs – pairwise comparisons showed a better performance in the QP condition compared to the NP condition (mean accuracy: 88.1% vs. 83.5%, p = 0.047). [4] Moreover, a paired t-test comparing only the mismatching NP/Pronouns and mismatching QP/Pronouns showed a significant difference (t (32) = -2.68, p = 0.006), meaning that children understood mismatching QP/Pronouns better than mismatching NP/Pronouns (mean accuracy: 77.3% vs. 88.9%).[5] One-sample t-tests showed no chance performance.

The separate ANCOVAs on the Dutch children revealed a main effect of Matching (F (2, 54) = 7.95, p = 0.001, η^2 = 0.23), revealing better performance in the Match (mean accuracy: 92.0%) compared to the Mismatch condition (mean accuracy: 56.0%; p < 0.001). The NP type condition did not yield a main effect, because the Dutch children performed similarly on sentences with NPs to those with QPs (mean accuracy: 67.8% vs. 69.7%, p > 0.4). Crucially, a paired t-test comparing only the Mismatch NP/Reflexives and Mismatch NP/Pronouns did not show a significant difference for the Dutch children (t (28) = -0.89, p = 0.190). One sample t-tests reflected chance performance in the NP Mismatch condition (t (28) = 0.71, p > 0.2).[6]

2.5. Analysis

Looking at the mismatch conditions only to circumvent a *yes*-bias (McKee 1992), our analysis and the comparison with M&C's English data leads to three generalizations that have to be accounted for: (i) both Dutch and English children show a DPBE; (ii) English children scored significantly better on the QP/Pronoun condition than Dutch children; and (iii) Dutch children scored significantly better on the QP/Reflexive condition than the English children.[7]

In this section, we propose that the two differences between English and Dutch children, namely the ones on the QP conditions, follow from the hypothesis that English and Dutch children have diverging preferences in their interpretation of the universal quantifiers used in the tests. Whereas English children prefer a collective reading for *every*, Dutch children prefer a distributive reading for *elk* ('every'). In addition, we will show that this analysis of the QP conditions has consequences for the analysis of the DBPE. In a nutshell, our analysis implies that an object pronoun, whether it is a reflexive or

[4] It is unsurprising that the differences between the NP and QP conditions are so small, because English children are found to have overcome their Principle B errors by age 7 (Chien & Wexler, 1990; Verbuk & Roeper, 2010).

[5] It is more informative to look at the Mismatch conditions, because "[i]f people typically say *yes* when they do not know what to do, then we can be confident that when children do reject a meaning-utterance pair, it really is unacceptable to them." (McKee, 1992, p. 33)

[6] We also tested 14 adults (mean age: 39 years; range: 19 – 69), who hardly erred on the relevant conditions. The adults' mean accuracy on reflexives was 99.0% and on pronouns 98.8%.

[7] A fourth difference is that Dutch children score worse on the NP pronoun condition than English children. This is in line with earlier findings showing that the DPBE is more prolonged in Dutch compared to English (cf. Koster, 1993; Philip & Coopmans, 1996), perhaps of the three-way system that includes pronouns, SE-reflexives and SELF-reflexives. We will ignore this difference in the discussion, as the focus is on the relation between the DPBE (present in both languages) and the (I)QA.

pronoun, can be interpreted as a locally bound variable. This assumption is difficult to incorporate in a binding theory that adopts Principles A and B (see Section 2.5.1), because the latter principle blocks such a co-identification relation. In a theory that dispenses with Principle B, such as the ones proposed by Spenader *et al.* (2009), Reuland (2011) and Rooryck and Vanden Wyngaerd (2011), this assumption can be incorporated without any problem (Section 2.5.2). Hence, our hypothesis about distinct interpretive preferences for universal quantifiers, combined with a binding theory that dispenses with Principle B, accounts for all the data.

2.5.1. A co-reference-based account of the QA

Chien and Wexler's account of the DPBE relies on the idea that children use a pragmatic way of establishing co-identification between the object pronoun and the local subject. The nature of this rule can be illustrated with the following context:

(16) (You know what Mary, Sue and John have in common? Mary admires John, Sue admires him,) and John admires him too.
(example from Heim, 1994, p. 216; emphasis in the original; derived from Evans, 1980, p. 356)

In (16), there is a context in which *him* is felicitously co-identified with the local subject *John*. This shows that in principle co-reference is a rule that is part of the adult grammar but employed in very specific discourse circumstances (for details see, e.g.: Baauw, 2002; Baauw et al., 2011; Grodzinsky & Reinhart, 1993; Reinhart, 1986). Chien and Wexler (1990) therefore argue that lack of pragmatic knowledge leads the children to overgeneralize the co-reference strategy, which in turn leads them to allow co-identification of an object pronoun and a local subject in general. It is perhaps more likely that the difficulty has to do with processing, because children have to compare two representations (one given by the syntax and one given by co-reference) and this creates a heavy burden on their processing capacity (cf. Reinhart & Grodzinsky, 1993; Baauw et al., 2011), leading to the chance performance that has been documented (Chien & Wexler, 1990; Koster, 1993; Philip & Coopmans, 1996; Wexler & Chien, 1985).[8]

[8] Alternatively, Rooryck and Vanden Wyngaerd (2011) argue that the DPBE is due to morphological intransparency of the reflexive paradigm. The finding that the effect can be observed in Dutch but not in German (cf. Ruigendijk et al., 2010; Ruigendijk, Baauw, Zuckerman, Vasić, de Lange & Avrutin, 2011) can be related to the fact that the reflexive system in German is transparent (m-ich(-), d-ich(-), s-ich(-)) but not in Dutch (me(-), je(-), zich(-)). The singular reflexives in German are bimorphemic where the *m-*, *d-* and *s-* morphemes mark person and *–ich* marks singular, whilst in Dutch the *–ich* ending cannot be considered a productive pronominal morpheme. The consequence of this is that reflexives compete with pronouns at a much earlier stage in German, compared with Dutch, so that the DPBE is overcome at a much earlier stage, too. Although this is an interesting alternative to the pragmatic co-reference strategy, the proposal has little to say about the QA, nor about the acquisition differences between English and Dutch.

The attractive property of this account is that it provides a handle on the QA, the fact that children seem to have more target-like interpretations when the local subject is a QP.

(17) These are the bears$_i$; this is Goldilocks$_j$. Is every bear$_i$ touching her$_{*i/j}$?
(Chien & Wexler, 1990, p.263)

According to Chien and Wexler the difference between a referential NP antecedent, such as *the seahorse* in (4), and a QP antecedent, such as *every bear* in (17), lies in the possibility of reference. An NP antecedent refers to a fixed antecedent in the discourse. A QP, on the contrary, does not refer to a unique, fixed antecedent; hence, it cannot enter into co-reference with a pronoun. Only binding is possible if the QP is to serve as an antecedent for *her* but Principle B rules out syntactic binding of *her* by *every bear* in (17). Therefore, children correctly reject a picture in which every bear is scratching herself.

The problem with this analysis is that it does not account for the differences between the English and Dutch children. Firstly, it is unclear why Dutch children do not become more target-like when the local subject is a QP rather than an NP. After all, the same co-reference strategy that they employ with NP antecedents should be blocked by QP antecedents. Secondly, it remains unclear why the QP/Reflexive condition causes problems for the English children: if the reflexive condition is easier than the pronoun condition, and QPs supposedly lead to more target-like behaviour, the QP/Reflexive condition should be relatively simple. One could argue that an additional factor is at stake (perhaps of a methodological nature, cf. Marinis & Chondrogianni, 2011), but then the next question is why Dutch children have no problems with this condition.

2.5.2. An alternative analysis

Instead of focusing on the QA in English, we take as a starting point its absence in Dutch. The fact that in the QP/Pronoun condition Dutch children incorrectly accept a picture in which three sheep are scratching themselves strongly suggests that they allow a bound variable interpretation of the pronoun: for each sheep it is the case that this sheep is scratching itself. This reading is only possible if we make two assumptions: (i) the QP must receive a distributive interpretation, and (ii) the child's grammar allows local binding of a pronoun. We will deal with these assumptions in turn. First, we focus on the difference between collective and distributive readings for universal quantifiers and show their relevance for the issues at hand. Then we turn to the assumption that the child's grammar allows locally bound pronouns and show how this assumption meets recent developments in binding theory. We finally show how these two ingredients derive all the data.

Universal quantifiers have two readings, a collective one and a distributive one. This difference can be clearly illustrated with the use of *all* and *each*. Example (18a) with *all* receives a collective reading, as it involves one single

event in which all the individual characters participate.[9] Note that due to the collective interpretation of the quantifier, a singular pronoun has a unique referent. Example (18b) describes a situation with a single piano.

(18) a. All men are carrying a piano upstairs.
(example from van der Ziel, 2011, p. 99)
b. All men are carrying his piano.

Example (19a) with *each*, on the other hand, receives a distributive reading, in which there is a pairing of each individual with an event, thereby creating an unlikely situation in which there are several men who are each, on their own, carrying a piano upstairs (van der Ziel, 2012). Here, a singular pronoun can receive a distributive interpretation. Example (19b) can describe a situation with multiple pianos.

(19) a. Each man is carrying a piano upstairs.
b. Each man is carrying his piano upstairs.

Let us now turn to the quantifiers used in the experiments, i.e. *every* for English and *elk* ('every') for Dutch. These have both readings in the adult grammars, which means that they are ambiguous between a collective and distributive reading (cf. for English: Novogrodsky et al., 2012; Tunstall, 1998; for Dutch: Hendriks et al., 2012; Philip, 2005; van der Ziel, 2012; Zwart, 2011, *inter alios*). Suppose that both readings are not equally available to English and Dutch children and that, in fact, they have distinct preferences: English children prefer a collective reading, whereas Dutch children prefer a distributive one. We call this the Collective Distributive Preference Hypothesis (henceforth CDPH). We explicitly call this a preference because neither English nor Dutch children categorically reject or accept sentences in the quantifier conditions. Both groups have two representations for the quantifier but the probability that the distributive interpretation is used is higher for Dutch children, whereas the probability of using the collective interpretation is higher for English children.

The CDPH provides a handle on the differences between the two learner groups. The non-target-like behaviour of the Dutch children on the QP/Pronoun condition suggests that the distributive reading is prominently available for them. The fact that, in contrast, English children more readily reject a mismatching picture in the QP/Pronoun condition then follows from the assumption that English children prefer a collective rather than a distributive reading. In that event, the object pronoun cannot be interpreted as a variable

[9] There are two types of collective readings. Van der Ziel (2011) distinguishes a collective-action, which is described here, from a collective-responsibility, in which not all of the individuals in a group may necessarily have the property that the group as a whole possesses. For example, (18a) can be a description of a scene in which one of the men might be holding the door open, whilst another is shouting which way the carriers should go, and only two men are doing the carrying. Only collective-action readings are concerned here and those will be referred to as collective readings for the sake of simplicity.

bound by the local QP. Hence, the fact that we observe a QA in English but not in Dutch is a consequence of different interpretive preferences for the universal quantifiers.

Before we expand this account, and consider each condition, we need to address the second assumption. If Dutch children allow an object pronoun to be locally bound, one might conclude that they still lack knowledge of Principle B, in contrast to English children. This, however, would amount to postulating two differences between English and Dutch children: one referring to the preferred interpretation of universal quantifiers, the other to the presence or absence of Principle B. In the NP/Pronoun condition, then, co-identification between the object pronoun and the local NP would have different sources: lack of knowledge of Principle B for the Dutch children and a co-reference strategy overriding Principle B for the English children. We would like to propose a simpler analysis instead, in which the collective-distributive preference distinction is the main difference between the two learner groups and in which their grammars are similar in all relevant respects. Hence, English and Dutch children alike allow local binding of the pronoun. We do not take this to mean that both groups lack knowledge of Principle B, but rather that we need to couch our analysis in a theory that allows local binding of pronouns more generally. This squares well with recent advances in binding theory that have downplayed the overall role of Principle B in the syntax (Spenader et al., 2009; Reuland, 2011; Rooryck & Vanden Wyngaerd, 2011). In the rest of this section, we present one of these proposals (by Spenader et al., 2009), sufficient for the present purposes, and then show how the data can be made to follow from the quantifier distinction. Such an analysis makes the co-reference strategy overriding the syntax (as employed in the competing analysis, see Section 2.5.1) redundant.

Instead of assuming that reflexives and pronouns are handled by distinct syntactic principles, Principles A and B, it is possible to assume that reflexives and pronouns are treated the same by the syntax. If so, they can both be bound by a local antecedent. The fact that we nevertheless observe a complementary distribution between reflexives and pronouns must then be ascribed to something else. Spenader *et al.* argue for a pragmatic blocking principle that forbids the use of a pronoun in those contexts where a reflexive could also have been used instead. Reflexives are the dedicated elements to express reflexive relations and pronouns consequently occur elsewhere. Hence, reflexives and pronouns are treated differently by the pragmatics but not by the syntax and semantics. Therefore, nothing syntactic or semantic rules out co-identification of the subject and object referent in a sentence like *John loves him*. Such co-identification is only blocked in the pragmatics. Another consequence is that a pronoun can always function as a bound variable under the scope of a local quantifier. As such, *everybody loves him* is semantically ambiguous and can have a bound and a non-bound reading for the pronoun (cf. Heim, 2008; Heim & Kratzer, 1998). Under the first interpretation, it is indistinguishable from the interpretation of a reflexive in the same context. The pragmatic principle,

however, will block the bound interpretation, as it will again favour the use of a reflexive to express a reflexive relation.

In the next section, we revisit all the conditions to show how they can be derived.

2.5.3. Deriving the data

We have seen that Principle A together with a pragmatic blocking principle provides a correct characterization of readings that adults have for reflexives and pronouns, both in contexts with and without a quantifier. The question then is in what respect children differ from adults. Two empirical findings need to be explained: (i) both English and Dutch children show a DPBE in non-quantificational (NP/Pronoun) contexts and (ii) the two learner groups behave differently in the QP/Reflexive and QP/Pronoun conditions. To account for (i), we adopt Spenader *et al.*'s (2009) proposal. To account for (ii), the interpretation of the quantifier becomes important. We discuss each in turn.

Let us start with the similarity. On the NP/Pronoun condition both Dutch and English children display a DPBE. Spenader *et al.* (2009) note, however, that this effect only shows up in comprehension. They account for this as follows. Children have knowledge of the blocking principle and know that they should not produce a pronoun wherever a reflexive is possible; hence, in production children do not show a DPBE. In comprehension, however, children must make an additional reasoning step by realizing that the speaker uttering a pronoun does not express a reflexive relation; otherwise (s)he would have used a reflexive. This is where the problem lies. Children have to place themselves in the mind of the speaker and ascribe to the speaker the same blocking principle. Children until age 7 are not completely successful in taking the speaker's perspective into account, and this has consequences for their interpretation of (20):

(20) The kangaroo says that the sheep is scratching him.

Since the blocking principle does not filter out the reflexive interpretation in sentence comprehension, children will incorrectly accept (20) as a description of a picture in which a sheep is scratching himself.

Let us now turn to the quantifier conditions and implement the CDPH. We start with the QP/Pronoun condition. Here, children have to judge whether the sentences in (21) are correct descriptions of a picture in which three sheep are scratching themselves.

(21) a. The kangaroo says that every sheep is scratching him.
b. De kangoeroe zegt dat elk schaap hem krabt.

The Dutch children performed as poorly on (21b) as on the NP/Pronoun condition, whereas the English children scored significantly more target-like on (21a) than on the NP/Pronoun condition. This means that English children

more readily reject an interpretation in which each sheep scratches itself. This follows from the CDPH. If Dutch children have a preference for a distributive reading of *elk* ('every'), the object pronoun *hem* ('him') can be interpreted as a variable bound by the local QP. Neither the syntax nor the semantics blocks this interpretation, and the pragmatic blocking principle that would filter it out is not yet functioning properly in children's sentence comprehension. Hence, the sentence in (21b) gets a reflexive reading that matches the picture, resulting in a low rejection rate.[10] English children, on the other hand, prefer a collective reading for the quantifier *every*. Although their grammar does not forbid them to interpret *him* as a locally bound variable in principle, the preference for a collective reading now does, as only a distributive interpretation allows a bound variable reading for *him*. The result is that English children will reject (21a) as a description of a picture in which the sheep are scratching themselves at a relatively high rate. The CDPH predicts that English children reject co-identification between the QP and the object pronoun, whilst Dutch children accept co-identification. This captures the finding that English children score more target-like on the QP/Pronoun condition than Dutch children.[11]

Let us now turn to the QP/Reflexive condition. Here, children had to judge whether the sentences in (22) correctly described a picture in which the sheep are scratching the kangaroo.

(22) a. The kangaroo says that every sheep is scratching himself.
b. De kangoeroe zegt dat elk schaap zichzelf krabt.

The English children performed poorly on this condition, as in Chien and Wexler's (1990) study, failing to reject a non-reflexive interpretation for *himself*. The Dutch children, however, performed at ceiling and rejected a non-reflexive reading. If the Dutch children, in compliance with the CDPH, prefer a distributive reading of the quantifier *elk* ('every'), a bound variable interpretation is straightforward. As a result, a picture in which all sheep

[10] An anonymous reviewer wonders if this does not predict that Dutch children should reject (21b) in the match condition, in which the picture shows one and not multiple kangaroos being scratched. The answer is *no*. If three sheep scratch one kangaroo, this can be construed as a collective scratching event but also as three scratching events on one individual. This counts as distributive (see van der Ziel 2011 for discussion). So the picture is simply ambiguous in that case. Note that the scratching example is different from the piano carrying example in (19). When three men are carrying a piano, there are no three piano-carrying events but one, which constitutes a collective event.

[11] An anonymous reviewer points out that there are contexts in which English children can easily have a distributive reading, such as those in (i):

(i) Every sheep ate an apple/bit the farmer/is wearing a hat/is white.

We also believe that such contexts will activate the distributive interpretation. If so, the reviewer wonders, why does the context in (22a) not trigger a distributive reading? What makes (22a) different from (i) is that in (22a) the preferred collective reading can simply be maintained by letting *him* refer to the kangaroo, which leads to a rejection of the sentence-picture pair. This possibility of maintaining the collective reading is absent in (i).

scratch the kangaroo is correctly rejected. English children, in contrast, prefer a collective reading, so that variable binding by the local QP is not possible. As a consequence, the local subject is not a felicitous antecedent for the reflexive. Now, in the mismatch condition three sheep are scratching the kangaroo. Since the QP subject is not a felicitous antecedent and since *himself* is a reflexive, the expectation is that English children reject the mismatching sentence picture pair. However, this is not what they do: they accept it. This means that they must have an interpretation in which the subject of the matrix clause and *himself* are co-identified. But how is that possible? Note that *himself* is polysemous, as it can function as a reflexive but it can also be interpreted as an intensifier consisting of the pronoun *him* in combination with a focus marker *self*. When children interpret *himself* as an intensifier, they can establish co-identification with the long-distant antecedent, in this case *the kangaroo*. Since this interpretation matches the picture, English children will reject the mismatching sentence-picture pair at a relatively low rate. Note that this is contrary to what happens in the NP Mismatch condition where children correctly reject the mismatching sentence-picture pair. In this condition, local binding is straightforward and it leads to an interpretation that does not match the picture. The QP/Reflexive condition is different, because the local antecedent is not a possible referent. Since *himself* needs to refer to something, children opt for the intensifier reading of *himself*. Thus, in both cases children are able to find a grammatical antecedent for *himself* yet leading to different judgments. Hence, children do not choose the intensifier interpretation because they want to say *yes* (i.e. it is not a *yes*-bias in that sense) but because *himself* needs a grammatical antecedent. [12]

Note that if English children have a preference for a collective reading for the QP, we predict that the QP cannot function as an antecedent for the reflexive in the matching sentence-picture pair either (with all the sheep scratching themselves). Although the *yes*-bias obviously inflates the target performance here, we nevertheless found a significant difference between the English and Dutch children on this condition (mean accuracy: 84.3% vs. 98.9%; $p < 0.001$).

To sum up, under the assumption that Principle B is not an independent principle of the syntax and pragmatics blocks the use of pronouns in contexts where a reflexive is appropriate, reflexives and pronouns can in principle be co-identified with a local subject, giving rise to a DPBE in non-quantificational conditions. The two differences between the English and Dutch children can be made to follow from a single distinction, as expressed by the CDPH. [13] Note that

[12] As pointed out by an anonymous reviewer, the adult grammar does not allow an intensifier interpretation of *himself* when *himself* functions as an argument, as in the test sentences. It must be the case, then, that English children at the relevant acquisition stage have not acquired this yet and allow argumental *himself* to obtain an intensifier interpretation. We know that children produce the intensifier meaning of *himself* before they use the reflexive meaning (Gülzow, 2006), which may well imply that the latter meaning is more entrenched.

[13] In Drozd and Van Loosbroek (2006), Dutch children performed worse on the collective context (three boys riding one elephant, two elephants – without anyone on them – next to it) than on the

we specifically call it a preference. We assume that for both child populations the universal quantifiers in principle allow both interpretations. Hence, we do not find 100% versus 0% scores but gradience.

If this analysis is on the right track, it sheds a different light on how the grammars of children and adults diverge. In Chien and Wexler's analysis, both adults and children have access to Principles A and B and therefore know that reflexives and pronouns are in complementary distribution. It is only in the NP/Pronoun condition that a co-reference strategy interferes with Principle B. In the alternative analysis, children can establish a co-identification relation between a reflexive or pronoun and a local subject antecedent since the pragmatic principle responsible for the complementary distribution of reflexives and pronouns is not functioning properly in comprehension. This relation is only blocked in the QP/Pronoun condition in English due to the collective preference for the quantifier. It is, therefore, the interpretation of this quantifier that leads to the apparent target behaviour of English children on this condition, and it is crucially not the knowledge that pronouns and reflexives are in complementary distribution. If this is so, the QP/Pronoun condition reveals little about children's understanding of the complementary syntax of pronouns and reflexives.

2.6. Conclusion

Like the delay of Principle B effect, the quantificational asymmetry is a language-specific phenomenon. Within the group of languages displaying the DPBE, only a subset shows the QA: English does, Dutch does not. In addition, English children struggle on the QP/Reflexive condition, whereas Dutch children have no problems here.

We argued that the two differences between the English and Dutch children call for a reinterpretation of the QA. The fact that QPs lead to a better performance on the interpretation of pronouns has been interpreted as showing that children have knowledge of Principle B, because it is exactly in this context that co-reference is excluded and children must rely on their syntactic knowledge. We argued that the better performance of English children on this QP/Pronoun condition is a consequence of a preference for a collective interpretation of *every*. This interpretation blocks the interpretation of an object pronoun as a bound variable, which leads children to reject co-identification between the pronoun and the QP subject. The same ingredient accounts for the fact that the QP/Reflexive condition is more difficult for

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distributive context (four elephants, three of them each have a boy on them and one is riderless). Test sentences included *ieder* ('each/every') and *alle* ('all'). Brooks and Sekerina (2006) showed in their Experiment 1 that English children performed better on collective contexts (three men washing one bear or one man washing three bears, with either two bears or two men in the background) than on distributive contexts (three men each washing a bear, with either two men or two bears in the background). Admittedly, the distributive contexts were only tested with *each* and *every*, whereas the collective contexts were tested with *all*. Still, we feel that these results are in line with the CDPH.

English children than for Dutch children. If there is no preference for a collective interpretation of the universal quantifier, which we argued is the case for Dutch children with *elk* ('every'), the QA disappears.

The proposed analysis of course raises a question about what is behind the Collective Distributive Preference Hypothesis. Why would Dutch children have a preference for the distributive reading, and English children for a collective reading? Although a detailed answer to this is a topic for further research, there are two factors that could play a role.

Firstly, the preferential differences could already be present in the input. It is well known that Dutch is a scope-rigid language, which means that a sentence of the type *Every man owns a car* only receives the interpretation provided by the surface order: for each man it is the case that this man owns a car. The inverse scope interpretation, with the indefinite subject scoping over the quantifier, is generally unavailable in Dutch, whereas it is a possible (though disfavoured) reading in English (van der Ziel, 2011). Although this difference can be related to the strong preference in Dutch children for the distributive reading – when the quantifier appears in subject position it always scopes over the indefinite object in Dutch – it does not immediately explain the preference for the collective reading in English children.

Secondly, English has a dedicated universal quantifier for expressing a distributive reading, namely *each*, but Dutch lacks such a quantifier (both *ieder* and *elk* ('every') are ambiguous). Novogrodsky *et al.* (2012) hypothesize that English children start out with an underspecified interpretation of *each* and *every*, so that both quantifiers can receive a distributive or collective reading. As children aged 5;6-7;0 begin to grasp the distributive interpretation for *each*, their collective answers to *every* increases simultaneously, and they prefer to give a collective interpretation to *every* (Novogrodsky et al., 2012). Further research needs to determine whether this preference for a collective reading is maintained in tasks that do not directly compare *each* and *every*.[14] Moreover, the quantifier interpretation preferences in general for Dutch and English adults as well as for Dutch and English children need to be further investigated.

[14] Van Koert (submitted) ran a picture selection task in which both Dutch and American-English children (n = 150, 5;0 – 9;0) had to choose between a picture containing a stereotypical distributive situation (a one-to-one pairing) and a picture showing a more collective situation (three-to-one) upon hearing a sentence such as: "All/every/each crocodile are/is tickling a dog". The results reveal that Dutch children choose the distributive picture significantly more frequently for all three quantifiers than the English children. English children show a three-way distinction in which *each* receives significantly more distributive readings than *every* and *every* receives significantly more distributive readings than *all*.

Chapter 3

Differences between Dutch and English children's interpretation preferences of quantifiers*

Abstract

This study presents the results of a picture selection task that show that Dutch children's interpretation preferences of quantifiers in subject position closely follow the adults' preferences. Yet, English children's interpretation preferences diverge from adults' preferences and from the Dutch preferences. The comprehension of Dutch quantifiers – ieder, elk and alle – by Dutch children (n=77) and adults (n=19) is directly compared to the comprehension of English quantifiers – each, every and all – by English children (n=75) and adults (n=25). The results show that all quantifiers receive significantly more wide scope interpretations in Dutch than in English. This means that (i) the quantifier interpretation preferences in adult Dutch differ from adult English; (ii) the Dutch and English children arrive at the adult preferences differently; (iii) the diverging preferences may explain differences found between Dutch and English children's behaviour on other structures.

3.1. Introduction

An interesting feature of language is that it can denote specific individuals as well as refer to quantities of individuals through, for example, quantificational expressions, such as *elke man* in Dutch or its English equivalent *every man*. Quantifiers – such as *ieder* ('each/every'), *elk* ('each/every') and *alle* ('all') in Dutch and *each*, *every* and *all* in English – have been studied widely, because of their complex linguistic behaviour (Ioup, 1975; Reinhart, 1997; Tunstall, 1998; Vendler, 1967, *inter alios*).[1] It is unsurprising then that the complexities of these quantificational expressions affect children's understanding of them. Investigations of quantificational expressions in child language acquisition have focussed on under and overexhaustivity (e.g. Crain, Thornton, Boster, Conway, Lillo-Martin & Woodams, 1996) with the main question being whether and

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[1] Henceforth the English translations for the Dutch quantifiers will not be given. Please note that Dutch has common and neuter gender for nouns and the singular universal quantifiers *ieder* and *elk* are inflected accordingly:

(i)	De aap	→	ieder-e aap, elk-e aap
	The monkey.COMMON		each/every monkey, each/every monkey
(ii)	Het schaap	→	ieder-ø schaap, elk-ø schaap
	The sheep.NEUTER		each/every sheep, each/every sheep

when four to six-year-olds could understand what a quantifier, most notably *every*, denotes. Nevertheless, more recent work into quantificational (Brooks & Braine, 1996; Brooks & Sekerina, 2005/2006; Hendriks, Koops van 't Jagt & Hoeks, 2012; Novogrodsky, Roeper & Yamakoshi, 2013; Roeper, Strauss & Pearson, 2006; Roeper, Pearson & Grace, 2011) and numerical expressions (Syrett & Musolino, 2013) done in the same age group centred on the distinct interpretations these expressions and their predicates can trigger: a collective and a distributive one. This is the approach we will take in this chapter; we will look at adults' and children's interpretative preferences of quantifiers in Dutch and English by comparing and contrasting their comprehension of sentences containing quantified noun phrase (QP) subjects.

Comparing interpretative preferences of one language to another may well help to explain remarkable results found in previous studies. A number of binding studies, for example, found that Dutch children behave similarly on (1a) and (1b) – they incorrectly accept *het schaap* ('the sheep'), a referential NP, as the antecedent for the pronoun *hem* ('him') as often as they do *elk schaap* ('each/every sheep'), a QP, (Drozd & Koster, 1999; van Koert, Koeneman, Weerman & Hulk, 2015; Philip & Coopmans, 1996). Yet, English children differentiate (1c) and (1d) by accepting local referential antecedent *the sheep* more frequently than the local quantificational antecedent *every sheep* (Chien & Wexler, 1990; Marinis & Chondrogianni, 2011).[2]

(1) Binding examples

a. De kangoeroe$_i$ zegt dat het schaap$_k$ hem$_{i/*k}$ krabt.
The kangaroo says that the sheep him scratches
'The kangaroo says the sheep is scratching him.'

b. De kangoeroe$_i$ zegt dat elk schaap$_k$ hem$_{i/*k}$ krabt.
The kangaroo says that every sheep him scratches
'The kangaroo says the every sheep is scratching him.'

c. The kangaroo$_i$ says the sheep$_k$ is scratching him$_{i/*k}$.

d. The kangaroo$_i$ says every sheep$_k$ is scratching him$_{i/*k}$.

This difference is most visible when Dutch and English children are directly compared on the same methodology, as Van Koert *et al.* (2015) show. Since

[2] There is much discussion in the literature about this so-called *quantificational asymmetry* and whether significant differences found between (1c) and (1d) can be attributed to experimental artefacts (see Conroy, Takahashi, Lidz & Phillips, 2009 for discussion). However, cross-linguistic differences arise when Dutch and English children are tested using the same methodology (van Koert et al., 2015). This means that these children build different interpretations; the task for linguists is to find out what they base these interpretations on. The quantifier in (1) is probably not the only factor affecting the children's performance; it is possible that other interfering factors include: (i) the necessity of an overt complementizer in Dutch versus the optionality of the overtness of the complementizer in English; (ii) the SOV-word order in the Dutch subordinate clause versus the SVO-word order in the English subordinate clause; (iii) the status of *hem* versus *him* (see Philip & Coopmans, 1996). Nevertheless, for reasons of scope, the present chapter explores whether the interpretative differences of the quantifier in both languages can explain the differences found between the Dutch and English children on (1b) and (1d).

quantifiers in combination with their predicates can give rise to two interpretations – a distributive or a collective one – it could be that one language prefers one of the two interpretations and the other language the other interpretation, leading to different results between the (1b) and (1d) conditions. The hypothesis that children (and adults) may have different interpretative preferences cross-linguistically is pursued in this study.

Distributive and collective interpretations transpire through distinct predications. The collective reading of (2) enables the VP *tickling a turtle* to be predicated of the group of bears that is represented by the QP-subject. This would result in a representation containing only one turtle, which the bears together are tickling.

(2) Every bear is tickling a turtle.

In contrast, the distributive reading of (2) entails that the VP *tickling a turtle* is predicated of each individual bear in the set denoted by the QP-subject. In other words, each bear alone is tickling one turtle. Syrett and Musolino (2013) explain that the VP predicate can thus apply at two levels: it can either signify a property of the group (collective reading) or it can denote a property of the individuals (distributive reading). Children quickly learn to represent these two levels, as previous research (Avrutin & Thornton, 1994; Syrett & Musolino, 2013) concluded that three-year-olds are able to generate collective and distributive interpretations. However, this does not mean that children immediately align these interpretations with the adult preferences, nor does it mean that these interpretations are immediately linked to the three universal quantifiers.

The findings of the present study demonstrate that there are differences between the interpretative preferences for the three universal quantifiers in Dutch and English: (i) Dutch adults show different interpretative preferences from English adults; (ii) Dutch children perform adult-like at six years, while English children are still not completely adult-like at nine years; (iii) *elk* and *every* trigger different interpretations, especially for children, which could well explain the findings in (1).

The chapter is organised as follows: Section 3.2 presents the theoretical background, which explains the distributive and collective readings and lists the principal differences between the Dutch and English quantifiers. It also gives an overview of the developmental background. At the end, this section posits the research questions. Then, Section 3.3 describes the experimental design and the methodology. Section 3.4 presents the analysis of the results, which, subsequently will be discussed in Section 3.5 on the basis of three above-mentioned differences: (i) between the adult languages; (ii) in the acquisition path; (iii) between *elk* and *every*. Finally, Section 3.6 concludes the chapter.

3.2. Background

3.2.1. Theoretical background

The interaction between quantified expressions, such as *every bear*, and their predicates, as in (2) repeated here in (3), typically give rise to two possible interpretations: a distributive (3a) and a collective one (3b).

(3) Every bear is tickling a turtle.
  a. ∀x [bear (x) → ∃y [turtle (y) ∧ tickle (x,y)]]
  b. ∃y [turtle (y) ∧ ∀x [bear (x) → tickle (x,y)]]

Distributive readings occur when the quantified expression receives a wide scope interpretation over the indefinite object (May, 1982; Tunstall, 1998). Hence, (3a) can be understood as: for every x such that x is a bear there is a y such that y is a turtle, and x tickled y. When the quantifier receives wide scope, the predicate is applied to each of the individuals denoted by the subject: each of the individual bears in the group has the property of tickling a turtle (Syrett & Musolino, 2013). The collective reading in (3b) arises when quantifier raising is applied to the indefinite object, so that it scopes over the quantified expression. Also known as the existential wide scope reading, (3b) can be paraphrased as: there is a y such that y is a turtle, for every x such that x is a bear and x tickled y. When the indefinite object has wide scope, the predicate is applied to the group as a whole: the group has the property of tickling the turtle (May, 1982; Tunstall, 1998). Ambiguity in the VP predicate causes these two readings to be available, since purely distributive (*smile, be asleep, weigh 1 kg*) or purely collective predicates (*surround, gather, meet*) only give rise to one of the two readings (Syrett & Musolino, 2013; Winter, 2002). Ambiguous predicates, such as *tickling a turtle*, allow for distributive and collective readings.[3] Thus, these predicates can either represent multiple tickling events, as in the distributive reading, or one joint tickling event, as in the collective reading. In case of the former, the event applies to each individual denoted by the subject and the indefinite object is therefore distributed. In the latter case, the predicate applies to the whole group, causing the indefinite object to receive a singleton reading.

Predicate-logic, which is represented in (3), treats the three universal quantifiers in Dutch and English on a par; yet, there exist syntactic and semantic differences between them. A number of syntactic differences between these quantifiers oppose *alle* with *ieder* and *elk* and *all* with *each* and *every*. For example, number agreement shows this opposition, as *alle* and *all* trigger plural agreement on the verb but *ieder*, *elk*, *each* and *every* trigger singular agreement (Broekhuis & den Dikken, 2012; Vendler, 1967). Partitive and floating constructions make different distinctions: *ieder, elk*, *all* and *each* allow these constructions, yet *alle* and *every* do not, as in (4) and (5) (cf. for Dutch:

[3] We follow Syrett and Musolino (2013), who follow Link (1987) among others, and assume that these predicates are ambiguous and not underspecified.

Broekhuis & den Dikken, 2012; van der Ziel, 2012; for English: Beghelli & Stowell, 1997; Roeper et al., 2006).

(4) Partitive constructions
   a. *Alle / elk / ieder van de beren kietelde een schildpad.
   b. All / *every / each of the bears tickled a turtle[4].

(5) Floating constructions
   a. De beren kietelden *alle / elk / ieder een schildpad[5].
   b. The bears all / *every / each tickled a turtle.

Partitive and floating constructions are markers for distributive interpretations of the predicate (Roeper et al., 2011); therefore, the differences given in (4) – (5) could affect language acquisition. Since *alle* and *every* lack these distributive markers, they carry less distributive information. Thus, some of these syntactic differences aid children's distributive interpretations of the quantifiers and their predicates, whereas others push children more towards collective interpretations.

There are semantic differences too, such as, for instance, co-occurrence with purely collective predicates and situation-mapping. Purely collective predicates again show this opposition between *alle* and *all* on the one hand and *ieder, elk*, *each* and *every* on the other, because the former can appear with purely collective predicates, but the latter absolutely cannot. Situation-mapping, however, shows more subtleties. All of these quantifiers can appear with prototypical distributive situations (there is a one-to-one pairing of agents and objects) and partial distributive situations (multiple agents can be paired with the same object and/or one agent is paired with multiple objects) (Ioup, 1975; Tunstall, 1998; van der Ziel, 2012). When (6a-d) are interpreted as prototypical distributive situations, there are multiple men each pushing their own car.

(6) Interpretations
   a. Iedere / elke man duwt een auto.
   b. Each / every man is pushing a car.
   c. Alle mannen duwen een auto.
   d. All the men are pushing a car.

There are also collective action situations (all the individual agents have the property of pushing but there is only one car for all of the agents together) and

[4] *Every* can appear in partitive constructions, when it is accompanied by *one*, as in: *every one of the bears tickled a turtle* (Vendler, 1967).

[5] The Dutch quantifier *alle* can license floating when it is part of the more complex quantifier *allemaal* "all-whole" (Broekhuis & den Dikken, 2012, p.906; van der Ziel, 2012, p.97).

collective responsibility situations (the group of men has the property of pushing). When (6) is seen as a collective action situation, then there is one car being pushed by multiple men together (Brooks & Braine, 1996; Tunstall, 1998; van der Ziel, 2012). A collective responsibility situation, on the contrary, means that the men worked together as a group to accomplish the task and not all of them have the property of pushing a car; hence, one of them may actually be sitting behind the steering wheel while the others are pushing (Ioup, 1975; Brooks & Braine 1996; van der Ziel, 2012). These latter events can only be illustrated with *all* and *alle*.

Collective action situations are interesting types of events, as there are two ways to arrive at an interpretation that makes them felicitous. Firstly, if (6) is given an existential wide scope reading, meaning that the indefinite object *a car* scopes over the quantified subject, then there is only one car that is pushed by a group of men, which is true for the collective action situation. Alternatively, if a universal wide scope reading is construed for (6), i.e. the quantified subject takes scope over the indefinite object, then each of the men is pushing a car but it does not necessarily have to be his own car, because it could happen to be one and the same car for all of the men; therefore, this interpretation is also true for the collective action situation. It is impossible to determine which of these two readings a hearer has built when he accepts a collective action situation for (6) (Crain et al., 1996; Guasti, 2002). Nevertheless, for languages that do not allow inverse scope – such as Dutch, for it is scope rigid (Philip, 2005), meaning that only the linear order of the quantifiers can be used in interpretation – the existential wide scope reading in (6) seems unavailable. Hence, if Dutch adults accept collective action situations for sentences like (6), which they do (Hendriks et al., 2012), then they probably rely on the universal wide scope reading. Although *ieder*, *elk* and *alle* are felicitous quantifiers to describe collective action situations, it does not seem unlikely that *alle* will cause the greatest number of selections of those situations, because of its syntactic and semantic characteristics that signify a more collective meaning. English allows inverse scope, meaning that both the existential and the universal wide scope readings are available. *Each* cannot be used to describe collective action situations, because of its distributive force (Beghelli & Stowell, 1997; Tunstall, 1998; Vendler, 1967); however, *every* and *all* are appropriate quantifiers for describing collective action situations but the latter will probably result in more picks of those situations than the former, due to the syntactic and semantic aspects of *all* that align with collective interpretations.

All in all, quantifier scope relations can give rise to distributive and collective interpretations of ambiguous predicates. The present experiment employs pictures showing prototypical distributive situations and collective action situations, which are described by sentences containing one of the three quantifiers in subject position as in (6). This experiment aims to determine the preferred interpretation of the three Dutch universal quantifiers by Dutch children and adults and the preferred interpretation of the three English universal quantifiers by English children and adults. The reasoning is as follows: if a participant – upon hearing a test sentence with a particular

quantifier – selects the picture showing the prototypical distributive situation, then he is argued to have constructed a wide scope reading of the quantifier, thereby arriving at the distributive interpretation of the predicate. If, on the other hand, a participant chooses the picture showing the collective action situation, then he is considered to have built a wide scope reading of the indefinite object, which leads to a collective interpretation of the predicate.[6] Adults and children have been subjected to grammaticality judgment tasks including sentences with quantified expressions in subject position (for Dutch: Hendriks et al., 2012; for English: Crain et al., 1996; Ionin, 2010); however, interpretation preferences are less studied, nor has Dutch been directly compared to English on this specific preference task. Before we move on to the actual experiment, let us first give a brief overview of the relevant studies into child quantifier interpretations.

3.2.2. Acquisitional background

Despite substantial research into children's quantifier interpretations, few of these studies investigated the preferred readings of quantifiers in combination with ambiguous predicates; instead many directed their attention to non-exhaustivity. Non-exhaustive situations are scenes in which there are a number of agents each paired with an object and there is one extra object; for example, three boys are each holding a balloon and a fourth balloon is floating in the air. When four to six-year-old children are asked whether every boy is holding a balloon in that situation, many of them will say *no* and explain their answer by commenting on the fourth balloon (e.g. for Dutch: Philip, 2005; Smits, 2010; for English: Brooks & Sekerina, 2005/2006; Crain et al., 1996; Roeper et al., 2006). They think that not only should each boy hold a balloon; each balloon should also be held by a different boy. This holds for Dutch as well as for English; yet, the languages differ in non-exhaustivity when different types of situations are used. Dutch children, aged four and five, accepted non-exhaustive prototypical distributive situations more frequently than they did non-exhaustive collective action situations, regardless of the quantifier, as *ieder* and *alle* were used to describe both situations (Drozd & van Loosbroek, 2001). English children, on the contrary, aged between five and nine, performed more adult-like on the non-exhaustive collective action situations described with *all* than on the prototypical distributive situations described with *each* (Brooks & Sekerina, 2005/2006, Experiment 1). Although different methodologies were used – a truth value judgment task in the Dutch study and a picture selection task in the English experiment – these results suggest that Dutch children prefer *ieder* and *alle* to describe prototypical distributive situations, rather than collective action situations. Yet, English children find collective action situations described with *all* easier to comprehend than prototypical distributive situations described with *each*. Taken together these findings suggest that there

[6] For ease of exposition, we will from now on use the terms *distributive interpretation* when referring to the wide scope interpretation of the quantifier in subject position and *collective interpretation* when we mean the wide scope interpretation of the indefinite object.

are differences between the interpretative preferences of quantifiers between Dutch and English children.

When non-exhaustive situations are explicitly compared to exhaustive situations, the former do not reveal the full extent of Dutch and English children's comprehension of distributivity (Roeper et al., 2011; van der Ziel, 2012). Therefore, examining children's interpretative preferences of quantifiers on exhaustive situations should reflect best what they understand about distributivity and collectivity. Since children have been shown to understand quantifiers from the age of four years onwards (Guasti, 2002; Philip, 2005) – and exhaustive situations reveal their comprehension better than non-exhaustive situations – the present experiment draws on exhaustive situations to determine whether Dutch and English children from five years onwards have already set their interpretative preferences of quantifiers and, if so, what their preferences are. It is likely that our results on exhaustive situations will show similarities with previous findings on non-exhaustive situations; however, studies on exhaustive situations might have revealed different outcomes. We will now turn our attention to a couple of studies that probed into Dutch and English children's knowledge of quantifiers in combination with the exhaustive situations.

There are two recent studies that investigated English children's interpretations of quantifiers in subject position in combination with exhaustive situations. Firstly, Brooks and Braine (1996) conducted a picture selection task with two pictures in their Experiment 2: one picture showed a prototypical distributive situation of, for example, three boys each building their own small boat; the other picture showed a collective responsibility scene with three boys together building one boat. The relevant test sentences included: *all the boys are building a boat* and *each boy is building a boat*. They tested four to nine-year-old children and adults. Children generally picked the collective responsibility scene for *all* and the prototypical distributive one for *each*, although it was only from 8 years onwards that they only chose the distributive picture for *each*. Adults behaved similarly to children, although their results were more pronounced. Secondly, Achimova *et al.* (2012) carried out an elicitation experiment comparing children's answers to *each* and *every* in *which*-questions. Relevant test sentences were of the type: *which flavour ice cream did each/every dog try?* They tested four and five-year-olds who answered both questions with pair-list answers (e.g. *the ginger dog tried vanilla, the white dog tried strawberry and the black dog had chocolate*) and with single answers (e.g. *chocolate*). This means that these children can give distributive and collective interpretations to *each* and *every*. Adults differentiate: they give pair-list answers to *each*, as they can only give it a distributive interpretation, and single answers to *every*, because they give it a collective reading in this situation. Both studies concluded that children are still learning the exact distributivity patterns of *each* and *every*.

Hendriks *et al.* (2012) examined Dutch children's interpretation of quantifiers in subject position tested with exhaustive situations. They conducted a grammaticality judgment task in which children and adults were

shown sequences of three pictures and were then asked whether the sequence matched the sentence that was read out *yes* or *no*. Picture sequences either showed prototypical distributive situations or collective action events. Relevant test sentences were of the type given in (7).

(7) Elke beer kietelt een schildpad.
Every/each bear tickles a turtle
'Every bear is tickling a turtle.'

The results revealed that four to seven-year-olds and adults accepted both distributive and collective situations for (7). However, the finding that children and adults accept both situations does not mean that they do not prefer one interpretation to the other. A study into preferences can reveal this.

The above studies show that Dutch and English children alike are able to interpret quantifiers in subject position in an adult-like manner in those cases where two interpretations are possible: a distributive and a collective interpretation of the predicate. Therefore, they imply that Dutch and English speakers behave similarly: they accept both interpretations. However, these experiments failed to show which interpretations Dutch children prefer for all the quantifiers and which readings English children prefer for *every*. The studies on non-exhaustive situations implied that Dutch children understand the quantifiers differently from how English children comprehend them, but a direct comparison has not been executed yet. In addition, these previous findings do not inform us to what extent children's quantifier interpretation preferences align with adults' preferences. Specifically, these results do not tell us whether certain preferences influence quantifier conditions in other tests, such as our previous binding experiment where Dutch children performed drastically differently from English children on exactly those quantifier conditions (van Koert et al., 2015). We want to determine which situation – a prototypical distributive event or a collective action event – Dutch and English children prefer to select upon hearing one of the three quantifiers. Both situation types were used in the binding test and a picture selection task with these two event types will help us ascertain which interpretation of the quantifier (a distributive or collective one) children and adults use to arrive at their preferred reading.

3.2.3 Research questions

The similarities and differences between the quantifiers in these languages and the previous experimental findings for them lead us to the following research questions:

(i) Do Dutch adults have different interpretation preferences from English adults regarding each of the quantifiers?

Little is known about Dutch adults' interpretative preferences; it is clear they accept both the prototypical distributive and the collective action situation for *elk* (Hendriks et al., 2012). English adults, however, show a preference for the prototypical distributive situation upon hearing *each* and a preference for the collective responsibility situation upon hearing *all* (Brooks & Braine, 1996). It is unclear whether they also prefer the collective action situation for *all*. Finally, adults typically show a preference for a prototypical distributive situation upon hearing *every* but prefer the collective action situation in about 25% of the cases (Anderson, 2004; Raffray & Pickering, 2010). The question is whether Dutch and English adults differentiate the three quantifiers in a similar way.

Secondly, we would like to know whether children have similar interpretation preferences to adults. Dutch children have similar grammaticality judgments to adults with regard to (7) (Hendriks et al., 2012) but does this mean that their interpretative preferences are similar, too? Thus, our second question is:

(ii) Do children have different interpretation preferences from adults regarding each of the quantifiers?

The studies discussed above showed that English children seem to be unaware which contexts cue a particular interpretation (Achimova et al., 2012; Brooks & Braine, 1996). Hence, it could very well be that their quantifier interpretation preferences are distinct from the English adults'.

Finally, binding studies found that Dutch quantified conditions (containing *elk*-subjects) yield different responses than English quantified conditions (including *every*-subjects) (Chien & Wexler, 1990; Drozd & Koster, 1999; van Koert et al., 2015; Marinis & Chondrogianni, 2011). Our third question, therefore, asks:

(iii) Do Dutch children assign a distributive reading to *elk*-subjects significantly more often than English children do to *every*-subjects?

If the current experiment finds also differences between *elk* and *every*-subjects, then it can be assumed that those differences on the binding tasks stem from differences between the interpretative preferences of Dutch and English children (van Koert et al., 2015).

3.3. The experiment

The main goal of these experiments was to establish the Dutch and English children's and adults' interpretative preferences of each of the quantifiers. We want to establish whether there are differences between Dutch and English adults' quantifier preferences. Moreover, we want to determine whether children's interpretative preferences follow those of adults'.

3.3.1. Participants

Participants took part voluntarily in this experiment and were able to withdraw at any moment. All the children and adults liked the pictures and none of them were fatigued at the end of the experiment.

3.3.1.1. Dutch participants

We tested 77 Dutch monolingual children between the ages of 5 and 9. We were interested in this age range for several reasons: (a) to see whether the interpretation preferences change over time we needed multiple age groups; (b) to be able to compare our results with previous studies that tested children in these age categories (cf. Brooks & Braine, 1996; Hendriks et al., 2012); and (c) to compare these results to the results obtained in the binding study (van Koert et al., 2015) where children were aged between 6;3-9;1. Thus, the child participants of the present study were divided into five age groups: there were 15 five-year-olds (mean age = 5;6, SD = 3 months, range: 61 – 71 months), 15 six-year-olds (mean age = 6;5, SD = 3.5 months, range: 73 – 83 months), 17 seven-year-olds (mean age = 7;6, SD = 3 months, range: 84 – 95 months), 15 eight-year-olds (mean age = 8;4, SD = 3 months, range: 96 – 106 months), and 15 nine-year-olds (mean age = 9;5, SD = 2.5 months, range: 108 – 116 months).

The children were drawn from one primary school in Nieuwkoop, Zuid-Holland, the Netherlands. All children were monolingual speakers of the standard variety of Dutch. None of the children had any reported language problems.

In addition, 19 adults (mean age = 27;6, SD =2.2 years, range: 24 – 32 years) were tested. The adult participants were monolingual speakers of the standard variety of Dutch. All had completed their higher professional education and none had studied languages.

3.3.1.2. English participants

We tested 75 American English monolingual children between the ages of 5 and 9. Participants were divided into 5 age groups: there were 15 five-year-olds (mean age = 5;6, SD = 3.5 months, range: 60 – 71 months), 15 six-year-olds (mean age = 6;8, SD = 3.5 months, range: 72 – 83 months), 15 seven-year-olds (mean age = 7;5, SD = 3.5 months, range: 85 – 95 months), 15 eight-year-olds (mean age = 8;5, SD = 3.5 months, range: 96 – 106 months) and 15 nine-year-olds (mean age = 9;3, SD = 2 months, range: 108 – 115 months).

The children were recruited from three primary schools in Northampton and Amherst, Massachusetts. All children were monolingual speakers of the standard variety of American English. None of the children had any reported speech problems.

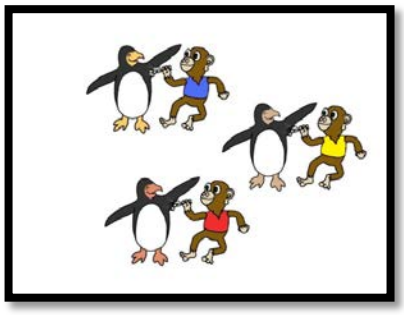
In addition, 25 adults (mean age = 21, SD = 1.6 years, range: 19 – 27 years) were tested. The adult participants were monolingual speakers of the standard variety of American English (n=22) or of British English (n=3). All were students of various degrees.

3.3.2. Experimental Methodology

The experimental method was a picture selection task involving two pictures, comparable to Brooks and Sekerina's (2005/2006) experiments, to Brooks and Braine's (1996) Experiments 1 and 2, to Experiment 2 in Syrett and Musolino's study (2013) and to the Hebrew version of the PST described in Ruigendijk *et al*. (2010). Our pictures were initially created by Hendriks *et al.* (2012) but we modified them so that they would meet the demands of the present experiment.[7] A picture selection task is one of the easiest designs to measure children's and adults' interpretation preferences (Baauw, Zuckerman, Ruigendijk & Avrutin, 2011; Syrett & Musolino, 2013).

3.3.2.1. Materials

The picture selection task consisted of items showing two pictures: one picture presented a prototypical distributive event, where each of the three protagonists was paired with one experiencer, Figure 3.1; the other picture displayed a collective action situation, where the three protagonists together were paired with one experiencer, Figure 3.2.



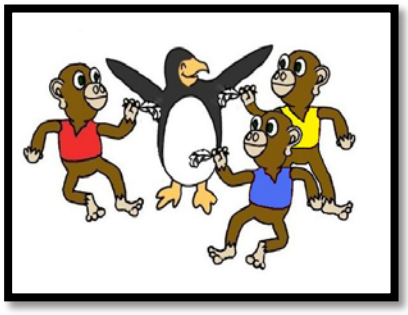


Figure 3.1. Prototypical distributive situation. Figure 3.2. Collective action situation.

The experiment contained two practice items, six filler items and 24 test items. All sentences were mono-clausal and included action verbs. Practice items served mainly as warm-ups to get the children used to the idea of choosing one of the pictures. Filler items showed either two pictures with a prototypical distributive situation or two pictures with a collective action event. An example of a sentence accompanying the filler item is given in ((8) for Dutch, (9) for English).

(8) Een kat schildert een egel.

(9) One cat is painting a hedgehog.

[7] We are grateful to Petra Hendriks for making her pictures available to us.

One of the pictures showed two cats each painting one hedgehog, whereas the other showed one cat painting one hedgehog. There were three hedgehogs in the picture.

Test items were of the type: [[QP-subject][action verb] [indefinite NP-object]]. Examples are given in (10) (Dutch) and (11) (English).

(10) Iedere aap kietelt een pinguïn.

(11) Each monkey is tickling a penguin.

Six sentences started with *ieder(e)* ('each/every'), six with *elk(e)* ('each/every') and six with *alle* ('all') in the Dutch version; six sentences started with *each*, six with *every*, and six with *all* in the English version.[8] Six action verbs were used; for Dutch: *rijden op* ('ride'), *duwen* ('push'), *schminken* ('paint'), *aankleden* ('dress'), *vastbinden* ('tie'), *kietelen* ('tickle'); for English: *ride, push, paint, dress, tie, tickle*. Each quantifier appeared once with each verb.

There were two versions of the test: only the order of presentation was different. The first filler appeared after two test items in version A and after one test item in version B. Fillers appeared after every three test items in the remainder of the test. The versions were the same across the languages.

3.3.2.2. Procedure

All the child participants were tested in a quiet room at their primary school. The pictures were presented in PowerPoint on a laptop. First children were shown a picture of most of the animals they were to see later. They were asked to name the animals. Subsequently, the experimenter explained that these animals would do funny things to one another in the pictures. She further informed the child that there would be two relatively similar pictures on the screen and the experimenter would then read out a sentence and the child had to point to the picture that matched the sentence best. The experimenter asked if the child understood the task. If so – and this was the case for all children – the test began with two practice items; the experimenter pointed out that there was one picture on the left and another one on the right. She explained what the children saw in the pictures and then read out the practice sentence. She repeated this procedure for the second practice item. Subsequently, the experimenter continued with the test items, for which she said the following ((12) for Dutch, (13) for English).

(12) Deze twee plaatjes gaan over kietelen. Als ik zeg: 'Iedere aap kietelt een pinguïn', welk plaatje past daar dan het beste bij, volgens jou?

[8] Since we wanted to keep the tests in both languages as similar as possible, we chose to use *all* instead of *all the* or *all of the*. A few adult participants felt that *all the* or *all of the* would have sounded more natural; however, our results for *all* are identical to Brooks and Braine's findings for *all the*, who found that children's understanding of *all the* closely resembled adults' interpretation preferences (1996, p. 255).

(13) These two pictures are about tickling. If I say: 'Each monkey is tickling a penguin', which picture would that be, do you think?

When the experimenter finished testing children could pick out a sticker. The test took about 12 minutes for the youngest children and about 7 minutes for the older children.

3.4. Results

The overall mixed factor ANOVA on the four groups (Dutch adults, Dutch children, American English adults and American English children) revealed a main effect of Language ($p < 0.001$) and a main effect of Age Groups ($p = 0.001$), meaning that the language and age groups had different interpretation preferences from one another; therefore, separate ANOVAs were conducted between Language and within Age Groups and between Age Groups but within Language.[9] Section 3.4.1 compares and contrasts the Dutch adults with the English adults and the Dutch children with the English children; Section 3.4.2 presents the Dutch results and Section 3.4.3 the English ones.

3.4.1. Dutch versus English results

As there was an interaction with Age Groups in the overall mixed factor ANOVA, there was a possibility that all the adults were performing identically but just different from the children or vice versa. To exclude this possibility, all the adults were analysed separately from the children.

To determine whether the Dutch adults differed significantly from the English adults in their performance a separate ANOVA was carried out, which revealed a main effect of Language ($p < 0.001$), meaning that the Dutch adults behaved significantly differently from the English adults on their interpretation of the quantifiers. To find out whether the Dutch children performed differently from the English children an ANOVA was conducted, which, again, uncovered a main effect of Language ($p < 0.001$), showing that the Dutch children performed differently from the English children.

[9] There is discussion in the literature on whether categorical data can be transformed to continuous data in order to carry out ANOVAs or whether mixed logit models should be used to analyse these categorical data (cf. Jaeger, 2008). We conducted mixed model logistic regression analyses in R (lme4 package, Version 1.1-7) with subjects and verbs as random effects and found that most models (such as those including Age) could not converge, due to the little variation in the Dutch preferred interpretations of *ieder* and *elk* and the adult English preferred interpretations of *each*. In other words, they were too consistent in their choice of preferred readings, as Figures 2 and 3 demonstrate. The models that could converge revealed similar outcomes as the ANOVAs: the Dutch adults and children behaved differently from the American English adults and children. Since we wanted to compare children's interpretation preferences to those of adults, we chose to transform our categorical data to continuous data and run ANOVAs.

3.4.2. Dutch results

To discover whether the Dutch adults behaved significantly differently from the Dutch children, their data were analysed in a mixed factor ANOVA with Quantifier Type (ieder, elk, alle) as a within group variable and Age Groups (adults, five, six, seven, eight, nine-year-olds) as a between groups variable. Pairwise comparisons were carried out with Bonferroni correction.[10]

The ANOVAs revealed a main effect of Quantifier Type (F (2, 89) = 34.7, p < 0.001, η^2 = 0.44) and a main effect of Age Groups (F (5, 90) = 4.5, p = 0.001, η^2 = 0.20). Pairwise comparisons for Age Groups showed that – everything else being equal – the five-year-olds gave significantly fewer distributive readings to the quantifiers than the six, seven and nine-year-olds and the adults. The five-year-olds did not significantly differ from the eight-year-olds, nor did the eight-year-olds perform significantly different from the other age groups. In other words, only the five-year-olds performed differently, the other age groups behaved similarly to one another.

Pairwise comparisons for Quantifier Type showed that – everything else being equal – the quantifier *alle* received fewer distributive interpretations than the quantifier *ieder* (mean percentage distributive interpretations: 66.2% vs. 91.1%, p < 0.001) and fewer than the quantifier *elk* (mean percentage: 91.5%, p < 0.001). The quantifiers *ieder* and *elk* did not significantly differ from each other.

Finally, overall one-sided t-tests showed that the five-year-olds gave significantly more distributive than collective responses to *ieder*, but they did not differentiate between distributive and collective readings for *elk* or for *alle*. The other age groups and the adults chose the distributive reading significantly more often than chance for *ieder* and *elk* but they were at chance for *alle*, meaning that they did not distinguish between the prototypical distributive situation and the collective action event.

Figure 3.3 displays the mean percentage of the selection of the prototypical distributive event for each quantifier by age group.[11]

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[10] A mixed factor ANOVA on the test items with Verb (rijden op, duwen, aankleden, vastbinden, kietelen, schminken) as a within group variable and Age Groups as a between groups variable revealed a main effect of Verb (F (5,68) = 5.6, p < 0.001, η^2 = 0.29). Pairwise comparisons for Verb showed that *vastbinden* received significantly more distributive readings than *rijden op* (mean percentage distributive readings: 90.8% vs. 81.6%, p = 0.028), *duwen* (mean: 80.8%, p = 0.016), *kietelen* (mean: 76.4%, p < 0.001) and *schminken* (mean: 81.8%, p = 0.017). In addition, *aankleden* received significantly more distributive readings than *kietelen* (mean: 84.7% vs. 76.4%, p = 0.026).

[11] Individual answer patterns show that in each age group about 20-30% of the children attribute the same number of distributive readings to *ieder, elk* and *alle*. From about 7 years onwards all of the children give more distributive readings to *ieder* and *elk* than to *alle*. Hence, the overall pattern in Figure 2 matches the individual patterns.

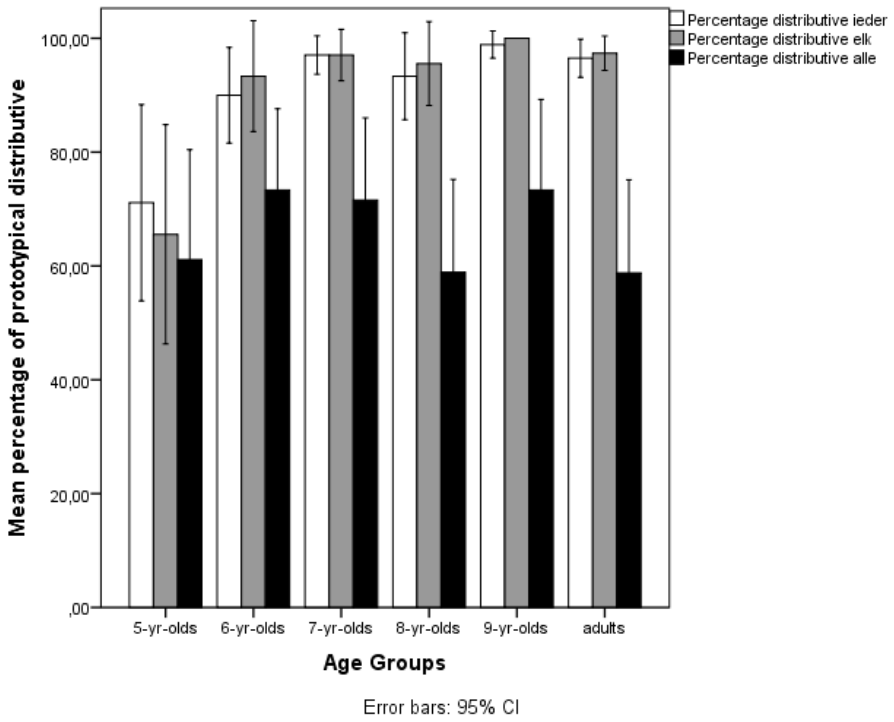

Figure 3.3. Mean percentage of selection of prototypical distributive event for the quantifiers *ieder*, *elk* and *alle* by age group.

3.4.3. English results

A mixed factor ANOVA was conducted on the test items with Quantifier Type (each, every, all) as a within group variable and Age Groups (adults, five, six, seven, eight, nine-year-olds) as a between groups variable. Pairwise comparisons were carried out with Bonferroni correction.[12] There was a main effect of Quantifier Type (F (2,188) = 160.4, p < 0.001, η^2 = 0.63) and an interaction between Quantifier Type * Age Groups (F (8,140) = 5.48, p < 0.001, η^2 = 0.24). To trace the source of the interaction separate ANOVAs were conducted for the English adults and children.

The separate ANOVA for the adults revealed a main effect of Quantifier Type (F (2, 23) = 63.0, p < 0.001, η^2 = 0.85). Pairwise comparisons showed that the quantifier *each* received significantly more distributive readings than the quantifier *every* (mean percentage distributive interpretations: 98.0% vs. 80.7%, p = 0.003) and more than the quantifier *all* (mean percentage: 26.7%, p

[12] A mixed factor ANOVA on the test items with Verb (ride, push, dress, tie, tickle, paint) as a within group variable and Age Groups as a between groups variable revealed a main effect of Verb (F (5,66) = 2.92, p = 0.019, η^2 = 0.18). Pairwise comparisons for Verb showed that *dress* received significantly more distributive readings than *tickle* (mean percentage distributive readings: 58.2% vs. 48.0%, p = 0.015). No other significant differences between the verbs were found.

< 0.001). The quantifier *every* also received significantly more distributive interpretations than the quantifier *all* (mean percentage: 80.7% vs. 26.7%, p < 0.001). One-sided *t*-tests showed no chance performance, meaning that both *each* and *every* received significantly more distributive than collective readings, whereas *all* received significantly more collective than distributive interpretations.

The separate ANOVA for the children found a main effect of Quantifier Type (F (2, 140) = 108.94, p < 0.001, η^2 = 0.61) and an interaction between Quantifier Type * Age Groups (F (8, 140) = 5.48, p < 0.001, η^2 = 0.24). Pairwise comparisons for Quantifier Type showed that – everything else being equal – the quantifier *all* received fewer distributive interpretations than the quantifier *each* (mean percentage distributive readings 26.0% vs. 74.4%, p < 0.001) and fewer than the quantifier *every* (mean percentage distributive 54.9%, p < 0.001). The quantifiers *each* and *every* also significantly differed from each other (mean percentage distributive interpretations 74.4% vs. 54.9%, p < 0.001). The interaction showed that the number of distributive interpretations for both *each* and *every* increased, as age increased, apart from the nine-year-olds who showed a lower mean percentage for distributive interpretations of *every* (60%) than the eight and seven-year-olds (67.8% and 61.1%, respectively). The number of distributive interpretations for *all* decreased, as age increased for all age groups.[13]

Finally, overall one-sided *t*-tests showed chance performance for *every*, meaning that *every* did not receive significantly more distributive than collective interpretations. The quantifier *each* received significantly more distributive than collective readings (t (74) = 6.74, p < 0.001) whereas the quantifier *all* received significantly more collective than distributive interpretations (t (74) = -7.01, p < 0.001). When the one-sided *t*-tests were broken down for the different age groups, the same pattern emerged, apart from the five-year-olds. The five-year-olds gave none of the quantifiers significantly more distributive than collective interpretations, meaning that they scored around chance for all of the quantifiers.

Figure 3.4 displays the mean percentage of the selection of the prototypical distributive event for each quantifier by age group.

[13] Individual answer patterns show the same trend: as children get older, they give more wide scope interpretations to *each* than to *every*, and more wide scope interpretations to *every* than to *all*.

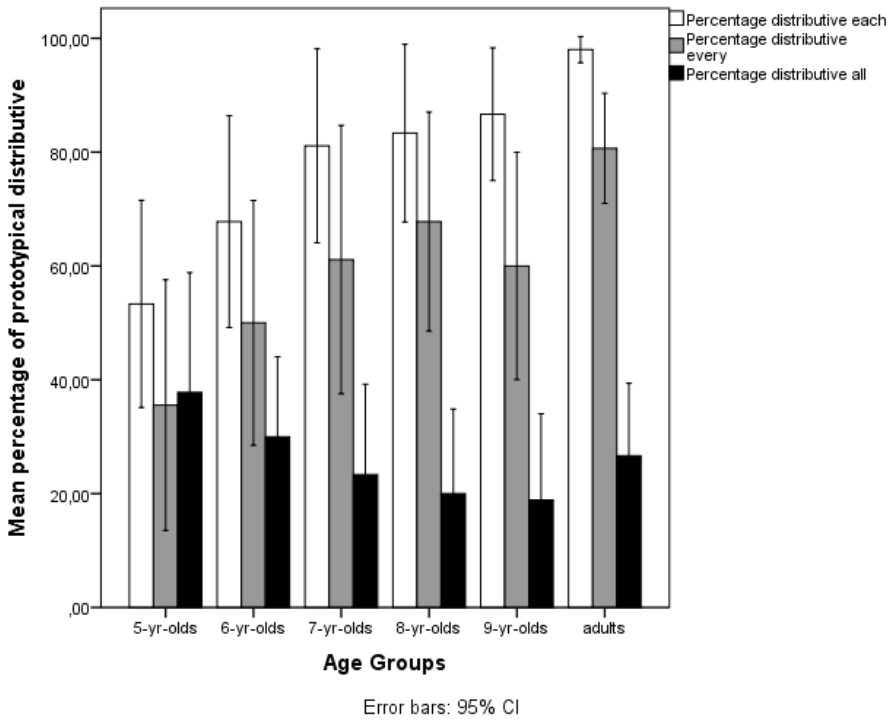

Figure 3.4. Mean percentage of selection of prototypical distributive events for the quantifiers *each*, *every* and *all* by age group.

3.5. Discussion

The principal results concerning the research questions are:

(i) Language-specific differences
Dutch adults are significantly more likely to select a prototypical distributive situation for quantifier-subjects than English adults are for quantifier-subjects.

(ii) Similarities and differences between children and adults
   a. Dutch children – from six years onwards – exhibit an identical dichotomous pattern to adults: *ieder* and *elk* consistently receive distributive interpretations and *alle* receives somewhat more distributive readings than collective interpretations.
   b. English children – from six years onwards – show a three-way pattern, just like adults. However, their preferences are less pronounced: *each* does not always receive a distributive interpretation and *every* receives both readings. Nonetheless, both adults and children typically give *all* a collective interpretation.

(iii) *Elk* versus *every*
Dutch children significantly choose the prototypical distributive situation for *elk* more frequently than English children do for *every*.

Taken together these findings revealed that the Dutch preferences add a dimension to the findings of the grammaticality judgments, because both adults and children accepted prototypical distributive and collective action situations for *elk* (Hendriks et al., 2012) but they consistently preferred the prototypical distributive situations for *elk* and *ieder*, and to some extent for *alle*. The present findings for the English preferences replicate previous findings, as adults typically select prototypical distributive situations for *each* and collective action situations for *all*; children also show this distinction but their preferences are less manifest (Brooks & Braine, 1996). The same is found for *every*: although adults are less consistent in their selection of the prototypical distributive situation for *every* than they are for *each*, they still show an undisputed preference for the distributive interpretation; children, however, show no convincing preference for either interpretation of *every*.

These diverging quantifier interpretation preferences are partly a reflection of the differences between the Dutch and English adult grammars, which will be discussed in Section 3.5.1. Moreover, they are partly a reflection of the differences between the acquisition paths of the preference patterns, which will be discussed in Section 3.5.2. Finally, Section 3.5.3 explores how these diverging quantifier interpretation preferences can explain the previously found differences between Dutch and English children on binding tasks.

3.5.1. Language-specific differences

Overall we found that Dutch adults select the prototypical distributive situation significantly more often than the English adults do, regardless of the quantifier. However, it is not merely the overall pattern that distinguishes these languages; rather, the individual quantifiers behave differently, too. Dutch adults prefer a distributive interpretation for *ieder* and *elk*, as demonstrated by their consistent selection of the prototypical distributive situation, but they show more variation with *alle*, because both situations were selected for *alle*. There is no quantifier in Dutch that pushes towards a consistent collective interpretation, since none of the quantifiers led to a reliable selection of the collective action event. Dutch is a scope rigid language, allowing only surface scope interpretations; as such, the quantified subject scopes over the indefinite object. This explains why we found that the distributive interpretation is overall the most preferred reading in Dutch. This does not mean that collective action situations are not accepted – because they are (Hendriks et al., 2012) – but given a choice Dutch adults prefer to understand quantified subjects as scoping over the rest of the sentence.

The preferred interpretation of *each* is comparable to the preferred reading of *ieder* and *elk*: these quantifiers yield a distributive interpretation

preference (cf. Brooks & Braine, 1996). Although a distributive interpretation is also preferred for *every*, it clearly shows more variation, as there is a 20-25% preference for the collective reading, replicating previous studies (Anderson, 2004; Raffray & Pickering, 2010). The one study that found a consistent preference for the collective reading for *every* had the indefinite object precede the quantified subject (Achimova et al., 2012), suggesting that adults preferably rely on the surface scope interpretation. Yet, *all* does not comply with this interpretative preference, for it triggers a considerable collective interpretation preference in the present experiment. The syntactic and semantic characteristics of *all*, see Section 3.2.1, may well cause this preference.

In general, a surface scope interpretation preference is found for both Dutch and English; yet, these languages differ in how strongly they project this surface scope interpretation preference. In Dutch there is a dichotomy: there is either a consistent distributive interpretation preference (*ieder*, *elk*) or there is a marginal distributive reading preference (*alle*). English displays a three-way pattern of preferences: a consistent distributive preference (*each*), a moderate distributive interpretation preference (*every*) or a collective preference (*all*). Thus, the adult preferences differ cross-linguistically. The next section discusses to what extent the children's interpretative preferences reflect the adults' preferences and explains the similarities and contrasts.

3.5.2. Language acquisition paths

The children's preferences largely reflected the adults' preferences but there were some differences cross-linguistically. The Dutch children from six years onwards behaved similarly to the adults: they consistently selected the prototypical distributive situation for *ieder* and *elk* and they chose both situations almost as often for *alle*. The Dutch five-year-olds, on the contrary, showed no reliable preference for each of the quantifiers. Likewise, the English five-year-olds gave all three quantifiers as many distributive as collective interpretations. There is a linear trend towards the adult pattern for the older age groups: as age increases *each* and *every* received more and more distributive readings, while *all* received more collective interpretations. On the whole, our results show that the Dutch six-year-olds behave like the Dutch adults, whereas the English children from six years onwards show a similar three-way distinction to adults, but display much more variation. Our results demonstrate that regarding quantifier preferences Dutch children undergo a condensed acquisition path, while English children experience a prolonged acquisition path. Let us try to explain the causes of this difference.

Early on Dutch children's preferences are aligned with those of adults: when they are six they exhibit the same behaviour as adults in quantifier interpretative preference tasks. Why are they faster than their English peers? Firstly, Dutch is limited to the surface scope interpretation, meaning that if a quantifier appears in subject position, it immediately has scope over the indefinite subject. Since this is the only possibility, the range of interpretation is clearly demarcated for Dutch children. Secondly, theirs is a simple learning

task, as they are presented with a dichotomy: *ieder* and *elk* receive a distributive interpretation, whereas *alle* is compatible with both a collective and a distributive reading. Thirdly, a Dutch child can rely on syntax and semantics to discover that *ieder* and *elk* are distributive, because they can float and can appear in partitive constructions, which are semantically aligned with the distributive interpretation (Roeper et al., 2006). *Alle* is syntactically more limited, as it cannot float nor can it appear in partitive constructions, but semantically it is flexible, because it is the only quantifier that can appear with purely collective predicates, such as *surround*. On that analysis, the speed with which Dutch children seem to grasp the adults' line of preferences of quantified subjects is to be expected: there are many cues in the input that guide them towards the adult interpretative preferences.

English children's preferences are in line with those of adults but they are much less pronounced; these children take some time to arrive at the consistent distributive interpretation of *each* and *every*. Why do they take more time than their Dutch peers? The quantifier *each* always scopes over other elements in the sentence (Beghelli & Stowell, 1996); therefore, children should be directed to the distributive interpretation. In addition, the syntactic and semantic characteristics of *each* point to the distributive interpretation, as *each* can float and appear in partitive constructions. Since all these cues point into the direction of a distributive interpretation, it is unexpected that the present study and previous studies found so much variation in the interpretations of *each* (Achimova et al., 2013; Brooks & Braine, 1996; Novogrodsky et al., 2013). *Each* is the only quantifier that always takes wide scope. If quantifiers are learned concurrently – i.e. children experience that two of the three quantifiers allow distributive and collective interpretations and only *each* does not – then children might be hesitant to commit themselves to limiting *each* to the distributive reading. *Every* sets children with another difficult task, because, unlike *each*, it allows distributive and collective interpretations but at the same time it fails to show the syntactic markers of distributivity: floating and partitive constructions. In light of these contradictory cues it is unsurprising that children take some time to comply with the adult grammar. Finally, children prefer to give the collective interpretation to *all*, similarly to adults, which is not unexpected. Despite the two interpretations being available for *all*, the syntactic (plural agreement) and semantic markers (purely collective predicates) clearly push towards a collective preference.

Taken together, the syntactic and semantic cues for quantified subjects seem more straightforward in Dutch than they are in English, causing Dutch children to show similar interpretative preferences to adults at a younger age than English children. The distributive interpretation for quantified subjects is more prevalent in Dutch than it is in English and children show this difference, too. Interestingly, these Dutch and English children did not only show different preferences on the test items, a few of them also reacted differently to the test items and to the fillers. Some of the children in our experiment asked after hearing a test sentence: "Do you mean one or three?". After the experimenter repeated the test sentence, English children would generally select the

collective picture, whereas Dutch children opted for the distributive situation. The filler items displayed a similar pattern: a few Dutch children did not accept a collective situation when a numerical subject was used (*two rabbits are biting a giraffe*), stating that the right picture was not there. One picture showed three rabbits together biting one giraffe, the other displayed two rabbits together biting one giraffe. A few English children, by contrast, failed to accept a distributive situation (*two monkeys are biting a camel*), again claiming that the correct picture was not shown. In this case, one picture displayed three monkeys each biting a different camel and the other showed two monkeys each biting a different camel. Whether the differences on the filler items are an artefact of the experiment – children's judgments of numerals might have been influenced by their judgments of quantifiers, especially since previous research showed that English children distribute plural numerical subjects and indefinite objects (Avrutin & Thornton, 1994; Syrett & Musolino, 2013) – or whether they truly reflect cross-linguistic differences, remains to be determined by further research.

3.5.3. Quantified interpretative preferences and binding

The present study shows that Dutch children prefer a distributive interpretation of *ieder* and *elk*, whereas English children display no such preference for *every*. How can these findings explain the results of previous binding studies? Binding studies have shown that on (1) – reprised here as (14) – there is a discrepancy between Dutch and English children's performances. Dutch children tend to accept the bound reading of the pronoun by the local quantified antecedent and English children reject it (for a comprehensive explanation see Van Koert et al., 2015). Can we explain this discrepancy by taking into account the present results?

(14) Binding examples

a. De kangoeroe$_i$ zegt dat het schaap$_k$ hem$_k$ krabt.
   The kangaroo says that the sheep him scratches
   'The kangaroo says the sheep is scratching him.'

b. De kangoeroe$_i$ zegt dat elk schaap$_k$ hem$_k$ krabt.
   The kangaroo says that every sheep him scratches
   'The kangaroo says every sheep is scratching him.'

c. The kangaroo$_i$ says the sheep$_k$ is scratching him$_k$.

d. The kangaroo$_i$ says every sheep$_k$ is scratching him$_k$.

The predicate *is scratching him* is an ambiguous predicate, just like *tickling a turtle* in (2), because it contains a variable *him*, and its interpretation depends on the reading given to the quantified subject. When a distributive reading is given to *every sheep*, there must be multiple scratching events, and hence, there must be multiple instantiations of *him*. For adults, this reading is blocked, because *him* cannot be bound locally in these contexts; however, for Dutch and English children this is possible (see Van Koert et al., 2015). When a collective

reading is given to *every sheep*, there must be one scratching event and only one instantiation of *him*; hence, the locally bound reading of the object pronoun is blocked.

Since *every* has much more collective potential for English children than *elk* has for Dutch children, the former are more likely to give a collective interpretation to *every sheep* in (14d) than their Dutch peers for (14b). If both Dutch and English children are unsure of the binding limitations of *him*, then our present results show that English children are actually helped by their collective interpretation of *every*, whereas Dutch children are hindered by their distributive interpretation of *elk*. However, a few English children have no clear interpretation preference for *every* and are just as likely to construct a distributive reading as they are to build collective reading. How can we explain their results? Van Koert *et al.* (2015) found that Dutch children performed around 60% correct on mismatching sentence-picture pairs including a referential NP subject and an object pronoun, as in (14a). In other words, Dutch children allow many instances of local binding of the object-pronoun. Since they always construct a distributed interpretation of the predicate, due to the quantifier *elk*, they do not show any difference between (14a) and (14b) in their performance. English children, on the contrary, have been found to perform around 75% correct on (14c) (Marinis & Chondrogianni, 2011). In those instances where some children do build a distributive reading of the predicate, there are two possible outcomes: (i) the distributive reading of *him* is blocked, because *him* cannot undergo local binding and they reject (14d) – similar to what they do in (14c); (ii) they accept (14d), because the distributive reading of *him* outweighs the blocking of the locally bound interpretation of *him*. All in all, differences in quantifier preferences cause Dutch children to behave differently on quantifier-variable binding from English children.

3.6. Conclusion

The present experiment employed a picture selection task to determine the interpretative preferences of universal quantifiers by Dutch adults and children and by English adults and children. Cross-linguistic differences were found, as Dutch adults displayed two types of preferences: a consistent distributive preference for *ieder* and *elk* ('each/every') and a marginal distributive preference for *alle* ('all'). English adults, on the other hand, showed three types of preferences: a consistent distributive preference for *each*, a moderate distributive preference for *every* and a collective preference for *all*. Even though the children's preferences were similar to the adults', the Dutch children's preferences paralleled those of the Dutch adults at a much younger age than the English children's preferences did those of the English adults. The explanation for this difference is that the syntactic and semantic properties of the Dutch quantifiers are aligned with the distributive interpretation to a greater extent than the English quantifiers. This also affects children's behaviour on other constructions involving universal quantifiers, such as binding, as their

quantifier interpretation preferences interact with their interpretation of the object reflexive or pronoun.

Chapter 4

How do Turkish-Dutch bilingual children interpret pronouns and reflexives in Dutch?*

Abstract

This study compared the comprehension of Dutch reflexives (zichzelf ('SE-self')) and pronouns (hem ('him')) by Turkish-Dutch bilingual children (n=33) to the comprehension of English reflexives (himself) and pronouns (him) by Turkish-English bilingual children (n=39) documented by Marinis and Chondrogianni (2011). The children were administered a Picture Verification Task in which they had to judge whether the sentence matched the picture. Test sentences were of the type [NP says [NP V NP]], where the embedded subject could be a referential NP (the rabbit) or a QP (every rabbit), and the embedded object a pronoun or a reflexive. Differences were found in the QP antecedent conditions: the Turkish-Dutch bilingual children performed target-like on the reflexives but not on the pronouns; the Turkish-English bilingual children performed at chance on the reflexives but scored target-like on the pronouns. When these findings were compared to the Dutch monolingual and English monolingual children's results respectively, it was found that the bilingual children showed similar patterns to the monolingual children. Although language-specific properties of Dutch and English are likely to be at play, the possibility of cross-linguistic influence from Turkish is considered, too.

4.1. Introduction

Binding studies have shown that monolingual Dutch and English children frequently accept co-identification between object pronouns and local c-commanding noun phrase (NP) antecedents, as in (1). Studies into adult L2 learners of English found that these learners do not err on object pronouns but may do so on object reflexives, depending on their first language (Demirci, 2001; White, 1998). For example, Demirci (2001) found that Turkish adult L2 learners of English allowed significantly more long-distance binding of reflexives than monolingual English speakers, especially if the context was biased towards a long-distant interpretation of the reflexive. Less research regarding binding has been done into bilingual children acquiring Dutch or English. Marinis and Chondrogianni (2011) studied early bilingual Turkish-English children and found that they showed non-target-like behaviour on two

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conditions: noun phrase (NP-)subjects and object pronouns, as in (1), and quantified noun phrase (QP-)subjects and object reflexives, as in (2).

(1) The cat says the dog_i is touching him_i.

(2) The $crocodile_i$ says every lion is touching $himself_i$.

Despite the Turkish-English bilingual children's non-target-like interpretations of the object pronoun in (1) and the object reflexive in (2), Marinis and Chondrogianni did not attribute these errors to influence from the children's Turkish but rather to developmental properties of their English, because these same patterns were observed in the monolingual English children tested in the same study.

In recent work (van Koert, Koeneman, Weerman & Hulk, 2015) we used Marinis and Chondrogianni's task to study monolingual Dutch children on the same two conditions. Our results showed interesting similarities and differences with respect to the monolingual English children tested by Marinis and Chondrogianni. In this chapter we present new results from Turkish-Dutch bilingual children who were administered the same test. Our goals are: (i) to compare the Turkish-Dutch bilingual children with the Turkish-English bilingual children; (ii) to determine whether for Dutch, too, monolingual and bilingual children behave alike; (iii) to consider an explanation for (the absence of) cross-linguistic influence in the Dutch and English bilingual children.

This chapter is organised as follows. In Section 4.2 we explain how pronouns and reflexives are distributed in Dutch, English and Turkish. In addition, we look at monolingual acquisition of the binding principles. Subsequently, in Section 4.3, we present the method of our study together with its participants. The statistical results for the Turkish-Dutch bilingual data are given and these are compared to the Turkish-English bilingual data collected by Marinis and Chondrogianni (2011). The bilingual results are discussed and particular emphasis is put on the diverging findings between the groups. It is suggested that the monolingual data should be considered. Therefore, Section 4.4 turns to the monolingual Dutch and English participants who were documented earlier (van Koert et al., 2015; Marinis & Chondrogianni, 2011). The bilingual data are compared to the monolingual data and it is found that the bilingual children follow the patterns of the monolingual children. In Section 4.5 we provide an overall discussion in which we discuss the absence of cross-linguistic influence for these Turkish-Dutch/English bilinguals. Finally, Section 4.6 concludes the chapter.

4.2. Anaphors: distribution and monolingual acquisition

Typically languages show a different distribution for reflexives than for object pronouns. These distinct distribution patterns are acquired by children at a certain stage but it is not necessarily the case that the patterns for reflexives and object pronouns are acquired simultaneously. In Section 4.2.1 we will look

at the distribution patterns of reflexives and pronouns in Dutch, English and Turkish, as found in the adult grammar. Subsequently, in Section 4.2.2, we will summarise the main findings of previous studies with regard to monolingual Dutch, English and Turkish acquisition of the distribution of reflexives and pronouns.

4.2.1. The distribution of reflexives and object pronouns

Whereas reflexives in Dutch, English and Turkish are generally locally bound, pronouns are commonly not bound by the local c-commanding antecedent. These different distribution patterns of reflexives and object pronouns are described in the binding principles (Chomsky, 1981). Principle A states that reflexives must be bound by their local c-commanding antecedents. Principle B states that pronouns must be free in their local clause. There are a few subtle differences between the behaviours of reflexives and pronouns in Dutch and English on the one hand and Turkish on the other. These will be discussed in Sections 4.2.1.1 and 4.2.1.2.

4.2.1.1. Dutch and English distribution

The binding principles imply a complementary distribution of reflexives and object pronouns. For Dutch and English these principles capture much of the behaviour, as shown in (3) and (4) for Dutch and (5) and (6) for English.

(3) De krokodil$_i$ zegt dat de leeuw$_j$ zichzelf$_{*i/j/*k}$ aanraakt.
The crocodile says that the lion SE-self touches
'The crocodile says the lion is touching himself.'

(4) De kat$_i$ zegt dat de hond$_j$ hem$_{i/*j/k}$ aanraakt.
The cat says that the dog him touches
'The cat says the dog is touching him.'

(5) The crocodile$_i$ says the lion$_j$ is touching himself$_{*i/j/*k}$.

(6) The cat$_i$ says the dog$_j$ is touching him$_{i/*j/k}$.

In the examples (3) – (6) co-indexation reflects co-identification. Only reflexives are allowed to refer to the local antecedent, i.e. the subject of the embedded clause, in (3) and (5). Pronouns have to refer to a distant antecedent: either to the subject of the main clause or to an exophoric antecedent, i.e. one occurring outside the sentence, as in (4) and (6).

A difference between Dutch and English is that the former has two reflexive anaphors: *zich* ('simple expression (SE)') and *zichzelf* ('SE-self'). Inherently reflexive verbs in Dutch take *zich* ('SE') and never use *zichzelf* ('SE-self') to express a reflexive action (Everaert, 1991; Reinhart & Reuland, 1993). Since *zich* ('SE') appears with only a few verbs, *zichzelf* ('SE-self') is typically selected to express a reflexive action. It has been found that monolingual Dutch five to

six-year-olds use *zichzelf* ('SE-self') significantly more frequently and more accurate than *zich* ('SE') (Ruigendijk et al., 2004).

Zich ('SE') can also occur in locative and directional prepositional phrases (PPs) where *zichzelf* ('SE-self') is ruled out but where *hem* ('him') can occur, as in (7).

(7) Klaas$_i$ duwde de kar voor zich$_i$ / hem$_i$ / *zichzelf$_i$ uit.
Klaas pushed the cart before SE / him / *SE-self out
'Klaas pushed out the cart.'
(example from Reinhart & Reuland, 1993, p. 690)

In (7) both *zich* ('SE') and *hem* ('him') may refer to *Klaas*. A similar phenomenon appears in English where both *himself* and *him* can occur in these PPs but refer to the subject of the main clause, as shown in (8).

(8) Max$_i$ pulled the cart towards him$_i$ / himself$_i$.
(example from Reinhart & Reuland, 1993, p. 686)

The examples in (7) and (8) violate the binding principles given in Section 4.2.1, because in this type of environments reflexive anaphors and pronouns are not in complementary distribution.

In short, although the clear-cut binding principles may explain the behaviours of reflexives and object pronouns in environments such as (3) – (6), they need additional postulations for the exceptions in (7) and (8). These exceptions may bear some resemblance to the divergent behaviour of the Turkish reflexive *kendisi* ('self.3SG').

4.2.1.2. Turkish distribution

Not only does Turkish have an overt pronoun *o* ('he/him') and a reflexive *kendi* ('self'), the language also includes null pronouns and the quasi-reflexive element *kendisi/kendileri* ('self.3SG/3PL') (Gürel, 2002; Marinis & Chondrogianni, 2011). The reflexive *kendi* ('self') is inflected for person, number and case and behaves according to Principle A, as in (9). The pronoun *o* ('he/him') is subject to Principle B, as can be seen in (10).

(9) Elif$_i$ Mehmet'in$_j$ kendi-ni$_{*i/j/*k}$ beğendigini söyledi.
Elif Mehmet.GEN self.ACC like.3SG.POSS.ACC say.3SG.PAST
'Elif$_i$ said that Mehmet$_j$ likes herself$_{*i}$/himself$_j$.'

(10) Elif$_i$ Mehmet'in$_j$ o-nu$_{i/*j/k}$ beğendigini söyledi.
Elif Mehmet.GEN s/he.ACC like.3SG.POSS.ACC say.3SG.PAST
'Elif$_i$ said that Mehmet$_j$ likes her$_i$/him$_{*j}$.'

Although the pronoun *o* ('he/him') and the reflexive *kendi* ('self') follow the binding principles, the quasi-reflexive element seems more deviant. Demirci (2001) describes the several properties of *kendisi* ('self.3SG') amongst which are

that it can take more than one possible antecedent, that it can be discourse bound, i.e. without an antecedent in the sentence, and that its binding may depend on the context. Thus, in (11) *kendisi* ('self.3SG') may refer to Elif, Mehmet or to an antecedent outside the sentence.

(11) Elif$_i$ Mehmet'in$_j$ kendi-si-ni$_{i/j/k}$ beğendigini söyledi.
Elif Mehmet.GEN self.3SG.ACC like.3SG.POSS.ACC say.3SG.PAST
'Elif$_i$ said that Mehmet$_j$ likes her$_{i/k}$/himself$_j$.'
(examples from Marinis & Chondrogianni, 2011, p. 205; adapted from Gürel, 2002, pp. 27-28)

Marinis and Chondrogianni note that *kendisi/kendileri* ('self.3SG/3PL') receives a reflexive reading when it refers to the local antecedent, *Mehmet* in (11); yet, when it refers to the non-local antecedent, *Elif* in (11), it receives a pronominal interpretation. Hence, the interpretation of *kendisi/kendileri* ('self.3SG/3PL') is heavily dependent on context. In fact, Demirci argues that pragmatics is an essential factor for the interpretation of reflexives in Turkish, because speakers have to rely on inference, context and world knowledge to decide between all the options. This is much more so in Turkish than in Dutch or English. Indeed, in sentences such as (11) where the interpretation of the reflexive is not biased toward the long distant or the local antecedent, Turkish L1ers will find both interpretations equally likely (Demirci, 2001).

4.2.2. Monolingual acquisition of the binding principles

4.2.2.1. Monolingual Dutch and English acquisition

Since the 1980s much research has been done on monolingual English and Dutch acquisition of the binding principles (for English: Chien & Wexler, 1990; Conroy et al., 2009; van der Lely & Stollwerck, 1997; Marinis & Chondrogianni, 2011; Thornton & Wexler, 1999; Wexler & Chien, 1986, *inter alios*; for Dutch: Bergmann et al., 2009; van Koert et al., 2015; Philip & Coopmans, 1995; van Rij et al., 2010; Ruigendijk et al., 2011; Sigurjónsdóttir & Coopmans, 1996; Spenader et al., 2009, *inter alios*). In many of these studies it was found that children performed more target-like on sentences involving Principle A – i.e. reflexives, as in (3) and (5) reprised in (12) – than on Principle B – that is object pronouns, as in (4) and (6) reprised in (13).

(12) The crocodile$_i$ says the lion$_j$ is touching himself$_{*i/j/*k}$.

(13) The cat$_i$ says the dog$_j$ is touching him$_{i/*j/k}$.

Young children until 7;0 find it more difficult to reject the local interpretation for the pronoun in (13) than the long distant interpretation for the reflexive in (12). Seemingly there is a delay in the correct interpretation of pronouns as compared to that of reflexives, leading to the term the Delay of Principle B Effect (DPBE).

The presence of the DPBE has received many explanations, ranging from incomplete acquisition (Chien & Wexler, 1990), to flawed methodologies used in the experiments (Conroy et al., 2009; Spenader et al., 2009), and from language-internal properties of pronouns and reflexives (Rooryck & Vanden Wyngaerd, 2011) to children's limited processing capacities (Baauw et al., 2011; Reinhart & Grodzinsky, 1993). The many explanations may have arisen, as the DPBE seems to be limited to English, Dutch, Icelandic and Russian (Baauw, 2002; Conroy et al., 2009; Hamann, 2011). The phenomenon is not found in Norwegian (Hestvik & Philip, 2000), in German (Ruigendijk et al., 2010) or in the Romance languages when clitics are used (cf. French: Jakubowicz, 1993).

Although linked to the DPBE, a different finding found in many binding studies on English is the quantificational asymmetry (QA). The QA entails that children show more target-like behaviour on sentences with a quantified noun phrase (QP) subject and an object pronoun, as in (14) than on those with an NP-subject, see (13).

(14) The cat_i says every dog_j is touching $him_{i/*j/k}$.

Only those languages that display a DPBE are argued to show a QA: if children's performance on (13) is target-like, then their performance on (14) cannot significantly improve; therefore, a QA is likely to only be found in Dutch, English, Icelandic and Russian. Explanations for the presence of the QA are similar to those that have been proposed for the DPBE: the phenomenon is argued to be due to either the non-referentiality of quantifiers (Chien & Wexler, 1990; Grodzinsky & Reinhart, 1993) or inconsistent test methodologies (Conroy et al., 2009).

A finding which has not received much attention in the literature is the *inversed quantificational asymmetry* (IQA), as Marinis and Chondrogianni (2011) term it. It comprises the finding that children perform less target-like on sentences containing a QP-subject and a reflexive, as in (15) than on sentences with an NP-subject and a reflexive, see (12).

(15) The $crocodile_i$ says every $lion_j$ is touching $himself_{*i/j/*k}$.

This asymmetry is especially evident in mismatching conditions (Chien & Wexler, 1990; van der Lely & Stollwerck, 1997; Marinis & Chondrogianni, 2011). It is an unexpected finding, since children should perform target-like on Principle A and their interpretation should improve with QP-subjects. Hence, the result has been ascribed to the difficulty of constructing a distributed reading and task-effects (Grimshaw & Rosen, 1990; Marinis & Chondrogianni, 2011).

4.2.2.2. A reinterpretation of the (inversed) quantificational asymmetry

Interestingly, in a recent study testing monolingual Dutch children on a similar task we found no IQA thereby defying the explanation of interfering task-effects

in this condition (van Koert et al., 2015). Even more striking is the absence of a QA in Dutch (Drozd & Koster, 1999; van Koert et al., 2015). When we compared our Dutch results to the English findings documented by Marinis and Chondrogianni, we found that the Dutch and English children differed from each other on the QP conditions. We proposed the collective distributive preference hypothesis to explain these diverging results: English children (5;6 – 7;0) prefer a collective reading of the quantifier *every* thereby excluding a bound variable reading of the reflexive and of the pronoun. If the pronoun is not bound by the QP-subject, it must refer to some other antecedent, leading to a QA. The QA appears when children perform more target-like on sentences with QP antecedents and object pronouns than on those with NP antecedents. If the reflexive is not bound by the QP-subject, it must also refer to some other antecedent, leading to an IQA, meaning that children perform less target-like on sentences with QP antecedents and object reflexives than on those with NP antecedents. Dutch children, on the other hand, prefer a distributive reading of the quantifier *elk* ('every/each') which imposes a bound variable reading on the reflexive and on the pronoun. If the pronoun is (incorrectly) bound by the QP-subject, it must refer to this subject; hence, there is no QA. If the reflexive is (correctly) bound by the QP-subject, it must refer to this subject; hence, there is no IQA in Dutch. By looking at quantifier preferences, we shed a different light on previous QA explanations.

4.2.2.3. Turkish monolingual acquisition

With such a bulk of information on Dutch and English it may be surprising that much less is known about Turkish monolingual acquisition of the binding principles. To our knowledge there is one study (Aarssen & Bos, 1999) that compared Turkish monolingual children (5;0 – 9;0) to Turkish-Dutch bilingual children (4;0 – 10;0) on their interpretation of reflexives and object pronouns. Aarssen and Bos used a picture selection task (PST): the experimenter read out a test sentence whilst the child saw four pictures from which she had to choose one that suited the sentence best. The task consisted of 24 sentences, half of which contained a reflexive and the other half an object pronoun. Six transitive verbs were used which could express either a reflexive or a disjoint meaning in both Dutch and Turkish. The reflexive *zich* ('SE') was used for Dutch, whereas for Turkish the reflexive *kendini* ('self.ACC') was used for half of the reflexive sentences and for the other half the reflexive infix *–(İ)n* was used. The characters in the pictures were two boys, *Martijn* and *Kerim*, who were friends. Examples of the test sentences are shown in (16) and (17) for Dutch and (18) and (19) for Turkish.

(16) De vriend$_i$ van Kerim$_j$ knijpt zich$_{i/*j/*k}$.
The friend of Kerim pinches SE
'Kerim's$_j$ friend$_i$ is pinching himself$_{i/*j/*k}$.'

(17) De vriend$_i$ van Kerim$_j$ knijpt hem$_{*i/j/k}$.
The friend of Kerim pinches him
'Kerim's$_j$ friend$_i$ is pinching him$_{*i/j/k}$.'

(18) Kerim'in$_i$ arkadaşı$_j$ kendi-ni$_{*i/j/*k}$ çimdikliyor.
Kerim.GEN friend.NOM self.ACC pinch.3SG.PRES
'Kerim's$_i$ friend$_j$ is pinching himself$_{*i/j/*k}$.'

(19) Kerim'in$_i$ arkadaşı$_j$ o-nu$_{i/*j/k}$ çimdikliyor.
Kerim.GEN friend.NOM s/he.ACC pinch.3SG.PRES
'Kerim's$_i$ friend$_j$ is pinching him$_{i/*j/k}$.'
(examples adapted from Aarssen & Bos, 1999)

The results showed that the Turkish-Dutch bilinguals performed similarly to the Turkish monolinguals in that they performed better on the pronouns than on the reflexives. Overall their scores were very low, ranging from 30% correct at 5;0 to 70% correct at 9;0. This could indicate that it takes Turkish-speaking children a long time to correctly understand the binding principles.

Surprisingly, the monolingual Dutch results in the Aarssen and Bos' study showed a similar pattern, i.e. there was no difference between the pronouns and the reflexives and the scores remained low (< 70% correct) until the children were 8;0. In most binding experiments, Dutch children typically display the DPBE (Bergmann et al., 2009; van Koert et al., 2015; van Rij et al., 2010; Ruigendijk et al., 2011; Sigurjónsdóttir & Coopmans, 1996; the classic and embedded condition in Spenader et al., 2009).

Since Aarssen and Bos' experiment was based on earlier PSTs designed by Deutsch and Koster (1982) and Deutsch *et al.* (1986) who did find a DPBE for the Dutch seven- and eight-year-olds, the unexpected results raise a few questions about the methodology. Firstly, the sentences might be too complex for young children to process. Deutsch *et al.*'s results showed that the six-year-olds scored around 50% correct on reflexives and pronouns; it is only from 7;0 that children's performance on reflexives significantly surpassed that on pronouns. The task complexity may well hold for both Dutch and Turkish. Secondly, the drawings could have been problematic for two of the six verbs, namely *to tie up* and *to release*, because they can be portrayed by the same picture; hence, the antecedents can be confused easily. Thirdly, the context may not have been ideal. For Dutch *knijpen* ('to pinch'), which was one of the six verbs, is not typically combined with *zich* ('SE'), as it is not an inherently reflexive verb (see Section 4.2.1.1). For Turkish, the use of an overt pronoun in (16) may have led Turkish-speaking children toward an interpretation involving an exophoric antecedent, because an overt pronoun in an embedded clause cannot refer to the subject of the main clause (Gürel, 2002).

Because of these concerns with Aarssen and Bos' study it is difficult to draw any conclusions regarding the development of the binding principles in Turkish monolingual children. There might be a delay of Principle A effect in Turkish but a careful methodology might just as well yield very different results.

As for the status of the QA in Turkish, it is unclear whether it is present or not. To our knowledge no study has investigated Turkish monolingual children's interpretation of quantified antecedents in relation to reflexives and pronouns. Nevertheless, some hypotheses can be postulated on the basis of certain qualities of Turkish universal distributive quantifiers. Firstly, Turkish is a scope-rigid language meaning that only the surface scope reading is considered (Kelepir, 2001; Öztürk, 2005), similar to Dutch. Secondly, there is only one universal distributive quantifier in Turkish: *her* ('every/each'). According to Öztürk (2005) *her* ('every/each') is the only quantifier in Turkish that imposes distributivity, as the other quantifiers are indistinguishable with regard to a collective or a distributive reading. Thirdly, Gürel (2002) notes that the overt pronoun may not be interpreted as a bound variable: an overt object pronoun cannot be bound by a QP-subject but a null object pronoun can, cf. (20) and (21).

(20) Her çocuk$_i$ o-nu$_{*i/j}$ çimdikliyor.
every.NOM child.NOM s/he.ACC pinch.3SG.PRES
'Every child$_i$ is pinching her$_{*i/j}$.'

(21) Her çocuk$_i$ *pro*$_{i/j}$ çimdikliyor.
every.NOM child.NOM pinch.3SG.PRES
'Every child$_i$ is pinching *pro*$_{i/j}$.'

All in all, Turkish *her* ('every/each') seems to be closer to Dutch *elk* ('every/each') regarding its interpretation than to English *every*; therefore, it is likely that no QA will be found for Turkish *her* ('every/each').

4.3. Turkish-Dutch and Turkish-English bilingual children

The present study investigates the interpretation of pronouns and reflexives in object position in bi-clausal sentences in a group of Turkish-Dutch bilingual children, who were age-matched to the Turkish-English bilingual children from the Marinis and Chondrogianni (2011) study.

The research questions ask:

(i) Whether the Turkish-Dutch bilingual children show non-target-like behaviour on the NP/Reflexive condition, similar to the Turkish-Dutch bilingual children in the Aarssen and Bos' study (1999).

(ii) Whether the Turkish-Dutch bilingual children show non-target-like behaviour on the NP/Pronoun conditions, similar to the Turkish-Dutch bilingual children in the Aarssen and Bos' study (1999) and to the Turkish-English bilingual children.

(iii) Whether the Turkish-Dutch bilingual children show non-target-like behaviour on the QP/Reflexive condition, similar to the Turkish-English bilingual children.

(iv) Whether the Turkish-Dutch bilingual children show target-like behaviour on the QP/Pronoun condition, similar to the Turkish-English bilingual children.

4.3.1. Participants

Thirty-three typically developing Turkish-Dutch bilingual children participated in the present study and thirty-nine typically developing Turkish-English bilingual children participated in the Marinis and Chondrogianni (2011) study.

The Turkish-Dutch bilingual children had a mean age of 8;3 (range: 6;5-10;1; SD = 12 months). They had a mean age of onset of 2;3 (range: 1;0-4;0; SD = 6 months) and a mean length of exposure of 5;10 (range: 4;2-7;9; SD = 13 months). The Turkish-Dutch bilingual children were born in the Netherlands in Turkish immigrant families. They attended schools in Amsterdam and Alphen aan den Rijn. The parents' social-economic status was measured by education: the mode was *MBO* ('senior secondary vocational training'). Most children spoke both Dutch and Turkish at home. Although highly likely, there is no information on whether the children received a qualitatively different Dutch input from the standard Dutch input (Hulk & Cornips, 2006).

The Turkish-English bilingual children had a mean age of 7;8 (range: 6;2-9;9; SD = 12 months). They had a mean age of onset of 3;3 (range: 2;6-4;0; SD = 5 months) and a mean length of exposure of 4;0 (range: 2;6-6;0; SD = 13 months). Further details of the Turkish-English children are documented by Marinis and Chondrogianni (2011). The social-economic status of both groups was comparable.

None of the children had any history of speech and/or language delay impairment and their parents were not concerned about their language development. All the children were individually tested by two experimenters in a quiet room at school.

4.3.2. Materials and procedure

The Dutch-speaking children were administered a Dutch translation of the Advanced Syntactic Test of Pronominal Reference-Revised (A-STOP-R) (van der Lely, 1997), the same test Marinis and Chondrogianni (2011) used. It comprises a booklet containing pictures to which accompanying bi-clausal sentences are read out by one of the experimenters. Children are asked to judge whether the sentence they heard matches the picture they see; thus, it is a PVT.

There are two monoclausal practice sentences, which all children answered correctly. The test consists of 96 test sentences. There are 16 conditions and six sentences per condition. Four conditions are control conditions containing the same sentence structure as the test sentences. In these control conditions one of the characters is male sporting a moustache and the other is female wearing

a pink bow; children performed well (range of mean accuracy: 73.4%-94.2%). The 12 experimental conditions had three variables: matching (match, mismatch and mismatch-syntax), NP type (referential NP (NP) and quantificational NP (QP)), and anaphor type (reflexive, pronoun). The Mismatch-Syntax condition is not considered here.

Examples of the test sentences in the mismatching conditions are given in (22) – (25), (a) lists the Dutch examples and (b) the English ones.

(22) Mismatching NP/Reflexive condition
   a. De krokodil zegt dat de leeuw zichzelf aanraakt.
   b. The crocodile says the lion is touching himself.

(23) Mismatching QP/Reflexive condition
   a. De krokodil zegt dat elke leeuw zichzelf aanraakt.
   b. The crocodile says every lion is touching himself.

(24) Mismatching NP/Pronoun condition
   a. De kat zegt dat de hond hem aanraakt.
   b. The cat says the dog is touching him.

(25) Mismatching QP/Pronoun condition
   a. De kat zegt dat elke hond hem aanraakt.
   b. The cat says every dog is touching him.

4.3.3. Bilingual children's results

The bilingual children's performance on reflexives and pronouns was analysed separately using repeated measures ANCOVAs with the between factors Test Language (English, Dutch), and the within factors NP type (NP, QP) and Matching (match, mismatch). Since the Turkish-English bilingual children were significantly younger than the Turkish-Dutch bilingual children (mean ages: 7;9 vs. 8;3, (F (1, 70) = 4.73, p = 0.033)), Age in Months was used as a covariate. Interactions were followed up using pairwise comparisons with Bonferroni correction. One-sample t-tests were used to ascertain chance level performance.

4.3.3.1. Reflexives

The ANCOVA revealed a main effect of Language (F (1, 69) = 16.92, p < 0.001), a main effect of Matching (F (1, 69) = 4.83, p = 0.031), an interaction between Language and NP type (F (1, 69) = 42.41, p < 0.001), an interaction between Language and Matching (F (1, 69) = 20.25, p < 0.001), an interaction between NP type and Matching (F (1, 69) = 5.42, p = 0.023), and a three-way interaction between Language, NP type and Matching (F (1, 69) = 12.25, p = 0.001). Figure 4.1 shows the interaction between Language and NP type.

Since there was a main effect of and interactions with Language, the groups performed differently from each other in the interpretation of reflexives on all

conditions. To trace the source of the interactions separate ANCOVAs were conducted for each group.

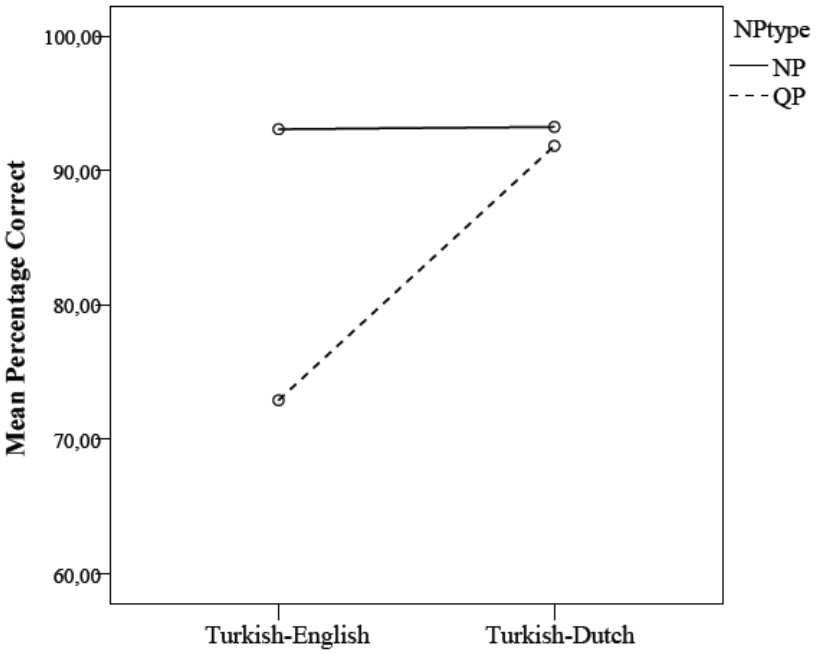

Figure 4.1. The bilingual children's performance on the reflexives categorized by the independent variable NP type; matching and mismatching conditions are collapsed. The covariate Age was evaluated at 7;11.

For the Turkish-Dutch bilingual children this resulted in no main effects and no interactions, meaning that they scored similarly on NPs and QPs and they showed comparable performance on matching and mismatching conditions. One sample t-tests showed no chance performance.

The Turkish-English bilingual children from Marinis and Chondrogianni (2011) showed a main effect of NP type (F (1, 38) = 98.50, p < 0.001), a main effect of Matching (F (1, 38) = 54.85, p < 0.001) and an interaction between NP type and Matching (F (1, 38) = 49.28, p < 0.001). The main effect of NP type showed that the children performed better on NPs than on QPs (mean accuracy: 92.7% vs. 72.6%, p < 0.001). The main effect of Matching indicated better performance in the match compared to the mismatch condition (mean accuracy: 93.4% vs. 72.0%, p < 0.001). The interaction was followed by pairwise comparisons which showed better performance in sentences with NPs compared to QPs in the match (mean accuracy: 96.6% vs. 88.9%, p = 0.002) and mismatch conditions (mean accuracy: 90.2% vs. 55.1%, p < 0.001). One sample

t-tests showed chance performance in the mismatching QP condition: (t (38) = 1.46, p > 0.1).

4.3.3.2. Pronouns

The ANCOVA revealed a main effect of Matching (F (1, 69) = 10.45, p = 0.002) and a three-way interaction between Language, NP type and Matching (F (1, 69) = 8.27, p = 0.005). Figure 4.2 shows the interaction between Language and NP type.

As there was an interaction with Language, the groups diverged in their interpretation of pronouns. To trace the source of the interaction separate ANOVAs were conducted for each group.

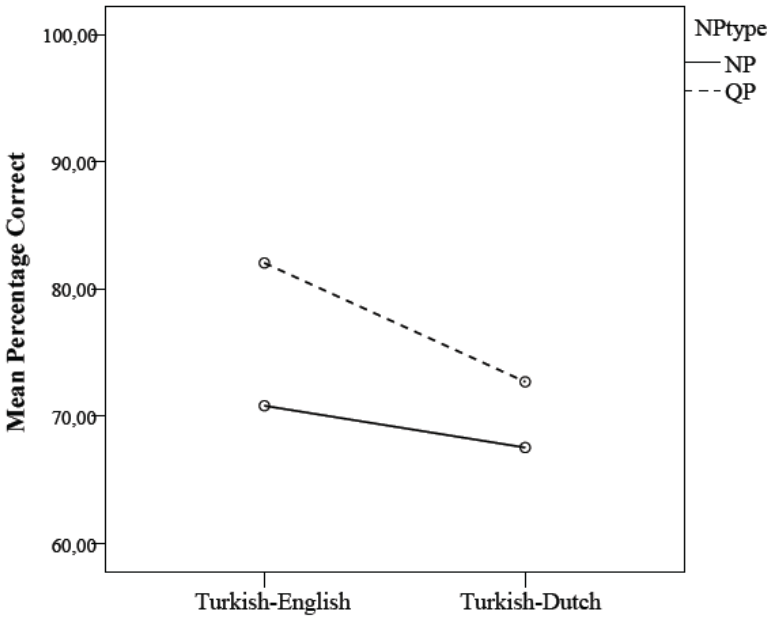

Figure 4.2. The bilingual children's performance on the pronouns categorized by the independent variable NP type; match and mismatch conditions are collapsed. The covariate Age was evaluated at 7;11.

For the Turkish-Dutch bilingual children this resulted in a main effect of Matching (F (1, 32) = 68.73, p < 0.001) but no interactions. Pairwise comparisons showed that the children scored significantly better in the match compared to the mismatch condition (mean accuracy: 90.7% vs. 51.5%, p < 0.001). No significant difference between the NP and QP conditions was found. One sample *t*-tests showed chance performance in the mismatch NP conditions (t (32) = 0.18, p > 0.4) and mismatching QP conditions (t (32) = 0.38, p > 0.3).

The Turkish-English bilingual children documented by Marinis and Chondrogianni (2011) displayed a main effect of NP type (F (1, 38) = 27.85, p <

0.001), a main effect of Matching (F (1, 38) = 86.80, p < 0.001), and an interaction between NP type and Matching (F (1, 38) = 6.39, p = 0.016). The main effect of NP type indicated that there was a significant difference between the QP and NP conditions (mean accuracy: 81.2% vs. 70.1%, p < 0.001). The main effect of Matching reflected better performance in the matching compared to the mismatching conditions (mean accuracy: 94.2% vs. 57.1%, p < 0.001). Pairwise comparisons indicated better performance in sentences with QP subjects compared to NP subjects in the matching (mean accuracy: 97.0% vs. 91.4%, p < 0.001) and mismatching conditions (mean accuracy: 65.4% vs. 48.7%, p < 0.001). One sample t-tests showed chance performance in the NP/Mismatch condition (t (38) = -0.3, p > 0.4).

4.3.4. Discussion

Regarding the research questions there were four important findings:

(i) The Turkish-Dutch bilingual children just as the Turkish-English bilingual children showed target-like behaviour on the NP/Reflexive condition, unlike the Turkish-Dutch bilingual in the Aarssen and Bos' study (1999).

(ii) The Turkish-Dutch bilingual children showed non-target-like behaviour on the NP/Pronoun conditions, similar to the Turkish-Dutch bilingual children in the Aarssen and Bos' study (1999) and to the Turkish-English bilingual children.

(iii) The Turkish-Dutch bilingual children show target-like behaviour on the QP/Reflexive condition, unlike the Turkish-English bilingual children.

(iv) The Turkish-Dutch bilingual children showed non-target-like behaviour on the QP/Pronoun conditions, unlike the Turkish-English bilingual children.

The Turkish-Dutch bilingual children performed target-like on the reflexive conditions. In fact, they scored so well that these results challenge earlier findings by Aarssen and Bos (1999), who found that their Turkish-Dutch bilingual children, particularly the ones younger than 7;0, scored lower on the reflexives than on the pronouns. The present study could not find a main effect of age, meaning that the younger children patterned similarly to the older children. Therefore, the substantial difference between the present study and the one by Aarssen and Bos must lie in the methodologies used. It could be that the sentence structure, especially concerning the introduction of the two antecedents, was more transparent in the present experiment than in the Aarssen and Bos' study (compare (16) and (17) to (22a) and (24a)).

The NP/Pronoun condition revealed non-target-like behaviour for both the Turkish-Dutch as well as for the Turkish-English bilingual children, particularly in the mismatch condition where both groups scored around chance. This behaviour has previously been found for monolingual Dutch and English children (see Section 4.2.2.1 for discussion and references). In the present study, as in most previous studies, this poor performance on the pronouns indicated a DPBE, because the bilingual children's performance on the NP/Reflexive condition was target-like. Although Aarssen and Bos (1999) also found non-target-like behaviour on the pronoun condition, it did not reveal a DPBE, since their participants' performance on the reflexives was also weak.

On the QP/Reflexive condition the Turkish-Dutch bilingual children outperformed the Turkish-English bilingual children. This cannot be due to the methodology, as the same test was used for both groups. According to Marinis and Chondrogianni (2011) the non-target-like behaviour of the Turkish-English bilingual children was a task-effect, as this condition required the demanding process of constructing a distributed reading. Yet, this explanation seems less likely in light of the present findings: the Turkish-Dutch bilingual children scored > 90% on this same condition. Consequently, the Turkish-Dutch bilingual children had no problem constructing a distributed reading, as was suggested for the English-speaking children. This matter will be discussed in more detail in Section 4.5.

Interestingly, the Turkish-Dutch bilingual children did not perform more target-like on the QP/Pronoun condition than on the NP/Pronoun condition, as the Turkish-English bilingual children did. In fact, the Turkish-Dutch bilingual children seemed to treat these antecedent types similarly; the QP antecedent did not aid interpretation. Therefore, the Turkish-Dutch bilingual children did not display a QA, which the Turkish-English bilingual children particularly showed in the mismatch condition.

Taken together these results can inform us about the possible influences from Turkish. On the one hand, the Turkish-Dutch and the Turkish-English bilingual children perform alike, because they both display target-like behaviour on the NP/Reflexive conditions and non-target-like behaviour on the NP/Pronoun conditions. Their comparable behaviour could indicate consistent cross-linguistic influence from Turkish into Dutch and English – we will discuss this in more detail in Section 4.5. On the other hand, the Turkish-Dutch bilingual children perform differently from the Turkish-English bilingual children, because they diverge from each other in the QP/Reflexive and QP/Pronoun conditions. These contrary behaviours most probably point to different factors at play in Dutch from those in English. The suggested difficulty of constructing the distributed reading in the QP/Reflexive condition may well be less in Dutch than in English, leading to higher mean accuracy scores in Dutch than in English. For the QP/Pronoun condition a similar explanation related to the ease of creating a distributed reading in Dutch may well explain the different results in Dutch and English.

Before going into the question of possible cross-linguistic influence from Turkish into Dutch and/or English, we compare the bilingual results to their

monolingual Dutch and English counterparts in the next section in order to investigate whether or not the bilingual children resemble their monolingual peers.

4.4. Monolingual Dutch and English children

Part two of the present study investigates the interpretation of pronouns and reflexives in object position in bi-clausal sentences in a group of monolingual Dutch children, who were age-matched to the Turkish-Dutch bilingual children, reported in Section 4.3. The differences and similarities between the monolingual and bilingual Dutch results are compared to the differences and similarities between the monolingual and bilingual English results (Marinis & Chondrogianni, 2011). The questions we would like to address are:

(i) Whether the monolingual Dutch children show target-like behaviour on the QP/Reflexive condition, similar to the Turkish-Dutch bilingual children and unlike the Turkish-English bilingual children.

(ii) Whether the monolingual Dutch children show non-target-like behaviour on the QP/Pronoun condition, similar to the Turkish-Dutch bilingual children and unlike the Turkish-English bilingual children.

4.4.1. Participants

Twenty-nine typically developing monolingual Dutch children participated in the present study and thirty-three typically developing monolingual English children participated in the Marinis and Chondrogianni (2011) study. The bilingual children's details are listed in Section 4.3.1.

The monolingual Dutch children had a mean age of 7;0 (range: 6;3-9;1; SD = 9 months). The parents' social-economic status was similar to that of the Turkish-Dutch bilingual children's parents'. Further details of the monolingual Dutch children are recorded by Van Koert *et al*. (2015).

The monolingual English children had a mean age of 7;5 (range: 6;0-9;0; SD = 9 months). The social-economic status of both groups was comparable. Further details of the monolingual English children are documented by Marinis and Chondrogianni (2011).

None of the children had any history of speech and/or language delay impairment and their parents were not concerned about their language development. All children were individually tested by two experimenters in a quiet room at school. The materials and procedure are described in Section 4.3.2.

4.4.2. Comparison of the monolingual and bilingual results

The differences and similarities between the monolingual Dutch and the monolingual English children are discussed by Van Koert *et al.* (2015). This section compares the monolingual and bilingual Dutch results and contrasts

these findings to the comparison between monolingual English and Turkish-English bilingual results made by Marinis and Chondrogianni (2011).[1]

4.4.2.1. Turkish-Dutch bilingual versus monolingual Dutch children

The Turkish-Dutch bilingual and monolingual Dutch children's performance on reflexives and pronouns was analysed separately using repeated measures ANCOVAs with the between factors Language background (L1, 2L1) and the within factors NP type (referential, quantificational) and Matching (match, mismatch). Since the Turkish-Dutch bilingual children were significantly older than the monolingual Dutch children (F (1, 60) = 26.71, p < 0.001), Age in Months was used as a covariate. Interactions were followed up using pairwise comparisons with Bonferroni correction. One-sample t-tests were used to ascertain chance level performance.

For the reflexives the ANCOVAs revealed no main effects and no interactions, indicating that both groups performed similarly in the interpretation of reflexives (mean accuracy: 96.6% for the monolingual Dutch and 92.1% for the Turkish-Dutch bilingual children) and that there was no difference between the matching or between the NP type conditions.

For the pronouns the ANCOVAs revealed a main effect of Matching (F (1, 59) = 7.61, p = 0.008) but, again, no main effect of and no interactions with Language background were found, meaning that both groups performed similarly in the interpretation of pronouns (mean accuracy: 76.5% for the monolingual Dutch and 68.8% for the Turkish-Dutch bilingual children). The main effect of Matching reflected better performance in the matching compared to the mismatching conditions (mean accuracy: 91.4% vs. 54.0%, p < 0.001). One sample t-tests showed chance performance in both groups in the mismatching NP conditions (monolingual Dutch: (t (28) = 0.71, p > 0.2; Turkish-Dutch bilingual: (t (32) = 0.18, p > 0.4) and in the QP/Mismatch conditions (monolingual Dutch: (t (28) = 1.70, p > 0.05; Turkish-Dutch bilingual: (t (32) = 0.38, p > 0.3).

4.4.2.2. Turkish-English bilingual versus monolingual English children

The differences and similarities between the monolingual English and the Turkish-English bilingual children are reported by Marinis and Chondrogianni (2011). The main findings were:

(i) on the QP/Reflexive condition, both groups performed at chance, revealing an IQA;

(ii) on the QP/Pronoun condition, both groups performed target-like, displaying a QA.

[1] The monolingual Dutch and Turkish-Dutch bilingual children made a standardized vocabulary test but there was no significant difference between their scores (F (1, 60) = 3.01, p = 0.088).

4.5. Overall discussion

By comparing the monolingual Dutch children to the Turkish-Dutch bilingual children it was found that:

(i) The monolingual Dutch and Turkish-Dutch bilingual children behave alike on the QP/Reflexive condition, i.e. both groups show target-like behaviour.

(ii) The monolingual Dutch and Turkish-Dutch bilingual children both show non-target-like behaviour on the QP/Pronoun condition.

The same held for the Turkish-English bilingual children who in both conditions behaved like the monolingual English children. These results strongly suggest that there was no cross-linguistic influence from Turkish into either Dutch or English.

Section 4.3 revealed that the Turkish-Dutch bilingual children do not perform similarly to the Turkish-English bilingual children, particularly regarding the QP antecedent conditions. At first sight this may have seemed surprising but when we took into account the monolingual data, we found similar patterns for the Dutch-speaking group on the one hand and the English-speaking group on the other.

These bilingual results lend additional support to the Collective Distributive Preference Hypothesis (CDPH) we postulated recently on the basis of monolingual findings (van Koert et al., 2015). We assume that children interpret reflexives and pronouns to be locally bound to their antecedents. This bound interpretation leads to a DPBE in the NP/Pronoun condition. For the QP/Pronoun condition a similar poor performance is expected based on the bound pronoun interpretation; however, whether or not the pronoun is interpreted as bound depends on the interpretation of the QP antecedent, according to the CDPH. If the QP antecedent receives a collective reading, the bound pronoun interpretation is cancelled, as a bound variable interpretation can only be induced if the QP takes a distributive reading. Thus, the pronoun is not interpreted as locally bound and must refer to a non-local antecedent. Hence, a target-like performance will be found on the QP/Pronoun condition under a collective interpretation of the QP antecedent. Since English-speaking children are hypothesised to prefer a collective reading of the quantifier *every*, they are expected to perform target-like on the QP/Pronoun condition, which is what Marinis and Chondrogianni (2011) have found. On the contrary, the present study found poor performance by the Dutch-speaking children on the QP/Pronoun condition. If the QP antecedent receives a distributive reading, the bound variable interpretation is stimulated, thereby encouraging the child to interpret the pronoun as bound to its local QP antecedent. Hence, a distributive interpretation of the QP antecedent will result in non-target-like performance on the QP/Pronoun condition.

The same explanation holds for the reflexive conditions. If the QP antecedent receives a collective interpretation, the bound interpretation is cancelled, meaning that the reflexive should refer to a non-local antecedent. Thus, a collective interpretation of the QP antecedent will cause poor performance on the QP/Reflexive condition, which is what Marinis and Chondrogianni (2011) found for the English-speaking children.[2] Yet, the present study found target-like performance by the Dutch-speaking children on the QP/Reflexive condition. Since the Dutch-speaking children are thought to give a distributive interpretation to QP antecedents, they interpret reflexives to be bound to their local QP antecedents; hence, they show target-like performance on the QP/Reflexive condition.

It is generally assumed that for children growing up bilingually from birth cross-linguistic influence may appear in particular at the syntax-pragmatics interface under certain overlap conditions (Hulk & Müller, 2000, and subsequent work). In Dutch and English, local binding of reflexives is a purely syntactic phenomenon, where cross-linguistic influence is not expected to play a role. However, in Turkish, the interpretation of reflexives is not purely syntactic but operates at the interface of discourse and syntax (see Section 4.2.1.2). Therefore, *kendisi* ('self.3SG') could well be expected to influence *zichzelf* ('SE-self') or *himself* with long-distance binding of the reflexive being then possible in Dutch or English for Turkish bilingual children under the (negative) influence of Turkish. Although we did not find this for the Turkish-Dutch bilingual children, the problems the Turkish-English bilingual children had with local binding of the reflexive in the QP/Reflexive condition, making them accept long-distance binding of *himself*, could be reinforced under the influence of Turkish. Nevertheless, we saw that monolingual English children had as many problems on this particular condition, rendering an explanation of cross-linguistic influence less plausible. Further research into other language pairs is clearly necessary to tease apart instances of cross-linguistic influence from language-internal factors.

For Dutch and English, the interpretation of object pronouns is at the syntax-pragmatics interface, because syntax is needed to rule out local binding and pragmatics is needed to arrive at the correct, or rather, most likely interpretation. For Turkish, the interpretation of object pronouns is also at the syntax-pragmatics interface (see Section 4.2.1.2). Hence, the phenomenon and its interpretation overlap in the languages under consideration, which may facilitate acquisition for the bilingual children. It may well be that positive influence from Turkish causes them to perform similarly to their monolingual peers on object pronouns.[3] The positive influence might even outweigh the fact

[2] In addition, *himself* is ambiguous between denoting a reflexive and an intensifier meaning, which strengthens the disjoint reading of *himself* caused by the collective interpretation of the QP (van Koert et al., 2015).

[3] Marinis and Chondrogianni (2011) found that the Turkish-English bilingual children performed significantly less target-like on the NP/Pronoun condition than their monolingual peers. We did not find a significant difference between the Dutch-speaking children on this condition, which might be

that the bilingual children's input in Dutch/English is much more limited than the input monolingual receive, which would typically lead to a delay.

Future research should take into account the Turkish of these bilingual children in order to establish how they manage with the interpretation of reflexives and pronouns, compared to their Turkish monolingual peers. Such research allows us to obtain more insight in the role of cross-linguistic influence in this bilingual population with respect to these binding phenomena.

4.6. Conclusion

In this study we compared Turkish-Dutch bilingual children to Turkish-English bilingual children (Marinis & Chondrogianni, 2011) on their interpretation of reflexives and pronouns. We found that instead of patterning alike, due to their shared language Turkish, they diverged from each other but they did pattern like their monolingual peers.

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because monolingual Dutch children are delayed on the pronouns to such an extent that the Turkish-Dutch bilingual children have much time to catch up.

Chapter 5

Revisiting binding in Turkish-Dutch bilingual children: Comprehension and production*

Abstract

The present study investigates the Dutch comprehension and production of reflexives and pronouns by young Turkish-Dutch bilingual children (4;3-6;8), as compared to young monolingual Dutch children (4;1-6;4), and it explores the Turkish comprehension of reflexives and pronouns by older Turkish-Dutch bilingual children (6;7-9;10). On the one hand, young bilingual children were examined in order to determine whether they performed differently from their older bilingual peers, who were tested in a previous study (van Koert, Hulk, Koeneman & Weerman, 2013). On the other hand, older Turkish-Dutch bilingual children were investigated on their Turkish comprehension, so that they could be compared to the older Turkish-Dutch bilingual children, who were tested previously in Dutch (van Koert et al., 2013). The Dutch results revealed that the young Turkish-Dutch bilingual children behaved similarly to their monolingual Dutch peers on their comprehension of reflexives and pronouns; however, they produced more omissions than their monolingual peers, which could either suggest a stage of Dutch (cf. Thrift, 2003) or reflect cross-linguistic influence (cf. Müller & Hulk, 2001). The Turkish findings showed that the Turkish-Dutch bilingual children behaved similarly on reflexives and pronouns, which has been found for monolingual Turkish children previously (Aarssen & Bos, 1999), too.

5.1. Introduction

Children acquiring two languages from birth constitute an interesting group for linguists, not only because their minds have to compute two different kinds of input simultaneously, but also because they seem to arrive at the same grammar as their monolingual peers, even though they have had half of the exposure their monolingual peers had. As such, there is a large difference in quantity of input between the bilingual and the monolingual child, which could cause a slight delay in acquisition. Nevertheless, binding studies that examined bilingual children's understanding of co-identification between object reflexives or object pronouns and local or non-local antecedents, as in (1) and (2), found hardly, if any, differences between the bilingual and the monolingual children (for Dutch and Turkish: Aarssen & Bos, 1999; for Dutch: Van Koert,

* A slightly modified version of this chapter has been accepted for publication as: van Koert, Margreet, Olaf Koeneman, Aafke Hulk & Fred Weerman. (to appear). Revisiting binding in Turkish-Dutch bilingual children: comprehension and production. In Sabrina Mossman (ed.), *Proceedings of the 13th Generative Approaches to Second Language Acquisition* [GASLA 13]. Cascadilla Press, Somerville, MA.

Hulk, Koeneman & Weerman, 2013; for English: Marinis & Chondrogianni, 2011).

(1) The badger$_i$ says the fox$_k$ is pointing to herself$_{*i/k}$.

(2) The elephant$_i$ says the camel$_k$ is pointing to her$_{i/*k}$.

These previous studies investigated bilingual and monolingual children who were aged between six and ten years old; hence, the bilingual children had had much exposure to the dominant language and could have caught up with their monolingual peers. The present study therefore wants to compare younger Turkish-Dutch bilingual children to monolingual Dutch children. Furthermore, the production of object reflexives and pronouns has not been studied much in monolingual Dutch children, let alone in bilingual children. Currently, there is discussion over whether monolingual children produce fewer target-like utterances for (2) than for (1), similar to their comprehension (Ruigendijk, Friedmann Novogrodsky & Babalan, 2010; Spenader, Smits & Hendriks, 2009). The present study wants to add to this discussion by taking into account monolingual Dutch and Turkish-Dutch bilingual production data. Finally, previous studies established that Turkish-Dutch bilingual children show similar behaviour to their monolingual Dutch peers on their comprehension of Dutch object reflexives and pronouns; however, do these Turkish-Dutch bilingual children show similar behaviour to their monolingual Turkish peers? Or do they behave differently? And if so, can cross-linguistic influence from Dutch to Turkish explain this?

This chapter is organised as follows. In Section 5.2 we explain how pronouns and reflexives are distributed in Dutch and Turkish. In addition, we look at monolingual acquisition of the binding principles. Subsequently, in Section 5.3, we present Experiment I, in which monolingual Dutch and Turkish-Dutch bilingual children carried out a picture selection task (PST). Section 5.4 describes Experiment II that comprised an elicited production task in which monolingual Dutch and Turkish-Dutch bilingual children participated. Section 5.5 presents the results of Experiment III, which consisted of a Turkish picture verification task on which Turkish-Dutch bilingual children were tested. Finally, Section 5.6 discusses the lack of qualitative differences between the monolingual and bilingual children and concludes the chapter.

5.2. Similarities and differences between Dutch and Turkish anaphors

Object reflexives in Dutch and Turkish display a different distribution from object pronouns, as reflexives are locally bound to their antecedents – following Principle A of the binding principles – while pronouns are unbound in their local clause, as stated in Principle B (Chomsky, 1981). Examples of the distribution of Dutch object reflexives and pronouns will be given in Section 5.2.1. Moreover, previous research into children's comprehension and

production of Dutch object reflexives and pronouns is succinctly described. In addition to reflexives and pronouns, Turkish has quasi-reflexive elements and null pronouns, which will be discussed in Section 5.2.2. Only one study, to our knowledge, has investigated the acquisition of Turkish object reflexives and pronouns and their outcomes will be briefly illustrated.

5.2.1. Dutch object reflexives and pronouns

The behaviour of reflexives is captured in Principle A: reflexives must refer to their local antecedents. Hence, the Dutch reflexive *zichzelf* ('SE-self') can only refer to *de das* ('the badger') in (3). Principle B states that pronouns cannot refer to their local antecedents; therefore, the Dutch pronoun *hem* ('him') cannot refer to *de kameel* ('the camel') in (4) but refers to either *de olifant* ('the elephant') or to an antecedent occurring outside of the sentence.

(3) De vos$_i$ zegt dat de das$_j$ naar zichzelf$_{*i/j/*k}$ wijst.
The fox says that the badger to SE.self points
'The fox$_i$ says the badger$_j$ is pointing to himself$_{*i/j/*k}$.'

(4) De olifant$_i$ zegt dat de kameel$_j$ naar haar$_{i/*j/k}$
The elephant says that the camel to her
wijst.
points
'The elephant$_i$ says the camel$_j$ is pointing to her$_{i/*j/k}$.'

Studies investigating monolingual Dutch children's comprehension of the binding principles found that children performed more target-like on reflexives, as in (3), than on pronouns, as in (4) (e.g. Baauw, Zuckerman, Ruigendijk & Avrutin, 2011; Bergmann, Markus & Fikkert, 2009; van Koert, Koeneman, Weerman & Hulk, 2015; Philip & Coopmans, 1996; van Rij, van Rijn & Hendriks, 2010; Sigurjónsdóttir & Coopmans, 1996; Spenader et al., 2009). The crucial difference between (3) and (4) is that Dutch children until the age of 8;0 have more difficulty with rejecting the local antecedent, such as *de kameel* ('the camel') in (4), for the pronoun than they have with rejecting the distant antecedent, such as *de vos* ('the fox') in (3), for the reflexive. This asymmetry has been termed the delay of Principle B effect (DPBE), because the correct comprehension of pronouns is delayed relative to the correct comprehension of reflexives.

Several explanations have been put forward to account for the DPBE (cf. Baauw et al., 2011; Chien & Wexler, 1990; Conroy, Takahashi, Lidz & Phillips, 2009; Grodzinsky & Reinhart, 1993; Spenader et al., 2009). There are two recent cross-linguistic accounts that compare and contrast language-internal properties of reflexives and pronouns: the pronominal paradigm (Rooryck & Vanden Wyngaerd, 2015) and the distribution of reflexives and pronouns in locative PPs (Ruigendijk et al., 2010). The pronominal paradigm is an account that takes the person and number features of the reflexive as a starting point.

Those features are fused in one morpheme in the Dutch reflexive *zich* (simple expression (SE)). In addition, *zich* is unrelated to the other forms in the pronominal paradigm; therefore, it is morphologically opaque. As such, a Dutch child cannot recognise the reflexive as belonging to the pronominal paradigm that also contains pronouns with similar features (Rooryck & Vanden Wyngaerd, 2015). Thus the DPBE arises in Dutch. The explanation involving the distribution of reflexives and pronouns in locative PPs suggests that those languages that allow pronouns in locative PPs to refer to local antecedents, such as Dutch and English as in (5), are the languages in which a DPBE arise (Ruigendijk et al., 2010). These explanations appear to be valid for Dutch but Section 5.2.2 discusses whether they could hold for Turkish, too.

(5) a. The boy$_i$ puts the chair behind himself$_i$ / him$_i$.
b. De jongen$_i$ zet de stoel achter zich$_i$ / hem$_i$ neer.

The DPBE does not only appear in comprehension tasks with monolingual Dutch children, it also occurs when Turkish-Dutch bilingual children are tested (van Koert et al., 2013). Van Koert *et al.* tested Turkish-Dutch bilingual children who had a mean age of 8;3 and a mean length of exposure of 5;10. In other words, these bilingual children had had an extended exposure to the Dutch language (although, admittedly it is not clear what the exact quality of their input was; however, the majority of them had attended Dutch playgrounds and all of them attended Dutch schools); hence, they could have caught up with their monolingual peers. To investigate whether younger Turkish-Dutch bilingual children show the same effects as monolingual Dutch children the current experiment, which is a follow-up to Van Koert *et al.*'s study (2013), compares and contrasts the comprehension and production of reflexives and pronouns by monolingual and bilingual children between 4;1 and 6;8. There were two reasons for testing children from the age of four onwards: (i) monolingual Dutch children only seem to have a reliable understanding of the reflexive from the age of four onwards (Ruigendijk, Baauw, Avrutin & Vasić, 2004); (ii) children in the Netherlands go to school from 4;0, meaning that Turkish-Dutch bilingual children have had at least some exposure to Dutch. Experiment I contains the comprehension part, which is discussed in Section 5.3.

Few studies investigated Dutch and English children's production of object reflexives and pronouns with regard to the binding principles (Bloom, Barss, Nicol & Conway, 1994; De Villiers, Cahillane & Altreuter, 2006; Ruigendijk et al., 2010; Spenader et al., 2009). One of the earliest studies examining spontaneous speech found that English children between 2;3 and 5;2 produced very few instances of *myself* and *me* in object position; yet, they hardly made any errors, indicating that children do not mistake pronouns for reflexives, at least in production (Bloom et al., 1994). The investigators concluded that Principle B is in place, even if children still need to learn to recognise pronouns, like *him*, as pronouns. Spenader *et al.* (2009) conducted an elicitation task with Dutch children between 4;5 and 6;6 and found that they correctly produced pronouns

in more instances than they seemed to correctly understand pronouns. Thus, they found an asymmetry between production and comprehension. In addition, they found that the target pronoun condition did not differ from the target reflexive condition. In other words, they did not find a DPBE in production. Yet, to arrive at the number of produced pronouns, Spenader *et al.* (2009) added up the percentage of produced nouns to the percentage of correctly produced pronouns; whether this is fair is arguable. As production tasks are almost impossible to restrict, it is difficult to determine which computation reflects children's knowledge best. It is clear, however, that when the correct production of pronouns only is compared with the correct production of reflexives, there is a DPBE, similar to what Ruigendijk *et al.* (2010) found for Hebrew. The current study aims to add to this discussion and to ascertain whether Turkish-Dutch bilingual children show the same behaviour as monolingual Dutch children Experiment II investigates their production in Section 5.4.

5.2.2. Turkish object reflexives and pronouns

The Turkish reflexive *kendi* ('self'), which is inflected for person, number and case, is subject to Principle A; thus, *kendini* ('self.ACC') can only refer to *tilkinin* ('fox') in (6). Following Principle B, the Turkish pronoun *o* ('he/she/it'), which is also inflected for person, number and case, cannot refer to its local antecedent and has to refer to the distant or to an exophoric antecedent. The object pronoun *onu* ('he.ACC') can hence refer to *fil* ('elephant') in (7) or to an antecedent that appears outside of (7).

(6) Porsuk$_i$ tilkinin$_j$ kendini$_{*i/j/*k}$ işaret ettiğini söylüyor.
Badger fox.GEN self.ACC indicate.3SG.POSS.ACC say.3SG.PRES
'The badger$_i$ says the fox$_j$ is pointing to herself$_{*i/j/*k}$.'

(7) Fil$_i$ devenin$_j$ onu$_{i/*j/k}$ işaret ettiğini söylüyor.
Elephant camel.GEN s/he.ACC indicate.3SG.POSS.ACC say.3SG.PRES
'The elephant$_i$ says the camel$_j$ is pointing to her$_{i/*j/k}$.'

In addition to overt object reflexives and pronouns, Turkish has a null pronoun and a quasi-reflexive element *kendisi* 'self.3SG' (Demirci, 2001; Gürel, 2002; Marinis & Chondrogianni, 2011). The latter can undergo both short and long distant binding, meaning that *kendisini* ('self.3SG.ACC') can refer to *suaygıri* ('hippo') or to *denizatının* ('seahorse.GEN') in (8). Context determines which interpretation is most likely; if there is no bias towards either of the antecedents in (8), then adult speakers of Turkish are equally likely to interpret *kendisi* ('self.3SG') as a reflexive or a pronoun (Demirci, 2001).

(8) Suaygırı$_i$ denizatının$_j$ kendisini$_{i/j/k}$ yıkadığını
Hippo seahorse.GEN self.3SG.ACC wash.3SG.POSS.ACC
söylüyor.
say.3SG.PRES
'The hippo$_i$ says the seahorse$_j$ is washing her$_{i/k}$/herself$_j$.'

Since Turkish has this quasi-reflexive element, bilingual children could be influenced in their other language and show more long distant interpretations for the reflexive than their monolingual peers. However, both Marinis and Chondrogianni (2011) and Van Koert *et al.* (2013) found no cross-linguistic influence from the Turkish quasi-reflexive element *kendisi* ('self.3SG') to the English reflexive *himself* and the Dutch reflexive *zichzelf* ('SE-self'), respectively.

Although the Turkish-Dutch bilingual children did not show any cross-linguistic influence from Turkish to Dutch in those previous studies, they might show influence from Dutch to Turkish. As explained above, monolingual Dutch children display the DPBE; are monolingual Turkish children expected to show a DPBE, too? If we follow the account of the pronominal paradigm, then a DPBE is not likely to arise, because the person and number features on the reflexive each have their own morpheme in Turkish (Kıran, 2014). This means that a Turkish child can easily recognise that the reflexive and the pronoun belong to the same pronominal system and, hence, they can deduce that a pronoun should not receive a reflexive interpretation. Furthermore, the distribution of reflexives and pronouns in locative PPs reaches the same verdict: as only reflexives can occur in locative PPs to refer to the local antecedent, as in (9), Turkish does not belong to the set of languages that is likely to display a DPBE.

(9) Çocuk$_i$ sandalyeyi kendi$_i$/onun$_{*i}$ arkasına koydu.
Child chair.ACC self/he.POSS behind.ADV puts.3SG.PRES
'The boy$_i$ puts the chair behind himself$_i$/him$_{*i}$.'

It is unclear whether monolingual Turkish children show a DPBE, because the only study that examined binding for this group might have been hindered by some methodological flaws (for a review of Aarssen & Bos (1999) see Van Koert et al., 2013). Interestingly, those investigators found that monolingual Turkish children performed less target-like on the reflexives than on the pronouns (Aarssen & Bos, 1999) but no explanation was given. Experiment III explores the comprehension of the Turkish reflexives, pronouns and quasi-reflexives by Turkish-Dutch bilingual children, which is described in Section 5.5.

5.3. Experiment I: Dutch comprehension

The comprehension study investigates the interpretation of Dutch object pronouns and reflexives in monoclausal sentences in a group of Turkish-Dutch bilingual children and a group of monolingual Dutch children. The research question addressed in this experiment asks whether young Turkish-Dutch bilingual children perform differently from their age-matched monolingual

Dutch peers on this binding task (Smit, 2013; Wijngaards, 2013). Previously, we showed that slightly older Turkish-Dutch bilingual children (age range: 6;5-10;1, M = 8;3) performed similarly to their monolingual Dutch peers (age range: 6;3-9;1, M = 7;0) on their comprehension of object reflexives and pronouns (van Koert et al., 2013). This similarity in performance could be due to the extensive length of exposure these bilingual children had had to Dutch, which could have caused them to catch up with their monolingual peers.

5.3.1. Participants

Twenty-four typically developing monolingual Dutch children and twenty-one typically developing Turkish-Dutch bilingual children participated. The monolingual Dutch children had a mean age of 5;3 (range: 4;1-6;4, SD = 8 months) and were recruited from the first two grades at a primary school in Volendam. The Turkish-Dutch bilingual children had a mean age of 6;0 (range: 4;3-6;8, SD = 7 months) and were recruited from several schools and associations in Amsterdam, The Hague and Delft. As the response rate of the parental questionnaire was very low, the bilingual children's mean age of onset was impossible to calculate. However, since all of these children attended Dutch primary schools from the age of 4 years onwards and most of them attended playground from the age of 2;6 years onwards, we estimated that all of these children had had at least several months of exposure to Dutch. Regardless of their age of onset, the experimenters did not experience any problems communicating with the Turkish-Dutch bilingual children in Dutch. All children were individually tested by two experimenters in a quiet room at school.

5.3.2. Materials and procedure

All of the children completed a standardized passive vocabulary test in Dutch containing 96 items (*Taaltoets Alle Kinderen* ('Language Test for All Children') before they carried out the picture selection task (PST). The present PST is an adapted version of the one used by Ruigendijk *et al.* (2010). First, it introduces the two protagonists for each item (Figures 5.1 and 5.2) and then shows the two test pictures simultaneously (Figure 5.3). Both pictures display two protagonists, with one picture showing one of the protagonists doing a reflexive action and the other picture illustrating a non-reflexive action. A PST is an ideal method to measure young children's interpretation preferences (Baauw et al., 2011; Syrett & Musolino, 2013). The pictures were accompanied by a monoclausal test sentence. An example of a pronoun condition is provided in (10).

(10) Hier zie je de piraat. Hier zie je de tovenaar. De piraat bijt 'm.
'This is the pirate. This is the wizard. The pirate is biting 'm.'

Figure 5.1. Picture of the pirate.

Figure 5.2. Picture of the wizard.

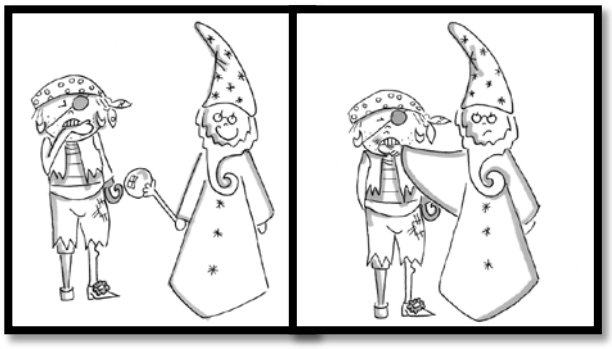

Figure 5.3. Example of a picture pair used in the comprehension test.

The task included 24 items per participant: 12 with an object reflexive and 12 with an object pronoun. The test sentences were presented in a semi-randomized order, so that a sequence of three test items was always followed by a filler. The two characters in the test sentences always had the same gender; hence, children could not rely on a gender agreement cue for their choice of antecedent. Since we opted for the most natural language set-ups, a weak object pronoun was used rather than the strong equivalent. Baauw (2002) demonstrated that, for Dutch, the use of weak object pronouns leads to similar results to the use of strong object pronouns.

5.3.3. Results

An independent samples *t*-test with percentage correct on the reflexive condition as the dependent variable and language background (Turkish-Dutch bilingual, monolingual Dutch) as the between-groups variable showed that there was no significant difference (mean percentage correct: 89.7% vs 90.6%). In addition, the two groups of children did not perform significantly different

from each other on the pronoun condition (mean percentage correct: 73.0% vs 68.8%). Figure 5.4 shows the results.

The Turkish-Dutch bilingual children scored significantly lower (mean number of items correct: 49.8) on the standardized passive vocabulary test than the monolingual Dutch children (mean number of items correct: 63.9) (t (43) = 3.27, p = 0.002). Furthermore, the monolingual Dutch children were significantly younger than the Turkish-Dutch bilingual children (mean age: 5;3 vs 6;0; t (43) = -3.70, p < 0.001). To determine whether age and/or vocabulary knowledge were significant predictors for the children's performance on the pronoun condition, we ran a multiple regression analysis, but neither of the predictors proved to be a significant contributor.

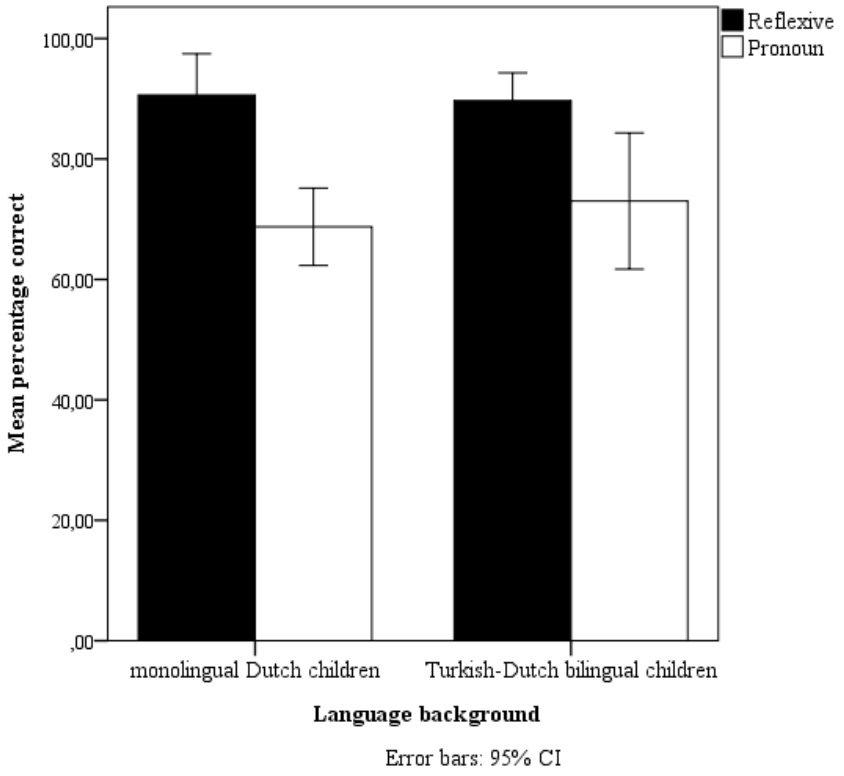

Figure 5.4. The monolingual Dutch and Turkish-Dutch bilingual children's results of the comprehension part of the PST.

5.3.4. Discussion

The Turkish-Dutch bilingual children displayed identical behaviour to the monolingual Dutch children in their interpretation of Dutch object reflexives and pronouns. Both groups performed better on the reflexives than on the

pronouns, thereby showing a DPBE. Although the Turkish-Dutch bilingual children had a smaller passive lexicon than the monolingual Dutch children, this difference did not seem to affect their interpretation of reflexive and pronouns. Moreover, both the vocabulary size and age at testing were not significant predictors of correct performance on the present binding task. Since these younger Turkish-Dutch bilingual children exhibited similar behaviour to the older Turkish-Dutch bilingual children that were tested in a previous study (van Koert et al., 2013), it seems likely that length of exposure has little effect on their binding performance. More precisely, the threshold of required input in the target language (i.e. Dutch) appears to be low, as these bilingual children receive less input than their monolingual peers but still demonstrate a comparable level of comprehension. Furthermore, Turkish does not seem to be in these bilingual children's way of acquiring the Dutch binding conditions.

5.4. Experiment II: Dutch production

The production study investigates the elicited production of Dutch pronouns and reflexives in object position in monoclausal sentences in a group of Turkish-Dutch bilingual children and a group of monolingual Dutch children.

5.4.1. Participants, materials and procedures

The same children as in Experiment I participated in this production experiment. The production of reflexives and pronouns was elicited by means of a production task. Children were shown two pictures of the protagonists, as in Figures 1a and 1b, and then they saw one picture. The pictures were accompanied by an introduction sentence and a question, as in (11) for the reflexive condition and (12) for the pronoun condition.

(11) Experimenter: 'Hier zie je de prinses. Hier zie je oma'
"This is the princess. This is granny."
Experimenter: 'En wat doet de prinses? (Die?)'
"And what is the princess doing? (She's?)"
Target answer: '(De prinses/zij/ze/die) bijt zichzelf.'
"(The princess/she's) biting herself."

(12) Experimenter: 'Hier zie je opa. Hier zie je de piraat.'
"This is grandpa. This is the pirate."
Experimenter: 'En wat doet opa met de piraat? (Die?)'
"And what is grandpa doing to the pirate? (He's?)"
Target answer: '(Opa/hij/die) slaat hem.'
"(Grandpa/he's) hitting him."

The task included 12 test items per participant, the target object of six of them was a reflexive, as in (11), and for six it was a pronoun, as in (12). The children's answers were transcribed during the session. Each response was

scored as reflexive, pronoun, NP or omission. Null responses were excluded from the analyses.[1]

5.4.2. Results

To analyse the results of the production task in the reflexive condition a χ^2 test was carried out. The association between the language background and which answer was given was close to significance (χ^2 (3) = 8.3, p = 0.056). The main difference that contributed to this result was that the monolingual Dutch children gave fewer answers containing an omission (9.7% of their answers; z = -1.6) than the Turkish-Dutch bilingual children (20.6% of their answers; z = 1.7). Figure 5.5 illustrates the differences between the monolingual Dutch and the Turkish-Dutch bilingual children on the reflexive condition of the elicited production task.

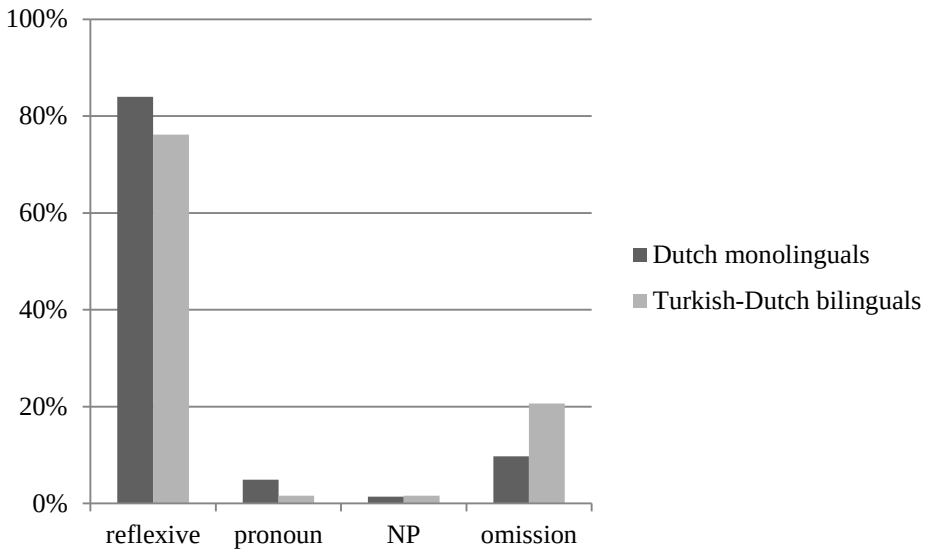

Figure 5.5. Mean percentage of types of answers given by the monolingual Dutch and the Turkish-Dutch bilingual children on the reflexive condition.

A χ^2 test was run to analyse the results of the production task in the pronoun condition. There was a significant association between the language background and which answer was given (χ^2 (3) = 29.82, p < 0.001). Monolingual Dutch children used significantly more pronouns in their answers (35.2% of their answers; z = 3.1) than Turkish-Dutch bilingual children (8.3% of their answers; z = -3.4). In addition, monolingual Dutch children gave significantly fewer answers containing an omission (39.4% of their answers; z

[1] One monolingual Dutch child provided two null responses in the pronoun condition; there were 10 null responses in total given by two Turkish-Dutch bilingual children.

= -1.6) than Turkish-Dutch bilingual children (59.5% of their answers; z = 1.7). Figure 5.6 shows the differences between the monolingual Dutch and the Turkish-Dutch bilingual children on the pronoun condition of the elicited production task.

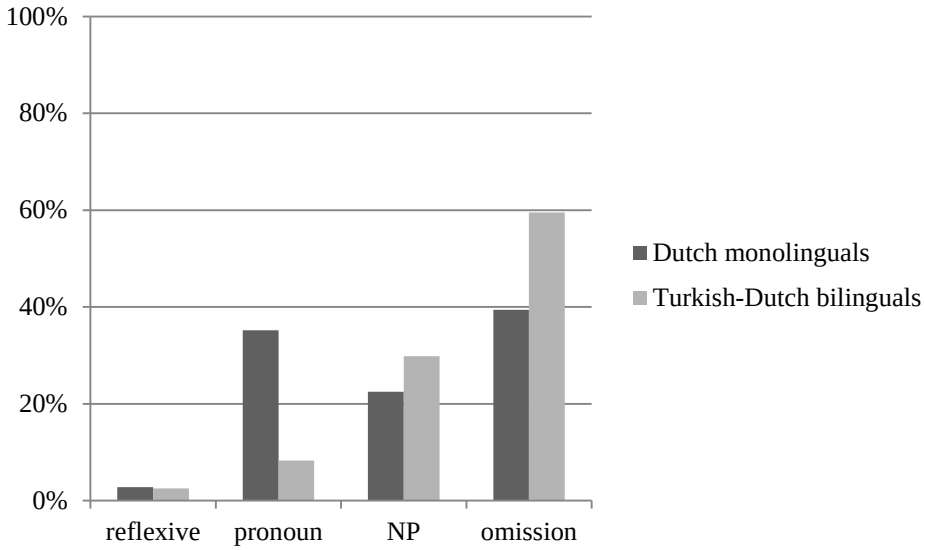

Figure 5.6. Mean percentage of types of answers given by the monolingual Dutch and the Turkish-Dutch bilingual children on the pronoun condition.

5.4.3. Omissions in the pronoun condition

Since the Turkish-Dutch bilingual children omitted significantly more objects in the pronoun condition than the monolingual Dutch children, we decided to investigate this difference more closely, as this could be an indication of cross-linguistic influence from Turkish to Dutch. When we re-examined the set-up of the elicited production task, we noticed that both protagonists in each item were highly prominent figures in the discourse, as in (13).

(13) Experimenter: 'This is the fairy [points to the picture of the fairy]. This is the witch [points to the picture of the witch]. [Shows the picture with the action and asks] What is the fairy doing to the witch?'

The discourse in (13) pragmatically licenses drop, if the language in question allows it. Turkish has discourse licensed object drop, meaning that in discourse set-ups such as (14) the object may be covertly realized.

(14) […Zeynep$_m$…]
Elif$_i$ Mehmet'in$_k$ *pro*$_m$ beğendiğini söyledi.
Elif Mehmet.GEN like.3SG.POSS.ACC say.PAST
'Elif$_i$ said (that) Mehmet$_k$ likes *pro*$_m$.'
(example based on Gürel, 2002, p. 28)

If the object is highly prominent in the discourse – and in (13) there is only one possible object, because the experimenter and the child are both looking at the picture showing the fairy biting the witch – it can be dropped in Turkish. Young monolingual Turkish children have been found to elide object pronouns significantly more than adults (Gürcanlı, Nakipoğlu Demiralp & Özyürek, 2007); are these Turkish-Dutch bilingual children therefore influenced by their Turkish when they omit the object in Dutch? Before we can answer that question, we need to look at adult and child Dutch.

Dutch has topic drop, meaning that in discourse set-ups like (15) the topicalized object may be dropped, resulting in a null object.

(15) Question: Ga je mee naar Star Wars VII?
'Do you wanna come with us to Star Wars VII?'
Answer: ~~Die~~ heb ik al gezien.
~~That~~ have I already seen
'I've already seen it.'
(example based on Müller & Hulk, 2001;
original by De Haan & Tuijnman, 1988)

Adults can use this kind of object topic drop when the discourse allows it. Young Dutch children use this type of topic drop to a greater extent than adults in spontaneous speech (De Haan & Tuijnman, 1988; Thrift, 2003). In addition, they are known to occasionally drop objects in postverbal position, (Blankenstijn & Schepers, 2003; Thrift, 2003), as in (16). This is ungrammatical in adult Dutch and probably reflects a developmental stage.

(16) Maria kan niet maken. (Maria, 2;08.28)
Maria can not make.INF
(example from Thrift, 2003, p. 113)

Hence, object drop is not just a Turkish phenomenon; it occurs in child Dutch as well. Typically developing Dutch children incorrectly drop the postverbal object increasingly less until, at around six years old, they hardly err anymore (Blankenstijn & Schepers, 2003; Thrift, 2003).

5.4.3.1. Analysis of object pronoun omissions

To determine whether the Turkish-Dutch bilingual children are influenced by their Turkish when they provide their response to the elicited production task, we need to know what their omissions consist of. If these monolingual Dutch children only produce object topic drop and the Turkish-Dutch bilingual

children only produce postverbal object drop, then cross-linguistic influence from Turkish to Dutch is more likely than when both groups of children produce similar numbers of object topic drop and postverbal object drop. Table 5.1 provides a summary of the responses that were categorized as follows: finite verb + subject, bare infinitive, bare finite verb and different construction.

Table 5.1. Fine-grained analysis of object omissions in elicited production task.

Type of omission	**Example**	**Monolingual Dutch**	**Turkish-Dutch bilingual**
Finite verb + subject	(Die$_{obj}$?) Bijt ze '(Her?) Bites she'	3	8
Bare infinitive	?Bijten 'Biting'	27	42
Bare finite verb	(Die$_{subj}$?) #Bijt '(She?) bites'	13	20
Different construction	(Die$_{subj}$?) Bijt in d'r vinger '(She?) Bites in her finger'	13	1

A χ^2 test revealed a significant association between the language background of the children and which type of omission was given (χ^2 (3) = 17.57, p = 0.001). The only significant difference that contributed to this result was that the monolingual Dutch children provided more omissions by using a different construction (23.2% of their omissions consisted of a different construction; z = 2.7) than the Turkish-Dutch bilingual children (1.4% of their omissions consisted of a different construction; z = -2.4). The Turkish-Dutch bilingual children did not behave significantly differently from their monolingual peers with regard to the other types of omissions. Therefore, the difference in object omissions between the bilingual and monolingual children appears to be quantitative rather than qualitative.

5.4.3.2. Discussion of types of object pronoun omissions

Table 1 lists four different types of omissions but in order to determine whether the Turkish-Dutch bilingual children show cross-linguistic influence, we need to know which types display object topic drop or postverbal object drop. The first type, "finite verb + subject", is an instance of topicalisation, because the finite verb precedes the subject (De Haan & Tuijnman, 1988). However, it is probably not an example of object topic drop, as it is likely that the children who produced these omissions understood the demonstrative pronoun *die* ('that') – that was used as a prompt to help children produce a sentence – as an object, meaning that the experimenter already uttered the object and children only had to produce the rest of the topicalised sentence. The reason why the bilingual children produced this type of omission slightly more than the monolingual children could be because the object reading of the prompt *die* ('that') is pragmatically not the most ideal interpretation. The topic position is usually reserved for new information and the object in this case did not constitute new information in the discourse. When there is no new

information, the subject bias causes listeners to infer that the demonstrative pronoun refers to the subject, i.e. *de fee* ('the fairy'), (Kehler & Rohde, 2013). Therefore, the most likely continuation for the question *Wat doet de fee met de heks? Die..?* ('What is the fairy doing to the witch? She's…?') should be one in which the demonstrative pronoun *die* ('that') is interpreted as a subject.

The second type of omission is "bare infinitive"; children tend to rely on the infinitive in elicitation tasks, even though it is pragmatically not the best continuation in adult language. It is not a straightforward case of omission, because on the one hand the bare infinitive suffices as answer, whereas, on the other hand, in set-ups like these it would be clearer to add a pronoun. In addition, it is not evident whether infinitival clauses contain object topic drop, as some claim that topicalisation is marked by preposed finite verbs (De Haan & Tuijnman, 1988), while others argue that object topic drop occurs in infinitival clauses, too (Thrift, 2003). Since there was no significant difference between the rates of production of "bare infinitive" between the bilingual and the monolingual children and since it is unclear whether this is a case of omission, we will not analyse this type further.

A clear type of omission is "bare finite", as it constitutes postverbal object drop. It is ungrammatical to only include the finite verb in the answer, because *slaan* ('to hit'), for example, is a transitive verb, which requires an object. Furthermore, this type of answer does not include topicalisation, as the addition of a subject after the finite verb would be necessary in that case. Since there is no significant difference between the rates of production of "bare finites" between the bilingual and the monolingual children, it is difficult to determine whether the bilingual children show signs of cross-linguistic influence from Turkish to Dutch. However, the bilingual children produce marginally more of these "bare finites" at a slightly older age; thus, it could be that they linger longer in this stage.

Finally, the last type of omission consisted of "different constructions". Monolingual Dutch children used significantly more different constructions, such as *knijpen aan z'n schouders* ('pinching on his shoulders'), *in d'r hand bijten* ('in her hand bite') and *ze hoofd kloppen* ('his head thump'), than the Turkish-Dutch bilingual children. It is highly likely that this difference is due to the monolingual children's bigger vocabulary size, which was demonstrated by the higher mean score on the standardized passive vocabulary test by the monolingual children. As this category had nothing to do with omission, we cannot conclude whether the bilingual children show signs of cross-linguistic influence from Turkish to Dutch on the basis of this category.

5.4.4. Discussion

The Turkish-Dutch bilingual children omit more reflexives and significantly more pronouns than the monolingual Dutch children in the present elicited production task. At first sight this difference signifies cross-linguistic influence, especially as object drop is a Turkish phenomenon that obligatorily occurs in discourse set-ups where the protagonists are highly prominent (Gürcanlı et al.,

2007). However, child Dutch also displays object drop, which is why the monolingual Dutch children show instances of object omission, too. Moreover, a fine-grained analysis of the object omissions did not reveal any significant differences between the monolingual and bilingual children. It is therefore difficult to tease apart cross-linguistic influence (from Turkish to Dutch) from (Dutch) language development. Cross-linguistic influence could manifest itself in that the bilingual children merely need more time to leave the object drop stage of Dutch than their monolingual peers (Müller & Hulk, 2001).

Secondly, these results reveal a DPBE in production (contra Spenader et al., 2009; but pro Ruigendijk et al., 2010), as the Turkish-Dutch bilingual and the monolingual Dutch children produce fewer pronouns (even when the full NPs are included) than reflexives. The DPBE seems more pronounced for the bilingual children, because they produce so few pronouns; yet, this could also indicate a difficulty with pronoun realisation.

5.5. Experiment III: Turkish comprehension

The third experiment examines the interpretation of Turkish object pronouns and reflexives in biclausal sentences by a group of Turkish-Dutch bilingual children; these were different children from the ones tested in Experiments I and II. The research question addressed in this experiment asks whether these Turkish-Dutch bilingual children show any signs of cross-linguistic influence from Dutch to Turkish, i.e. will they show a DPBE in Turkish, even though on the basis of two theoretical accounts this effect is not expected to occur in Turkish. To our knowledge there is only one study that investigated the comprehension of binding by monolingual Turkish children and they found worse performance on reflexives than on pronouns (Aarssen & Bos, 1999); however, unfortunately, their methodology differed greatly from the present methodology, which makes a comparison difficult to draw.

5.5.1. Participants

Twenty-two typically developing Turkish-Dutch bilingual children participated. They had a mean age of 8;3 (range: 6;7-9;10, SD = 12 months) and were recruited from primary schools in Arnhem. There is a strong Turkish community in the Netherlands with several organizations, clubs, TV channels, mosques and schools. The participants' parents were likely heritage speakers of Turkish, because they undoubtedly do not belong to the group of first generation immigrants. However, no parental questionnaire was administered; thus, the bilingual children's familiarity with Turkish could only be estimated from their results on the Turkish translation of the Peabody Picture Vocabulary Test (Blom, Boerma & Timmermeister, 2014). All the children were individually tested by a native speaker of Turkish in a quiet room at their school.

5.5.2. Materials and procedure

All of the children completed a part of the Turkish translation of the Peabody Picture Vocabulary Test (Blom et al., 2014), which consisted of 32 items, before

they carried out the binding task. The binding task was a Turkish translation of the advanced syntactic test of pronominal reference revised (A-STOP-R) (van der Lely, 1997), which is a picture verification task. The original control items in the A-STOP-R depended on gender: these pictures showed one of the animals sporting a moustache, indicating that this particular animal was male so that it could be referred to with *him* and *himself*, and the other animal wore a pink bow and pink nail varnish to signify that this animal was feminine and, hence, could be referred to with *her* and *herself*. However, since Turkish has no gender, these control items had to be adapted; therefore, they were changed to include *kendisi* ('self.3SG'), which is the quasi-reflexive (i.e. both locally and non-locally bound) element, to establish which interpretation these Turkish-Dutch bilingual children prefer for *kendisi* ('self.3SG').

5.5.3. Results

The Turkish-Dutch bilingual children's overall performance was analysed using repeated measures ANOVAs with the within factors Anaphor (reflexive, pronoun) and Matching (match, mismatch). No significant main effect of Anaphor was found, meaning that the overall mean percentage correct on object reflexives was comparable to the overall mean percentage correct on object pronouns (75.8% versus 72.0%). The ANOVA revealed a main effect of Matching (F (1, 21) = 24.76, $p < 0.001$, $\eta^2 = 0.54$), meaning that the children performed better on the matching than on the mismatching sentence-picture pairs (mean percentage correct: 87.3% versus 60.4%). The results are presented in Table 5.2.

Table 5.2. Turkish-Dutch bilingual children's results on the Turkish picture verification task.

Test condition	**Reflexive match**	**Reflexive mismatch**	**Pronoun match**	**Pronoun mismatch**
% correct	87.9%	63.6%	86.7%	57.2%

For the control items a one-sample *t*-test showed that these children understood *kendisi* ('self.3SG') as a reflexive more than chance (t (21) = 7.25, $p < 0.001$). In other words, they preferred to interpret *kendisi* ('self.3SG') as a reflexive (76.2% of the time) rather than as a pronoun (23.8% of the time). Finally, the Turkish-Dutch bilingual children had a mean score of 21 items correct on the vocabulary test (range: 12 – 30 items, SD = 5 items).

5.5.4. Discussion

The Turkish-Dutch bilingual children show similar behaviour on the Turkish object reflexives and on the pronouns; thus, they do not display a DPBE in Turkish and they do not have a poorer understanding of reflexives than of pronouns (contra Aarssen & Bos, 1999; but in line with the theoretical accounts of Rooryck & Vanden Wyngaerd (2014) and Ruigendijk *et al.* (2010), see Sections 5.2.1. and 5.2.2.). On the one hand, these bilingual children do not seem to be influenced by their Dutch, as they do not show a DPBE; on the other

hand, they appear to show more target-like behaviour on the reflexives than their monolingual peers in the Aarssen and Bos study, which may indicate some facilitative effect from Dutch. Indeed, if the resources for Turkish and Dutch were not pooled in these bilingual children, worse performance than the monolingual children would have been expected. However, since the methodologies differ to such an extent, it is difficult to make any comparison between the monolingual Turkish child participants in the Aarssen and Bos study and our Turkish-Dutch bilingual child participants.

The bilingual children in the present experiment showed a preference for the reflexive interpretation of *kendisi* ('self.3SG') in situations where the reflexive and the pronoun reading were equally likely. Despite there not being any studies that examined the interpretation preferences of *kendisi* ('self.3SG') by monolingual Turkish children, we do know that monolingual Turkish adults do not prefer one reading over the other in situations like these (Demirci, 2001). Why do these bilingual children show a different preference? It could be that these children prefer local binding and, hence, rely on the reflexive interpretation of *kendisi* ('self.3SG') rather than on the pronoun interpretation (Kıran, 2014); yet, this explanation is not likely, as these same children sometimes incorrectly accepted non-local NP antecedents for *kendi* ('self'), which the 63.6% correct performance on the reflexive mismatch conditions shows, see Table 2. Another explanation posed by Kıran (2014) is that *kendisi* ('self.3SG') is morphologically closer to *kendi* ('self') than to *o* ('he/she/it'), causing children to connect the meaning of *kendisi* ('self.3SG') to that of *kendi* ('self'). This explanation is tenable, as the acceptance rate of *kendisi* ('self.3SG') as a reflexive (76.2%) is comparable to the mean percentage correct on *kendi* ('self') in the matching and mismatching conditions (75.8%). Alternatively, these bilingual children may map the structure of the Dutch pronominal paradigm, including the object pronoun *hem* ('him'), the complex reflexive *zichzelf* ('SE-self') and the simple reflexive *zich* ('SE'), to the Turkish pronominal system, meaning that *hem* ('him') is mapped onto *o* ('he/she/it'), *zichzelf* ('SE-self') onto *kendi* ('self') and *zich* ('SE') onto *kendisi* ('self.3SG'). Since *zich* ('SE') allows long-distant binding in some contexts (Everaert, 1991), it shares some superficial characteristics with *kendisi* ('self.3SG'). If indeed children map these two systems onto each other, it would cause them to prefer the reflexive interpretation of *kendisi* ('self.3SG'), as it is the most salient reading of *zich* ('SE'). It is only this latter explanation that assumes cross-linguistic influence from Dutch to Turkish.

5.6. Conclusion

All in all, Experiments I, II and III revealed that Turkish-Dutch bilingual children show very similar behaviour to their monolingual Dutch and Turkish peers in their comprehension and production of object reflexives and pronouns. First of all, Experiment I showed that young Turkish-Dutch bilingual children perform more target-like on reflexives than on pronouns, just like young monolingual Dutch children. Therefore, Turkish does not seem to hinder the acquisition of

Dutch binding by these bilingual children. Secondly, Experiment II demonstrated that, even though Turkish-Dutch bilingual children omit more object reflexives and pronouns in their elicited production than their monolingual Dutch peers, they again both show more target-like behaviour on reflexives than on pronouns. Hence, there are no qualitative differences between the bilingual and monolingual children. All the children's omissions may have had to do with difficulties in pronoun realisation, causing both bilingual and monolingual children to rely on an avoidance strategy. An alternative explanation is that the bilingual children remain longer than their monolingual peers in a phase in which they allow object drop under the influence of Turkish. The present experiment did not gather enough evidence to decide between these two explanations. Finally, Experiment III revealed that the Turkish-Dutch bilingual children performed similarly on Turkish object reflexives and on Turkish object pronouns, thereby showing no delay of Principle B effect. A previous study found that monolingual Turkish children performed less target-like on the reflexives than on the pronouns (Aarssen & Bos, 1999); however, since the methodologies are very different, it is impossible to determine whether the more target-like performance on the reflexives by the Turkish-Dutch bilingual children is due to (positive) cross-linguistic influence from Dutch to Turkish. Despite the children's similar behaviour on reflexives and pronouns, their performance does not reach ceiling. Perhaps the use of overt pronouns and reflexives throughout the task in both studies was not very natural for the children (Gürcanlı et al., 2007). Further research is necessary to uncover what monolingual Turkish children's knowledge of reflexives and pronouns comprises and to what extent Turkish bilingual children differ. Taken together, the present experiments showed that Turkish-Dutch bilingual children experience no impediment from either language in the domain of binding.

Chapter 6

Changing the setting of preferences: How English-Dutch bilingual children diverge from their monolingual peers*

Abstract

Monolingual Dutch and English children differ from each other on sentences with local QP antecedents and object reflexives or object pronouns. It has been found that these dissimilarities stem from different quantifier interpretation preferences (van Koert et al., to appear). Since these languages differ, the question is: how do English-Dutch bilingual children perform? The present experiment tested 29 English-Dutch bilingual children with a mean age of 8;0 (range: 6;0 – 10;10; SD = 16 months). A picture verification task measured their performance on sentences containing QP antecedents and object reflexives and pronouns. A picture selection task determined their quantifier interpretation preferences. The results showed that the bilingual children's quantifier interpretation preferences corresponded to their behaviour on reflexives and pronouns in the QP conditions, just as in monolinguals. However, the bilingual children in the present experiments showed convergence between their Dutch and English: their binding results and their interpretation preferences in Dutch were the same as in English.

6.1. Introduction

Monolingual Dutch and monolingual English children have often been found to have problems with correctly interpreting the object pronoun, *him*, in sentences with a local referential noun phrase (NP) antecedent, as in (1) and (2) (cf. for English: Chien & Wexler, 1990; van der Lely & Stollwerck, 1997; cf. for Dutch: Koster, 1993; Philip & Coopmans, 1996). Whereas Dutch children also incorrectly accept a local quantified noun phrase (QP) antecedent, such as *elk schaap* ('each/every sheep'), for a pronoun, as in (3), (Drozd & Koster, 1999; van Koert, Koeneman, Weerman & Hulk, 2015), English children are significantly better able to reject a local antecedent when it is a QP, as in (4) (Chien & Wexler, 1990; Marinis & Chondrogianni, 2011; van der Lely & Stollwerck, 1997).

(1) De kangoeroe zegt dat het schaap hem krabt.

(2) The kangaroo says the sheep is scratching him.

* A slightly modified version of this chapter has been submitted as: van Koert, Margreet, Olaf Koeneman, Aafke Hulk & Fred Weerman. (under review). English-Dutch bilingual children's interpretation of object pronouns and reflexives and their interpretation of quantified subjects.

(3) De kangoeroe zegt dat elk schaap hem krabt.

(4) The kangaroo says every sheep is scratching him.

In other words, there is an asymmetry for monolingual English children between local NP and QP antecedents, as in (2) and (4), which is not present for monolingual Dutch children. Previous research linked this difference between Dutch and English children to their dissimilar quantifier interpretation preferences (van Koert, Hulk, Koeneman & Weerman, to appear; van Koert, submitted). Whereas Dutch children consistently prefer a distributive interpretation, English children prefer a collective interpretation. To test Van Koert *et al.*'s hypothesis, the present study explores English-Dutch bilingual children's quantifier interpretation preferences in Dutch and English and examines their performance on sentences such as (1) – (4). The question is if their two languages cause their quantifier interpretation preferences to differ from the monolingual children's. A further question is that if they do, will there be a direct effect on their performance on (1) – (4)? Only few studies investigated quantifier interpretations of simultaneous bilinguals (e.g. Sekerina & Sauermann, 2014; Wei & Lee, 2001; Yip & Matthews, 2007) and little research has been conducted into bilingual children's performance on sentences containing object reflexives and pronouns in Germanic languages (van Koert, Hulk, Koeneman & Weerman, 2013; Marinis & Chondrogianni, 2011). Moreover, the two phenomena have not yet been investigated together in one study.

This study contains two experiments: one on quantifier interpretation preferences (Experiment I) and the other on the interpretation of object reflexives and pronouns (Experiment II). The outcomes of the two experiments show that not only do the English-Dutch bilingual children behave differently from their monolingual Dutch and English peers regarding their quantifier interpretation preferences, they also perform differently from their peers on conditions such as (3) and (4). This corroborates Van Koert *et al.*'s (2015; to appear) hypothesis that children's quantifier interpretation preferences influence their performance on binding, i.e. on conditions such as (3) and (4). Another finding is that the bilingual children's results on both experiments reveal bidirectional influence, i.e. from Dutch to English and from English to Dutch, which has been found in only a few other studies examining simultaneous bilingual children (Foroodi-Nejad & Paradis, 2009; Nicoladis, 2002; Nicoladis & Gavrila, 2014) and only for production. Typically, unidirectional influence – from one language to another – is found for simultaneous bilingual children (cf. Argyri & Sorace, 2007; Kupisch, 2007; Serratrice, Sorace & Paoli, 2004; Serratrice, Sorace, Filiaci & Baldo, 2009; Sorace, Serratrice, Filiaci & Baldo, 2009).

This chapter is organised as follows: Section 6.2 discusses previous findings for monolingual and bilingual children with regard to quantification and binding. The research questions for the present study are provided at the end of Section 2. Information on the methodology, the participants and the

procedure of the two experiments is given in Section 6.3. Section 6.4, then, analyses the results of the quantification and the binding experiment by comparing and contrasting the bilingual children's results to those of monolingual Dutch and English children. It is established that the bilingual children perform differently from their monolingual Dutch and English peers on both experiments. Subsequently, Section 6.5 discusses the link between children's quantifier interpretation preferences and their binding performance. In addition, it offers some explanations for bidirectional cross-linguistic influence. Finally, Section 6.6 concludes this chapter.

6.2. Background

The two experiments in this study examine two phenomena: English-Dutch bilingual children's quantifier interpretation preferences and their comprehension of binding. Regarding quantifier interpretation preferences, this study investigates which of the two available interpretations bilingual children prefer given a certain quantifier in subject position and an indefinite NP in object position. Section 6.2.1 discusses previous findings with regard to Dutch and English quantification in more detail. This study also investigates bilingual children's performance on sentences containing noun phrase (NP) and quantified noun phrase (QP) antecedents and object reflexives and pronouns. Section 6.2.2 gives an overview of previous literature concerning Dutch and English binding. Finally, Section 6.2.3 formulates the research questions for this study.

6.2.1. Quantifiers

Quantifiers are words, such as *a* and *every*, that express quantities. When two quantifiers appear in a sentence, as in (5), they typically interact, resulting in two available interpretations of such a sentence. Hence, (5) can either mean that a quantity of girls, three for instance, are reading one and the same book. For example, (5) could mean that Sophie, Elsa and Anna are reading *Little Women* together; this interpretation is captured in (5a) and is commonly referred to as the collective interpretation (May, 1982; Tunstall, 1998).

(5) Every girl is reading a book.
   a. There is a y such that y is a book, for every x such that x is a girl and x is reading y.
   b. For every x such that x is a girl there is a y such that y is a book, and x is reading y.

The sentence in (5) could also mean that Sophie is reading *The Jungle Book*, Elsa is reading *Harry Potter and the Philosopher's Stone*, and Anna is reading *Little Women*. This interpretation is provided in (5b) and is labelled the distributive interpretation (May, 1982; Tunstall, 1998). The collective and distributive interpretations seem particularly available when the larger quantity appears in subject position (*every girl*) and the smaller in object position (*a book*), more so

than when it is the other way around (Anderson, 2004; Hendriks, Koops van 't Jagt & Hoeks, 2012; Raffray & Pickering, 2010).

Both interpretations exist and both are available in Dutch and English; even young children seem to be aware of the two interpretations (Achimova, Crosby, Syrett, Déprez & Musolino, 2013; Crain, Thornton, Boster, Conway, Lillo-Martin & Woodams, 1996; Roeper & de Villiers, 1993; Syrett & Musolino, 2013). When two interpretations are available, one is typically preferred over the other. Dutch is a clear example of this: although monolingual Dutch adults and children accept the two interpretations of the Dutch equivalent of (5) in grammaticality judgment tasks (Hendriks et al., 2012), they show a consistent preference for the distributive interpretation, that is (5b), as they choose the distributive situation in a preference task more than 95% of the time (van Koert et al., to appear; van Koert, submitted; Rouweler & Hollebrandse, 2015). Monolingual English adults also prefer the distributive situation for a sentence such as (5) but to a much lesser extent than the Dutch adults and children, as they choose the distributive situation around 70-80% of the time (Anderson, 2004; van Koert et al., to appear; van Koert, submitted; Raffray & Pickering, 2010). Monolingual English children, by contrast, do not seem to have a preference for sentences like (5) and are just as likely to choose (5a) as they are to pick (5b) as their preferred interpretation of (5) (Achimova et al., 2012; van Koert et al., to appear; van Koert, submitted; Novogrodsky, Roeper & Yamakoshi, 2012).

Which interpretation is preferred also depends on which quantifier is used. There are three universal quantifiers in Dutch, viz. *ieder* ('each/every'), *elk* ('each/every') and *alle* ('all'), and in English, i.e. *each*, *every* and *all*. Dutch adults and children show a two-way divide in their interpretation preferences of these quantifiers: *ieder* and *elk* receive identical interpretation preferences, namely a consistent preference for the distributive situation, whereas *alle* displays no preference (van Koert et al., to appear; van Koert, submitted; Rouweler & Hollebrandse, 2015). English adults and children, on the contrary, have a three-way divide for their quantifier interpretation preferences: *each* receives the most distributive interpretations, followed by *every*, and *all* receives the most collective interpretations (Brooks & Braine, 1996; van Koert et al., to appear; van Koert, submitted). Thus, this is another difference between monolingual Dutch and English children with regard to their quantifier interpretation preferences.

With these differences between quantifier interpretation preferences, the question remains which preferences simultaneous English-Dutch bilingual children display. Which interpretations do they prefer for the three quantifiers in Dutch and in English? Research into bilingual acquisition has established that simultaneous bilingual children are good at separating their two languages (e.g. De Houwer, 1990; Genesee, 1989). However, since these children grow up acquiring two languages simultaneously, it is unsurprising that some form of influence will appear in (one of) their languages (Hulk & Müller, 2000; Müller & Hulk, 2001; Nicoladis, 2002; Serratrice et al., 2004; Yip & Matthews, 2007). Many studies into simultaneous bilingual children revealed that bilingual

children are not qualitatively different from their monolingual peers (Hulk & Müller, 2000; Müller & Hulk, 2001); that is, they do not comprehend sentences differently or produce different utterances from their monolingual peers. Rather, bilingual children can be quantitatively different from their monolingual peers (Hulk & Müller, 2000; Müller & Hulk, 2001); for example, Nicoladis (2002) found that both monolingual English and French-English bilingual children produced compound reversals in English, e.g. *balloon-clown* instead of *clown-balloon*, but the bilingual children did so twice as many times as their monolingual peers. Nicoladis concluded that the bilingual children were quantitatively different from the monolingual children due to their other language.

It is commonly found that one of the languages influences the other, i.e. unidirectional cross-linguistic influence. Most studies into comprehension have found unidirectional cross-linguistic influence for bilingual children (e.g. Argyri & Sorace, 2007; Kupisch, 2007; Serratrice et al., 2004; Serratrice et al., 2009; Sorace et al., 2009). For instance, Serratrice *et al*. (2009) investigated English-Italian simultaneous bilingual children on their interpretation of generic and specific plurals; they found that the bilingual children's English influenced their acceptability of ungrammatical sentences in Italian. Only a few studies into production established bidirectional cross-linguistic influence (Foroodi-Nejad & Paradis, 2009; Nicoladis, 2002; Nicoladis & Gavrila, 2014). The clearest example is given by Foroodi-Nejad and Paradis (2009), who compared Persian-English bilingual children to monolingual Persian and monolingual English children on their production of compounds. They found that the bilingual children produced more right-headed compounds in Persian than their Persian peers, but also that they produced more left-headed compounds in English than their English peers. This was a quantitative difference, as even the monolingual English children produced some left-headed compounds; similarly, the monolingual Persian children used some right-head compounds.

To establish whether or not the English-Dutch bilingual children separate their quantifier interpretation preferences, a quantifier preference task is carried out in Experiment I. Van Koert *et al*. (2015; to appear) hypothesised that monolingual Dutch and English children's quantifier interpretation preferences are linked to their binding performance. To understand how monolingual Dutch children differ from monolingual English children with regard to binding, the next section provides a concise overview of studies investigating Dutch and English binding.

6.2.2. Binding

Reflexives and pronouns have little lexical content and need to be bound by referential expressions to receive meaning. Whereas reflexives need to be bound locally by their antecedents, as in (6), pronouns need to be locally free, which means that their antecedents have to appear in a different clause, as in (7) (Chomsky, 1981). Co-indexation means co-identification in (6) and (7).

(6) The horse$_i$ says the rabbit$_k$ is scratching himself$_{*i/k}$.

(7) The kangaroo$_i$ says the sheep$_k$ is scratching him$_{i/*k}$.

Monolingual Dutch and monolingual English children are very well able to accept local antecedents, such as *the rabbit* in (6), and to reject distant antecedents, such as *the horse* in (6), for reflexives from about four years onwards (e.g. Chien & Wexler, 1990; Koster, 1993; van der Lely & Stollwerck, 1997; Philip & Coopmans, 1996). When it comes to pronouns, however, they are able to accept the distant antecedent, such as *the kangaroo* in (7), but they are unable to reject the local antecedent, such as *the sheep* in (7), for the pronoun for about half of the time until they are seven or eight years old (e.g. Chien & Wexler, 1990; Koster, 1993; van der Lely & Stollwerck, 1997; Philip & Coopmans, 1996). Thus, there seems to be an asymmetry between the children's knowledge of reflexives and their knowledge of pronouns.

Local antecedents are easier to reject for monolingual English children, when they are QPs, as in (8) (Chien & Wexler, 1990; Marinis & Chondrogianni, 2011; van der Lely & Stollwerck, 1997).

(8) The kangaroo$_i$ says every sheep$_k$ is scratching him$_{i/*k}$.

The performance difference between (7) and (8) is labelled the quantificational asymmetry (QA) (Elbourne, 2005) and is explained by the hypothesis that children are confused between the typical meaning of a pronoun and its co-referential meaning (Chien & Wexler, 1990; Grodzinsky & Reinhart, 1993). Pronouns may co-refer with local NP antecedents under special discourse circumstances, which require a particular intonation. Nevertheless, children do not recognise the circumstances or the intonation and are, therefore, torn between the two meanings of a pronoun, resulting in their chance performance on test sentences like (7). Since quantifiers have no reference (Grodzinsky & Reinhart, 1993), they cannot co-refer; thus, children cannot be confused between the two meanings of a pronoun and are better able to reject a local QP antecedent, as in (8), than an NP antecedent, as in (7).

Although this account seems promising, it cannot be maintained cross-linguistically. Monolingual Dutch children do not show a performance difference between the Dutch equivalents of (7) and (8); they perform just as poorly on (8) as they do on (7) (Drozd & Koster, 1999; van Koert et al., 2015). Van Koert *et al*. (2015) proposed a new account that links children's performance on sentences such as (8) to their quantifier interpretation preferences. Dutch children prefer a distributive interpretation of *elk* ('each/every') (van Koert et al., to appear; van Koert, submitted), which renders a distributed interpretation of *him* possible, viz. there is more than one *him*. Hence, Dutch children accept a picture displaying three sheep scratching themselves for the Dutch translation of (8). By contrast, English children prefer a collective interpretation of *every* (van Koert et al., to appear; van Koert, submitted), which leads to a single interpretation of *him*. Therefore, English

children reject a mismatching picture for (8). This is exactly what the results of the binding tasks show (Drozd & Koster, 1999; van Koert et al., 2015; Marinis & Chondrogianni, 2011; Philip & Coopmans, 1996).

The new account is also supported by children's performance on sentences with object reflexives and QP antecedents, as in (9). Whereas Dutch children perform on target on the Dutch equivalents of (9), English children display chance behaviour (Chien & Wexler, 1990; van Koert et al., 2015; Marinis & Chondrogianni, 2011; van der Lely & Stollwerck, 1997).

(9) The horse$_i$ says every rabbit$_k$ is scratching himself$_{*i/k}$.

This is precisely what the new account predicts: a distributive interpretation yields a distributed interpretation of *himself*, whilst a collective interpretation leads to a single interpretation of *himself*. Thus, Dutch children, with their preference for a distributive interpretation, perform target-like on (9), but English children, who prefer a collective interpretation, are unable to reject the distant antecedent, *the horse*, for the reflexive *himself* in (9). Since QP antecedents do not aid English children in their correct interpretation of reflexives, Marinis and Chondrogianni labelled this finding the inversed quantificational asymmetry (IQA).

All in all, it is the QP conditions on which monolingual Dutch children differ the most from monolingual English children. This is unsurprising in light of Van Koert *et al.*'s account, because the children's quantifier interpretation preferences also diverge, see Section 6.2.1. The question is: what will English-Dutch bilingual children do? Previous research into binding revealed that Turkish-Dutch bilingual children behaved similarly to their monolingual Dutch peers on the QP conditions (van Koert et al., 2013), as did Turkish-English bilingual children (Marinis & Chondrogianni, 2011). However, since these children's Turkish was not investigated, it is unclear whether their Turkish quantifier interpretation preferences differed from their preferences in Dutch or English. The present study examines English-Dutch bilingual children's comprehension of binding in Dutch and in English and connects these outcomes to their quantifier interpretation preferences. The next section presents the research questions.

6.2.3. Research questions

Monolingual Dutch and monolingual English children differ greatly from each other with regard to their interpretative preferences of quantifiers. This difference is not a qualitative difference, but a quantitative difference, as monolingual Dutch children prefer the distributive interpretation to a greater extent than the monolingual English children (van Koert, submitted). Quantitative differences are also found between monolingual and bilingual children; these quantitative differences are typically referred to as cross-linguistic influence (Hulk & Müller, 2000; Müller & Hulk, 2001). In addition, studies into the domain of semantics uncovered quantitative differences

between the bilingual and the monolingual children's judgments (Serratrice et al., 2009). Since the interpretation of quantifiers belongs to the domain of semantics, the quantifier preference task could reveal quantitative differences between the bilingual children and their monolingual peers. Hence, our first research question is:

(A) Are English-Dutch bilingual children similar to or different from their Dutch and English monolingual peers concerning their preferred interpretations of quantifiers?

Dutch monolingual children behave differently from English monolingual children with regard to binding: Dutch children tend to incorrectly accept a local QP antecedent as the referent of an object pronoun, whereas English children do not. In other words, English children show a QA, because they perform more target-like on local QP antecedents than on local NP antecedents. Furthermore, English children are prone to incorrectly reject a local QP antecedent as the referent of an object reflexive, thereby showing an IQA, whereas Dutch children do not. Again, these are quantitative differences between the monolingual Dutch and the monolingual English children, which could lead to quantitative differences between the monolingual and bilingual children, too. Thus, our second research question asks:

(B) Do English-Dutch bilingual children perform similarly to or differently from their Dutch and English monolingual peers in the domain of binding?

The differences between the children's judgments of the QP conditions are explained by their different quantifier interpretation preferences: Dutch children prefer the distributive interpretation, whilst English children prefer the collective interpretation (van Koert et al., 2015). Since quantifier interpretation preferences and the comprehension of QP antecedents are connected, we wonder:

(C) Do the results of the quantifier preference task correspond to the results of the binding task?

Previous research revealed that monolingual Dutch children prefer a distributive interpretation of quantifiers (van Koert et al., to appear; van Koert, submitted) and that they accept local QP antecedents for both reflexives and pronouns (van Koert et al., 2015). However, different groups of children were tested. The present study tests the same bilingual children on their quantifier interpretation preferences and their comprehension of QP antecedents. Moreover, they are tested in Dutch and in English, so that their results in both languages can be compared directly.

6.3. Method

The present study investigates English-Dutch bilingual children's interpretation preferences of quantified subjects in Dutch and English (Experiment I) and their interpretation of object reflexives and pronouns in Dutch and English (Experiment II). The English-Dutch bilingual children's performance on the quantification task will be compared and contrasted with the monolingual Dutch and monolingual English children's performance on the same tasks. Furthermore, we compare and contrast their Dutch results with that of monolingual Dutch children's performance on the binding task. In addition their English scores will be compared and contrasted with the results obtained by monolingual English bilingual children on the binding task.

6.3.1. Experiment I: Quantifier preference task

6.3.1.1. Participants

Twenty-nine typically developing English-Dutch bilingual children participated in this study.[1] They were compared to 62 monolingual Dutch and 60 monolingual American English children (van Koert et al., to appear; van Koert, submitted).

The English-Dutch bilingual children had a mean age of 8;0 (range: 6;0 – 10;10; SD = 16 months) and all attended Dutch primary schools. The children and their parents lived in cities and villages across the provinces of Noord-Holland, Zuid-Holland and Utrecht. Twenty-four children had one Dutch-speaking and one English-speaking parent; five children had two English-speaking parents. All the children had been exposed to English from birth; yet, only twenty children had been exposed to Dutch from birth, whereas the other nine had a mean age of onset of Dutch of 2;6 (range: 9 months – 48 months). The children's social economic status (SES) was measured by their parents' level of education: since university was the mode, the children had a high SES.

The monolingual Dutch children had a mean age of 7;11 (range: 6;1 – 9;8; SD = 13 months) and attended primary school in Zuid-Holland. Finally, the monolingual American English children had a mean age of 7;11 (range: 6;0 – 9;7; SD = 12 months) and attended primary school in Amherst, Massachusetts.

6.3.1.2. Materials

The quantifier preference task consisted of a picture selection task including two choices, similar to Brooks and Sekerina's experiments (2005/2006). Since we wanted to measure interpretation preferences, a picture selection task is one of the easiest methods (Baauw et al., 2011, Syrett & Musolino, 2013). This picture selection task contained items displaying two pictures simultaneously: one picture provided a prototypical distributive event, in which each of the three agents was paired with one experiencer, as in Figure 6.1, the other

[1] We originally tested thirty-three children; however, three of them were diagnosed with dyslexia, resulting in their exclusion. One child did not finish the binding task; therefore, his results are not included.

picture showed a collective action situation, in which the three agents together performed an action on one experiencer, as in Figure 6.2.

Figure 6.1. Prototypical distributive event.

Figure 6.2. Collective action situation.

There were two practice items to get the children used to choosing between two equally likely situations. Furthermore, there were 24 test items and six fillers. All sentences were mono-clausal with action verbs, such as: *rijden op – ride*, *duwen – push*, *schminken – paint*, *aankleden – dress*, *vastbinden – tie*, *kietelen – tickle*. Test items were introduced as in (10):

(10) Test items
   a. Deze twee plaatjes gaan over kietelen. Als ik zeg: 'Elke beer kietelt een schildpad', welk plaatje past daar dan het beste bij, volgens jou?
   b. These two pictures are about tickling. If I say: 'Every bear is tickling a turtle', which picture would that be, do you think?

All of the animals in the quantification experiment were introduced at the beginning; hence, it was ensured that the English-Dutch bilingual children knew all the names of the animals.

6.3.2. Experiment II: Binding task

6.3.2.1. Participants

The same English-Dutch bilingual children as in Experiment I participated in this experiment. Their results were compared to those of twenty-nine typically developing monolingual Dutch children who had been tested in a previous study (van Koert et al., 2015), as well thirty-three typically developing monolingual British English children (Marinis & Chondrogianni, 2011). The monolingual Dutch children had a mean age of 7;0 (range: 6;3 – 9;1, SD = 9 months) and attended primary schools in North-Holland and Utrecht. The monolingual British English children had a mean age of 7;5 (range: 6;0 – 9;0, SD = 9 months) and attended primary schools in the Reading area (Marinis & Chondrogianni, 2011). Not only are these monolingual children significantly

younger than their English-Dutch bilingual peers, but they also differ in SES: the former have a low SES, while the latter have a high SES. Since the monolingual children were originally compared to a group of children who had a low SES (van Koert et al., 2013; Marinis & Chondrogianni, 2011), theirs had to be comparable. The analyses can only control for age by using it as a covariate.[2]

6.3.2.2. Materials

We used the advanced syntactic test of pronominal reference (A-STOP-R) to test the children's understanding of binding (van der Lely, 1997). The A-STOP-R was used in its original English edition and in its Dutch translation. The test included experimental and control conditions. The experimental conditions contained two types of anaphors: object reflexives and object pronouns. There were two matching conditions within the experimental conditions: match and mismatch. In addition, there were two antecedent conditions within the experimental conditions: NP and QP antecedents. Finally, there were six test sentences per condition. Thus, there were 2 x 2 x 2 x 6 = 48 test items. Examples of the test sentences in the mismatching conditions are given in (11) – (14), (a) lists the Dutch examples and (b) the English ones.

(11) Mismatching NP/Reflexive condition
   a. De krokodil zegt dat de leeuw zichzelf aanraakt.
   b. The crocodile says the lion is touching himself.

(12) Mismatching QP/Reflexive condition
   a. De krokodil zegt dat elke leeuw zichzelf aanraakt.
   b. The crocodile says every lion is touching himself.

(13) Mismatching NP/Pronoun condition
   a. De kat zegt dat de hond hem aanraakt.
   b. The cat says the dog is touching him.

(14) Mismatching QP/Pronoun condition
   a. De kat zegt dat elke hond hem aanraakt.
   b. The cat says every dog is touching him.

The control conditions also contained two types of anaphors and two matching conditions. Again, there were six test sentences per condition, resulting in a total of 2 x 2 x 6 = 24 control items. The pictures in the control conditions stressed the protagonists' genders, as one of them was female and the other male; hence, the control condition checked whether children perform

[2] Another group of twenty-nine monolingual Dutch children with a mean age of 7;1 was tested on this binding task (van Uden, 2014). They were assumed to have a medium SES. Their performance on the mismatching pronouns was significantly better than that of the monolingual Dutch children with a low SES; however, they performed similarly to the English-Dutch bilingual children when age was not used as a covariate.

better when gender is a cue.[3] Finally, there was a mismatch-syntax condition including 24 items that was excluded from the analyses. Thus, there were 96 items in total. Six action verbs were used: *aanraken – touch*; *aanwijzen – point to*; *kietelen – tickle*; *knijpen – pinch*; *krabben – scratch*; *wassen – wash*. Most of the agents and experiencers were animals, such as sheep, rabbits, kangaroos and horses; four characters were humans: the dancer, granny, the girl and the boy.

6.3.2.3. Procedure

The English-Dutch bilingual children were administered a test battery that took about 25 to 45 minutes. Half of the children first did the Dutch session and then the English one, while the other half first completed the English session and then the Dutch one. There were at least two weeks and at most six weeks apart between the two sessions (M = 23.3 days between the sessions). The Dutch session consisted of a standardized passive vocabulary test (*Taaltoets Alle Kinderen* ('Language Test for All Children')), the Dutch version of the quantifier preference task and the Dutch version of the binding task. The English session consisted of a standardized passive vocabulary test (Peabody Picture Vocabulary Test), the English version of the quantifier preference task, the English version of the binding task and a questionnaire regarding the child's use of English and Dutch at home. In addition, the parents were also administered a questionnaire regarding the child's upbringing with and exposure to the two languages.

The group that did the Dutch session first hardly differed from the group that did the English session first: their vocabulary scores in both languages were similar, they were of the same age and they spoke roughly the same amount of Dutch and English with their parents. However, the children that completed the Dutch session first spoke significantly more Dutch with their siblings than the group that did the English session first, as can be seen in Table 6.1.

All of the English sessions took place in a quiet place at home, where these bilingual children were used to speaking English. Twenty Dutch sessions were conducted in a quiet place at school where these bilingual children were used to speaking Dutch; however, nine children carried out their Dutch session at home, because either the school or the parents were reluctant to give permission.

There were two versions of the quantification and binding experiments: children received one of the versions in Dutch and the other one in English. There was no effect of version in the statistical analyses, meaning that the two versions yielded the same effects and outcomes.

Table 6.1. Summary of the characteristics of the two groups.

[3] Although the bilingual children behaved mostly target-like on the control items in Dutch (mean percentage correct: 88.1%) and in English (mean percentage correct: 86.8%), they showed the same pattern as for the experimental items, i.e. they scored significantly better on the matching than on the mismatching items. This held for both languages and was particularly noticeable in the pronoun condition.

	Order	Mean (SD)	Range	P-value
Age at session 1	Dutch – English	8;01 (17)	6;00 – 10;10	0.626
	English – Dutch	7;09 (16)	6;03 – 10;00	
Age at session 2	Dutch – English	8;01 (17)	6;00 – 10;10	0.638
	English – Dutch	7;10 (16)	6;04 – 10;01	
% correct TAK	Dutch – English	80.0% (10)	54.2 – 93.8	0.806
	English – Dutch	78.9% (12.8)	63.5 – 93.8	
% correct Peabody	Dutch – English	78.4% (15.1)	48.6 – 93.8	0.769
	English – Dutch	80.1% (15.2)	51.4 – 97.2	
% of Dutch with parent	Dutch – English	46.1% (23.3)	10.0 – 90.0	0.116
	English – Dutch	31.4% (24.3)	0.00 – 75.0	
% of English with parent	Dutch – English	53.9% (23.3)	10.0 – 90.0	0.116
	English – Dutch	68.6% (24.3)	25.0 – 100	
% of Dutch with siblings	Dutch – English	75.4% (26.3)	0.00 – 100	0.026
	English – Dutch	45.0% (34.5)	0.00 – 100	
% of English with siblings	Dutch – English	24.6% (26.3)	0.00 – 100	0.026
	English – Dutch	55.0% (34.5)	0.0 – 100	

6.4. Results

First the statistical analyses of the quantifier preference task are provided before the results of the binding task are presented.

6.4.1. Experiment I: Quantifier preference task

The English-Dutch bilingual children completed the quantifier preference task in Dutch and in English. Hence, their performance in those two languages was compared by means of a repeated measures ANOVAs with the between factor Language (Dutch, English) and the within factor Quantifier (ieder/each, elk/every, alle/all). No main effect of Language was found (F (1, 56) = 0.28, p > 0.5), meaning that the bilingual children performed similarly in Dutch and English.

6.4.1.1. Dutch results

The English-Dutch bilingual children were compared to the monolingual Dutch children on their comprehension of quantified subjects and indefinite objects. The children's performance on the quantifier preference task was analysed using repeated measures ANOVAs with the between factor Language Background (monolingual Dutch, English-Dutch bilingual) and the within factor Quantifier (ieder, elk, alle). Figure 6.3 shows the monolingual Dutch and the English-Dutch bilingual children's interpretive preferences of the three Dutch quantifiers.

The ANOVA revealed a main effect of Language Background (F (1, 89) = 8.38, p = 0.005) and a main effect of Quantifier (F (2, 88) = 28.72, p < 0.001). Pairwise comparisons revealed that the monolingual Dutch children chose the distributive reading overall significantly more often than the English-Dutch bilingual children (mean percentage distributive: 86.9% versus 73.4%). In addition, the overall results showed that the quantifiers *ieder* and *elk* received

significantly more distributive interpretations than the quantifier *alle* (mean percentage distributive: 88.0% and 89.3% versus 63.1%).

All in all, the English-Dutch bilingual children had less of a preference for the distributive interpretation than the monolingual Dutch children, but they showed the same two-way divide between the quantifiers.

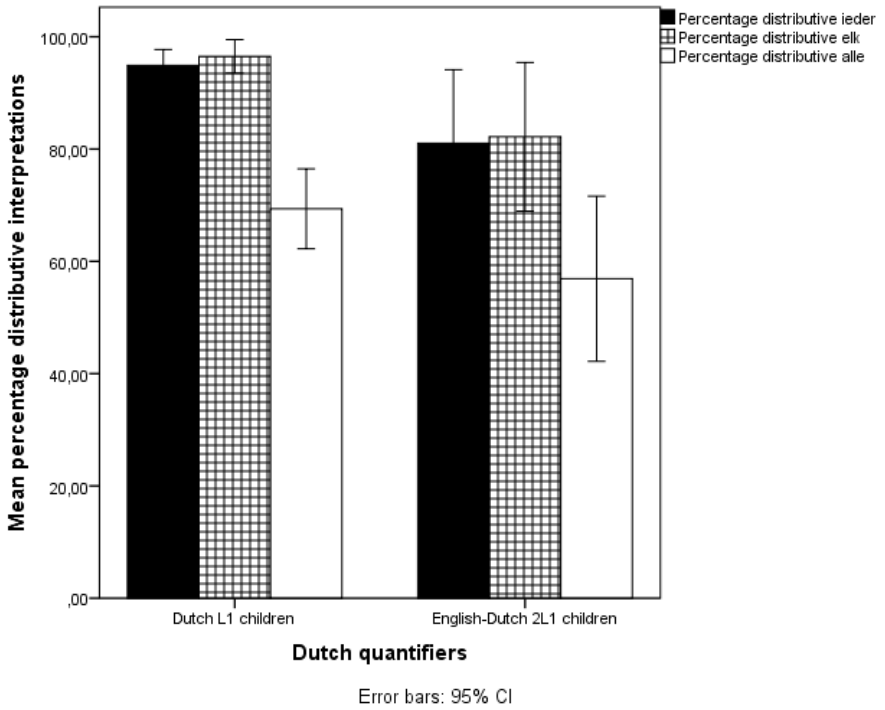

Figure 6.3. The monolingual Dutch and English-Dutch bilingual children's quantifier interpretation preferences.

6.4.1.2. English results

The English-Dutch bilingual children were compared to the monolingual English children on their comprehension of quantified subjects and indefinite objects. The children's performance on object pronouns was analysed using repeated measures ANOVAs with the between factor Language Background (monolingual English, English-Dutch bilingual) and the within factor Quantifier (each, every, all). Figure 6.4 shows the monolingual English and the English-Dutch bilingual children's interpretive preferences of the three English quantifiers.

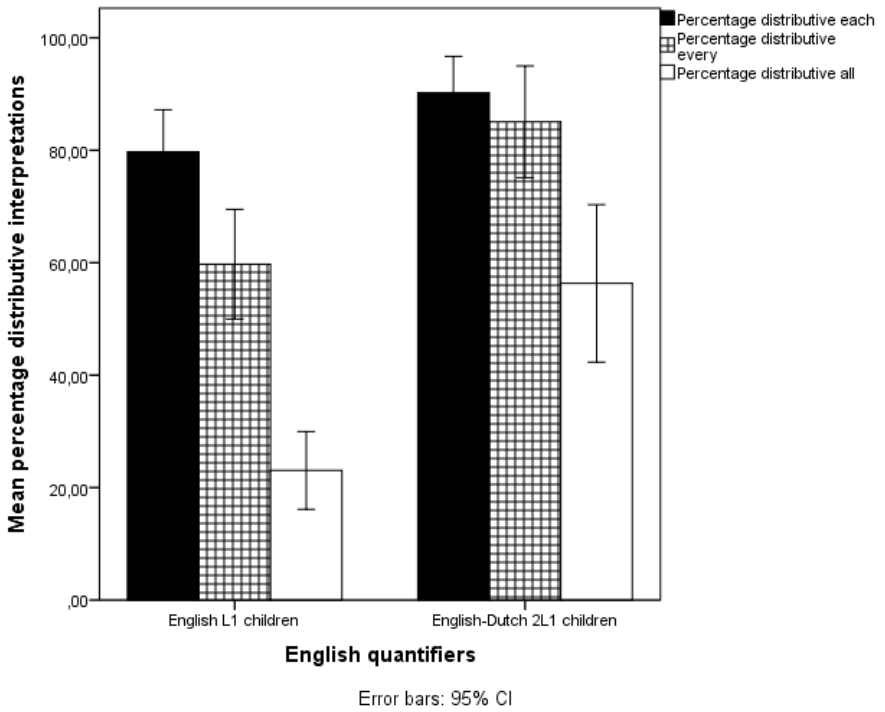

Figure 6.4. The monolingual English and English-Dutch bilingual children's quantifier interpretation preferences.

The ANOVA revealed a main effect of Language Background (F (1, 87) = 16.28, $p < 0.001$), a main effect of Quantifier (F (2, 86) = 75.08, $p < 0.001$) and an interaction between Language Background and Quantifier (F (2, 86) = 6.03, $p = 0.004$). Pairwise comparisons revealed that the monolingual English children chose the collective reading significantly more often than the English-Dutch bilingual children (mean percentage distributive: 54.2% versus 77.2%). In addition, pairwise comparisons revealed that, overall, *each* received significantly more distributive interpretations than *every* (mean percentage distributive: 85.0% versus 72.4%, $p < 0.001$) and *every* received more distributive readings than *all* (mean percentage distributive: 72.4% versus 39.7%, $p < 0.001$). Finally, pairwise comparisons revealed that the interaction between Language Background and Quantifier was due to the differences between the distributive readings given by the monolingual and bilingual children to the quantifiers. The monolingual English children differ between *each*, *every* and *all*, whereas the English-Dutch bilingual children hardly differentiate between *each* and *every*, as can be seen in Table 6.2.

In short, the English-Dutch bilingual children preferred the collective interpretation to a lesser extent than the monolingual English children. They also showed a two-way divide instead of a three-way divide between the quantifiers.

Table 6.2. Percentages of distributive readings given to the three English quantifiers.

Quantifier	English monolinguals	English-Dutch bilinguals
Each	79.9%	90.2%
Every	59.7%	85.1%
All	23.1%	56.3%

6.4.2. Experiment II: Binding task

Examples of the Dutch and English test sentences of the binding task can be found in (11) - (14) in Section 6.3.2.2. The English-Dutch bilingual children completed the binding task in Dutch and in English. To determine whether they performed differently in both languages, a repeated measures ANOVAs was carried out for the reflexives and the pronouns. The between factor was Language (Dutch, English) and the within factors were NP type (referential, quantificational) and Matching (match, mismatch).

The ANOVAs for the reflexives revealed a main effect of Language (F (1, 56) = 4.87, p = 0.031), meaning that the English-Dutch bilingual children performed differently in Dutch than in English. Pairwise comparisons showed that they behaved more target-like on the Dutch reflexives (mean percentage correct: 93.0%) than on the English reflexives (mean percentage correct: 86.1%).

The ANOVAs for the pronouns showed no main effect of Language (F (1, 56) = 0.19, p > 0.6), indicating that the English-Dutch bilingual children behaved exactly the same in Dutch as they did in English on the pronouns.

6.4.2.1. Dutch results

The English-Dutch bilingual children were compared to the monolingual Dutch children on their comprehension of object reflexives. Since the children's ages differed significantly between the monolingual and the bilingual group (F (1, 56) = 10.64, p = 0.002), Age was used as a covariate. For both the reflexives and the pronouns the covariate Age turned out to be a main effect, meaning that the older children performed better than the younger children; this main effect and its interactions will not be further discussed. The children's performance on object reflexives was analysed using repeated measures ANCOVAs with the between factor Language Background (monolingual Dutch, English-Dutch bilingual) and the within factors NP type (referential, quantificational) and Matching (match, mismatch). Interactions were followed up using pairwise comparisons with Bonferroni correction.

Figure 6.5 shows the monolingual Dutch and English-Dutch bilingual children's performance on the interpretation of Dutch reflexives.

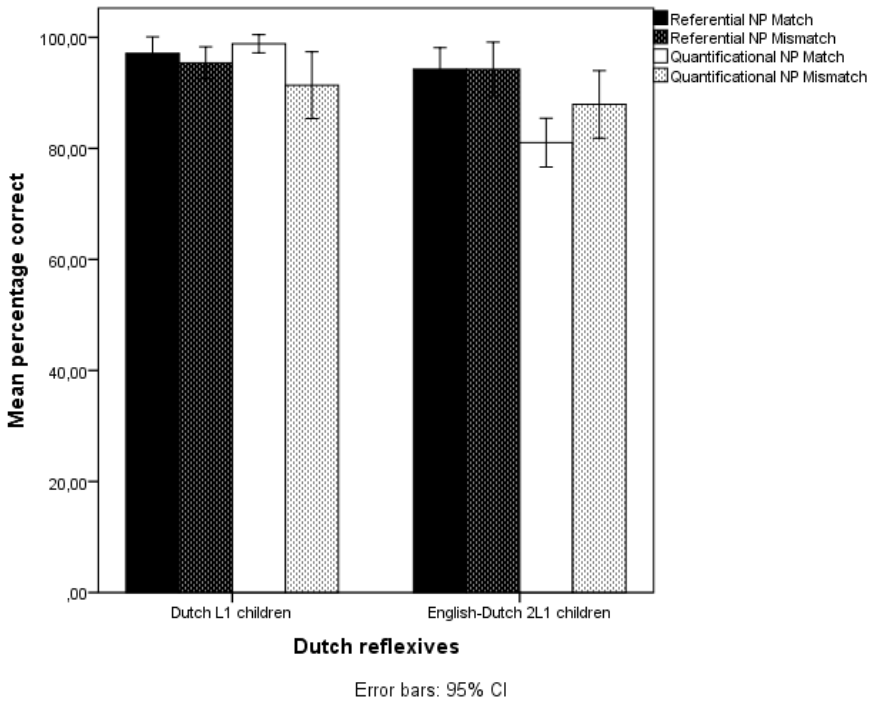

Figure 6.5. The monolingual Dutch and English-Dutch bilingual children's performance on the Dutch object reflexives. The covariate age was evaluated at 7;6.

The ANCOVA revealed a main effect of Language Background (F (1, 55) = 24.30, $p < 0.001$, $\eta^2 = 0.31$) and an interaction between NP type and Language Background (F (1, 55) = 11.63, $p = 0.001$, $\eta^2 = 0.17$).

Pairwise comparisons showed that the main effect of Language Background was due to a lower overall mean percentage obtained by the English-Dutch bilingual children than that by the monolingual Dutch children (88.2% versus 96.9%, $p < 0.001$). Furthermore, the interaction between NP type and Language Background was caused by a significant difference between the NP and QP antecedent conditions for the English-Dutch bilingual children (93.4% versus 83.0%), whereas these antecedents were similar for the monolingual Dutch (97.1% versus 96.6%).

Since there was a main effect of and interactions with Language Background, the children performed differently from one another on the interpretation of Dutch reflexives. To trace the source of the interactions separate ANOVAs were conducted for the English-Dutch bilingual children. We used the within factors NP type (referential, quantificational) and Matching (match, mismatch). The ANOVA revealed a main effect of NP type (F (1, 28) = 22.27, $p < 0.001$, $\eta^2 = 0.44$), meaning that these English-Dutch bilingual children scored better on the NP than on the QP antecedents (mean percentage correct:

94.3% versus 84.5%) in the Dutch object reflexive condition. No other significant main effects or interactions were found.

The English-Dutch bilingual children were compared to the monolingual Dutch children on their comprehension of Dutch object pronouns. The children's performance on object pronouns was analysed using repeated measures ANCOVAs with the between factor Language Background (monolingual Dutch, English-Dutch bilingual) and the within factors NP type (referential, quantificational) and Matching (match, mismatch). Interactions were followed up using pairwise comparisons with Bonferroni correction.

Figure 6.6 shows the monolingual Dutch and the English-Dutch bilingual children's performance on the interpretation of Dutch pronouns.

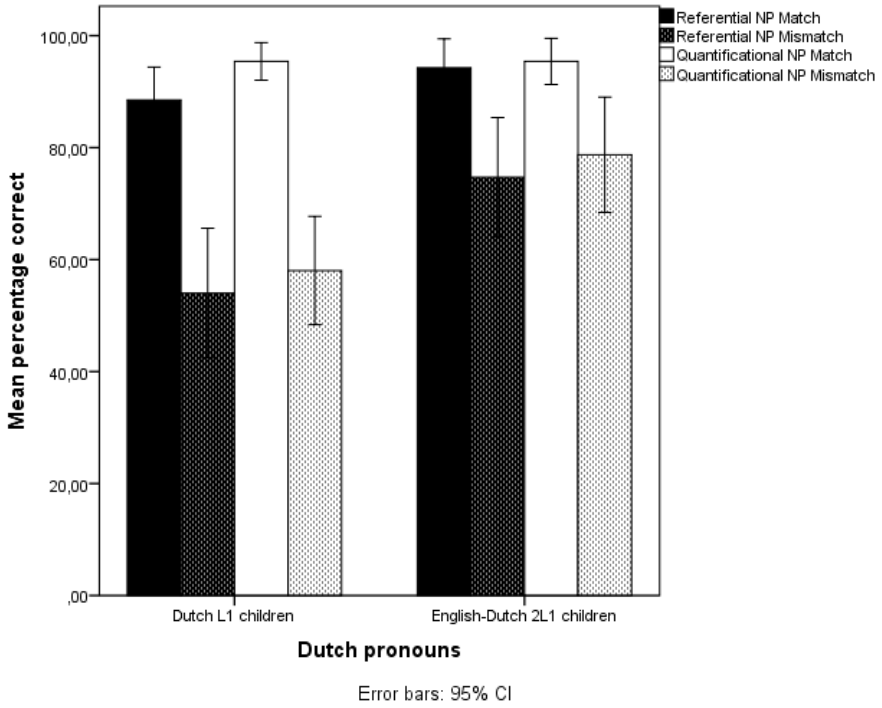

Figure 6.6. The monolingual Dutch and English-Dutch bilingual children's performance on the Dutch object pronouns. The covariate age was evaluated at 7;6.

The ANCOVA revealed a main effect of Matching (F (1, 55) = 16.23, p < 0.001, η^2 = 0.23). Pairwise comparisons indicated that the main effect of Matching was due to the children performing significantly better on the matching than on the mismatching conditions (mean percentage correct: 93.4% versus 66.4%, p < 0.001).

Since there was no main effect of and no interactions with Language Background, no separate ANOVAs needed to be conducted, because the

bilingual children behaved similarly to the monolingual Dutch children on the Dutch object pronouns.

To summarise, the English-Dutch bilingual children behaved differently from the monolingual Dutch children on the reflexives by showing an IQA, but they performed similarly to their monolingual peers on the pronouns by not revealing a QA.

6.4.2.2. English results

The English-Dutch bilingual children were compared to the monolingual English children on their comprehension of object reflexives. Since the children's ages differed significantly between the monolingual and the bilingual group (F (1, 60) = 3.99, p = 0.05), Age was used as a covariate. For both the reflexives and the pronouns the covariate Age turned out to be a main effect, meaning that the older children performed better than the younger children; this main effect and its interactions will not be further discussed. The children's performance on object reflexives was analysed using repeated measures ANCOVAs with the between factor Language Background (monolingual English, English-Dutch bilingual) and the within factors NP type (referential, quantificational) and Matching (match, mismatch). Interactions were followed up using pairwise comparisons with Bonferroni correction. Figure 6.7 shows the monolingual English and English-Dutch bilingual children's performance on the interpretation of English reflexives.

The ANCOVA revealed a main effect of NP type (F (1, 59) = 12.25, p = 0.001, η^2 = 0.17), an interaction between NP type and Language Background (F (1, 59) = 5.60, p = 0.021, η^2 = 0.09), and an interaction between NP type, Matching and Language Background (F (1, 59) = 8.27, p = 0.006, η^2 = 0.12).

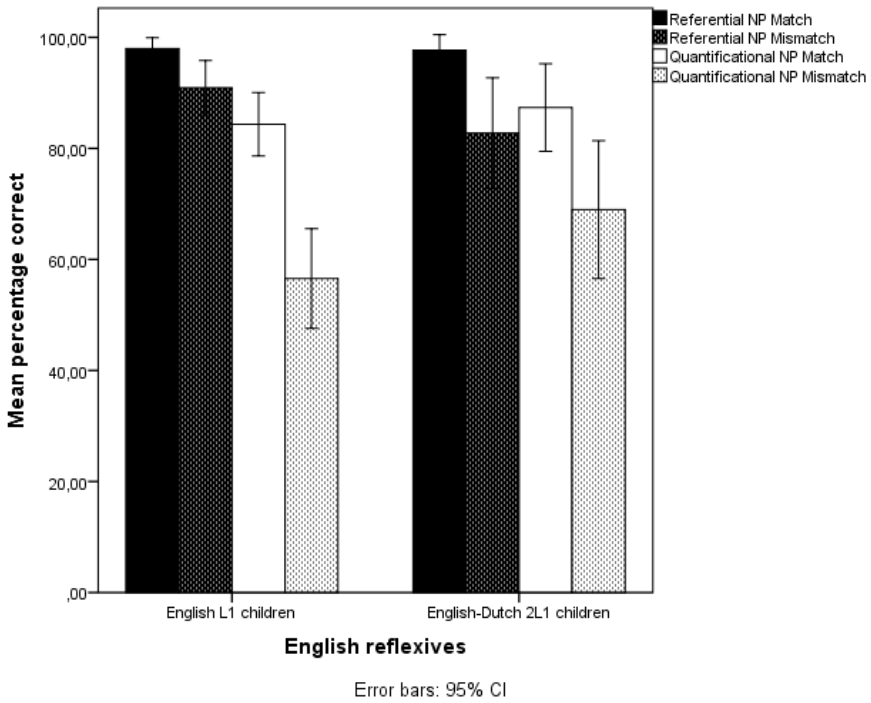

Figure 6.7. The monolingual English and English-Dutch bilingual children's performance on the English object reflexives. The covariate Age was evaluated at 7;8.

Pairwise comparisons revealed that the main effect of NP type was due to the children performing better on the NP than on the QP antecedents (mean percentage correct: 92.3% versus 74.2%). The interaction between NP type and Language Background showed that the monolingual English children differed more between the NP and QP antecedent conditions (mean percentage correct: 95.2% versus 72.2%) than the English-Dutch bilingual children, who showed a smaller difference (mean percentage correct: 89.5% versus 76.2%).

Since there were interactions with Language Background, the children performed differently from one another on the interpretation of English reflexives. To trace the source of the interactions separate ANOVAs were conducted for the English-Dutch bilingual children. We used the within factors NP type (referential, quantificational) and Matching (match, mismatch). The ANOVA revealed a main effect of Matching (F (1, 28) = 13.65, p < 0.001, η^2 = 0.33) and a main effect of NP type (F (1, 28) = 13.19, p = 0.001, η^2 = 0.32). The main effect of Matching showed that children performed better on the matching than on the mismatching conditions – everything else being equal – (mean percentage correct: 92.5% versus 75.9%, p = 0.001). Moreover, the main effect of NP type revealed that children performed better on the NP than on the QP antecedents (mean percentage correct: 90.2% versus 78.2%, p = 0.001).

The English-Dutch bilingual children were compared to the monolingual English children on their comprehension of object pronouns. The children's performance on object pronouns was analysed using repeated measures ANCOVAs with the between factor Language Background (monolingual English, English-Dutch bilingual) and the within factors NP type (referential, quantificational) and Matching (match, mismatch). Interactions were followed up using pairwise comparisons with Bonferroni correction. Figure 6.8 shows the monolingual English and English-Dutch bilingual children's performance on the interpretation of English pronouns.

The ANCOVA revealed a main effect of Language Background (F (1, 59) = 8.07, p = 0.006, η^2 = 0.12), a main effect of Matching (F (1, 59) = 17.35, p < 0.001, η^2 = 0.23) and an interaction between Matching and Language Background (F (1, 59) = 6.77, p = 0.012, η^2 = 0.10). Pairwise comparisons revealed that the main effect of Language Background was due to the different scores obtained by these two groups of children. The monolingual English children's results were overall significantly higher than the English-Dutch bilingual children's results (mean percentage correct: 91.2% versus 82.3%, p = 0.006). Furthermore, pairwise comparisons showed that the main effect of Matching was due to all the children together performing better on the match than on the mismatch conditions (mean percentage correct: 96.4% versus 77.0%). Finally, the interaction between Matching and Language Background was due to the monolingual English children showing a smaller difference between the match and the mismatch conditions (mean percentage correct: 97.4% versus 85.0%) than the English-Dutch bilingual children (mean percentage correct: 95.5% versus 69.0%).

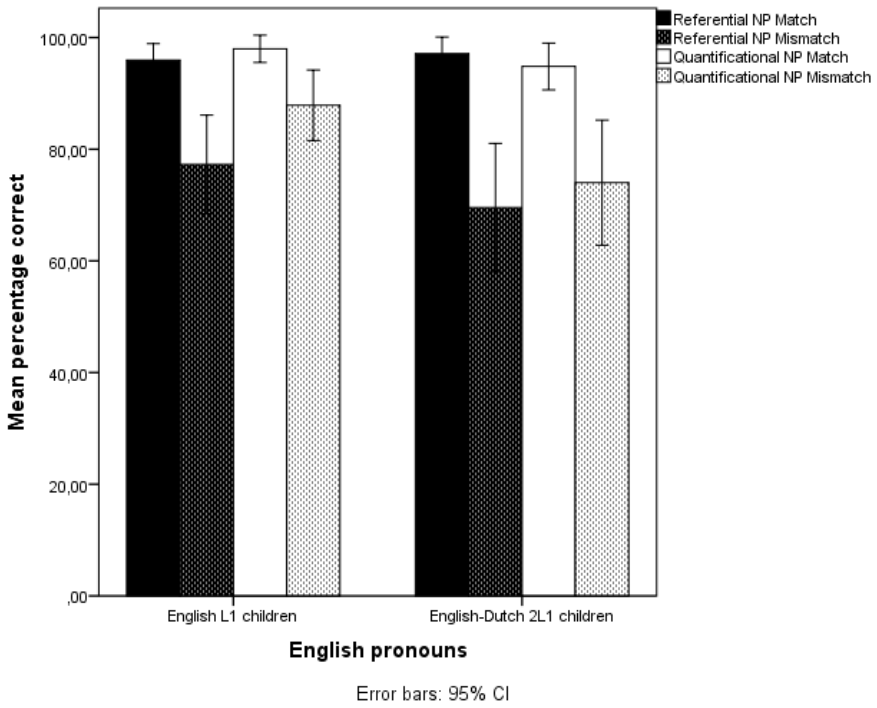

Figure 6.8. The monolingual English and English-Dutch bilingual children's performance on the English object pronouns. The covariate Age was evaluated at 7;8.

Since there was a main effect of and there were interactions with Language Background, the children performed differently from one another on the interpretation of English pronouns. To trace the source of the interactions separate ANOVAs were conducted for the English-Dutch bilingual children with the within factors NP type (referential, quantificational) and Matching (match, mismatch). The ANOVA revealed a main effect of Matching (F (1, 28) = 27.69, p < 0.001, η^2 = 0.50). The main effect of Matching showed that – everything else being equal – children performed better on the matching than on the mismatching conditions (mean percentage correct: 96.0% versus 71.8%, p < 0.001).

To sum up, the English-Dutch bilingual children performed similarly to the monolingual English children on the reflexives, because both groups displayed an IQA. However, the bilingual children were different from their monolingual peers with regard to the pronouns, as they did not show a QA, unlike their monolingual peers (Marinis & Chondrogianni, 2011).

6.5. Discussion

Research question (A) in Section 6.2.3 asked whether the English-Dutch bilingual children behaved similarly to or differently from their monolingual Dutch and English peers with regard to their quantifier interpretation

preferences. The quantifier preference task showed that the bilingual children had different quantifier interpretation preferences from their monolingual peers, as they preferred the distributive interpretation significantly less frequently than the monolingual Dutch children and they preferred the collective interpretation to a significantly lesser extent than the monolingual English children. Research question (B) asked whether they are similar to or different from their monolingual peers when it comes to their behaviour on binding. The binding task showed that they performed differently from their monolingual peers, because they performed less accurately than the monolingual Dutch children on the QP/Reflexive condition and less accurately than the monolingual English children on the QP/Pronoun condition. Research question (C) asked whether their quantifier interpretation preferences correspond to their performance on the binding task. It seems that they do: when the bilingual children's quantifier interpretation preferences diverge from the monolingual norms, so do their judgments of the QP conditions in the binding task. Consequently, Experiments I and II had two main outcomes:

(i) The English-Dutch bilingual children's performance on the binding task is linked to their quantifier interpretation preferences.

(ii) The English-Dutch bilingual children show convergence, as they behave similarly in Dutch as they do in English in both experiments.[4]

The first finding confirms Van Koert *et al.*'s (2015; to appear) hypothesis that children's quantifier interpretation preferences influence their performance on QP conditions in a binding task. A minor remaining issue is why we found an IQA in Dutch and in English but no QA; Section 6.5.1 explains this difference. Convergence is an atypical phenomenon in simultaneous child bilingualism, as unidirectional cross-linguistic influence is more commonly found (cf. Argyri & Sorace, 2007; Kupisch, 2007; Serratrice et al., 2004; Serratrice et al., 2009). Section 6.5.2 discusses the few other studies that found convergence and discusses a possible explanation for this finding.

6.5.1 Correspondence between quantifier preferences and binding performance

The quantifier preference task had four outcomes. Firstly, the English-Dutch bilingual children showed similar interpretation preferences for the quantifiers across the two languages; thus, they made no distinction between the languages. Secondly, they preferred the collective interpretation of all three Dutch quantifiers significantly more often than their monolingual Dutch peers. In addition, they preferred the distributive reading of all three English quantifiers significantly more frequently than their monolingual English peers.

[4] Here convergence refers to "the existence of some element(s) of the languages that are more similar to each other as used by bilinguals compared to monolingual speakers." (Ameel, Malt, Storms & Van Asche, 2009, p. 271).

Finally, they failed to make a three-way distinction in English between the three quantifiers, but instead relied on a two-way distinction.

Let us examine the final finding first. The English-Dutch bilingual children differed from their monolingual English peers – and from the monolingual English adults – by assuming a two-way distinction between the three quantifiers (i.e. *each* and *every* are categorized together and *all* is part of a different category) rather than a three-way distinction (van Koert, submitted). Since monolingual Dutch children and adults adopted a two-way distinction for their quantifier preferences (van Koert, submitted), the English-Dutch bilingual children probably based their two-way distinction of their English quantifiers on Dutch. A likely explanation for this influence from Dutch on English is that Dutch can be considered the bilingual children's dominant language. Since they are predominantly exposed to Dutch in the majority of social situations, they are likely to obtain more Dutch input on a regular basis than English (cf. Argyri & Sorace, 2007). Hence, the greater exposure to Dutch input in comparison to English input could have had an effect on their two-way versus three-way distinction in their quantifier interpretation preferences.

Although the bilingual children's reliance on the two-way distinction seems to indicate more influence from Dutch on English than vice versa, what is most striking is that both Dutch and English influence each other in the bilingual children's preferred quantifier interpretations. The first three outcomes as listed above show that Dutch and English actually converge with regard to preferred quantifier interpretations in these bilingual children's minds: the preferred readings have become similar in the two linguistic systems. Other studies found convergence for simultaneous bilingual children with regard to compounding (Foroodi-Nejad & Paradis, 2009; Nicoladis, 2002) and adjectival placement (Nicoladis & Gavrila, 2014). These studies revealed that the bilingual children's productions in their two languages were quantitatively more alike than they resembled the monolingual children's productions in either of the two languages. The present study has now found the same with regard to comprehension, as the English-Dutch bilingual children's preferences differed from those of monolingual children in both Dutch and English. For Dutch, the bilingual children preferred the distributive interpretation to a lesser extent than the monolingual Dutch children. At the same time they preferred the collective reading to a lesser extent than the monolingual English children.

The binding task produced three findings. Firstly, the English-Dutch bilingual children showed similar behaviour on the binding tasks across the two languages; in other words, they showed the same effects in their Dutch as in their English. This is analogue to what was found for the quantifier preference task. Secondly, their performance in Dutch revealed an IQA. In other words, the bilingual children performed worse on the QP/Reflexive conditions than on the NP/Reflexive conditions, whilst the monolingual Dutch children showed no such asymmetry. Finally, the bilingual children did not show a QA in English. Thus, the bilingual children showed no difference between the QP/Pronoun and NP/Pronoun conditions, whereas the monolingual English

children performed more target-like on the QP/Pronoun than on the NP/Pronoun conditions.

If quantifier interpretation preferences have an effect on the binding task, as suggested by previous research (van Koert et al., 2015; van Koert, submitted), then we expect any difference between monolingual children's and bilingual children's behaviour on the quantifier preference task to lead to differences between monolingual children's and bilingual children's performance on the binding task. This turned out to be correct; the bilingual children showed a decreased preference for the distributive interpretation compared to the monolingual Dutch children, which corresponded to their showing an IQA on the binding task. An IQA, i.e. children performed more target-like on object reflexives in sentences containing NP antecedents than QP antecedents, was absent for the monolingual Dutch children. The sentences in (15) show the relevant test items for English (15a) and Dutch (15b).[5]

(15) a. The horse$_i$ says every rabbit$_k$ is scratching himself$_i$.
b. Het paard$_i$ zegt dat elk konijn$_k$ zichzelf$_i$ krabt.
The horse says that every rabbit SE-self scratches
'The horse says every rabbit is scratching himself.'

Whilst it is unsurprising, compared to monolingual English children, that English-Dutch bilingual children accept a long-distant interpretation of the reflexive in English – albeit to a lesser extent than their monolingual English peers, probably due to influence from Dutch – it is unexpected that they show the same behaviour in Dutch. Why do they behave differently from their monolingual Dutch peers? QPs and their predicates can either be interpreted distributively or collectively, as explained in Section 6.2.1. The quantifier preference task found that English-Dutch bilingual children prefer to interpret predicates containing *elk*-subjects more frequently as collective than their monolingual Dutch peers. It was the collective interpretation of *every* that led monolingual English and English-Dutch bilingual children away from the local antecedent (*every rabbit*), causing them to accept the main clause antecedent (*the horse*) as a referent for the English reflexive. It is likely that the same holds for the English-Dutch bilingual children when they carry out the binding task in Dutch: due to the collective interpretations of *elk*, they are led away from the local antecedent (*elk konijn* ('every/each rabbit')), causing them to accept the main clause antecedent (*het paard* ('the horse')).

No QA was found either in Dutch or in English in the analyses. This means that the bilingual children were as target-like on (16), the QP/pronoun conditions, as they were on (17), the NP/pronoun conditions.

[5] The indices in (15a-b), (16a-b) and (17a-b) correspond to the picture the children saw. In (15a-b), they saw a mismatching picture which showed the three rabbits scratching the horse. In (16a-b) they saw a mismatching picture displaying three sheep scratching themselves. Finally, in (17a-b) they saw a mismatching picture showing a sheep scratching itself.

(16) a. The kangaroo$_i$ says every sheep$_k$ is scratching him$_k$.
b. De kangoeroe$_i$ zegt dat elk schaap$_k$ hem$_k$ krabt.
The kangaroo says that every sheep him scratches
'The kangaroo says every sheep is scratching him.'

(17) a. The kangaroo$_i$ says the sheep$_k$ is scratching him$_k$.
b. De kangoeroe$_i$ zegt dat het schaap$_k$ hem$_k$ krabt.
The kangaroo says that the sheep him scratches
'The kangaroo says the sheep is scratching him.'

If the IQA in Dutch is caused by the bilingual children's increased preference of collective interpretations, then we would also expect to find a QA in their Dutch, because Van Koert *et al*. (2015; to appear) claimed that the QA is due to the preferred collective interpretations, just like the IQA. Why is there no QA in Dutch or in English? The most likely answer is that the QA is a subtle effect, as it depends in part on children's "reflexive" interpretation of the pronoun, which should eventually disappear, once they become aware that a pronoun should not refer to a local antecedent. By contrast, the IQA is a much more robust effect, as even adults can be lured into accepting long-distant interpretations of reflexives under certain circumstances (Parker & Phillips, 2014). Therefore, the subtle QA could have just disappeared under the pressure of the preferential distributive interpretations.

6.5.2. Convergence between Dutch and English

The goal of this study was to compare and contrast English-Dutch bilingual children's behaviour on the quantifier preference task and on the QP conditions of the binding task to that of monolingual Dutch and English children. An unexpected and new finding for this comprehension study was that the English-Dutch bilingual children showed convergence, i.e. their Dutch and English were more similar to each other with regard to quantifier interpretation preferences and QP conditions than the Dutch and English of monolingual children were regarding quantifier interpretation preferences and QP conditions.

The few studies that found convergence conducted production experiments (Foroodi-Nejad & Paradis, 2009; Nicoladis, 2002; Nicoladis & Gavrila, 2014). Nicoladis (2002) examined French-English bilingual children's comprehension and production of compounds and found that they produced as many compound reversals in their French as in their English. Since no such convergence was found in the comprehension task, Nicoladis suggested that it might be due to the nature of the task, as children had to do an elicited production task. Foroodi-Nejad and Paradis (2009) investigated Persian-English bilingual children's production of compounds and found that they produced as many compound reversals in their Persian as in their English. They also suggested that the convergence they found was caused by the methodology, but since our present results from the comprehension tasks

reveal bidirectional cross-linguistic influence, it is not likely that convergence is task-dependent.

Another explanation that Foroodi-Nejad and Paradis (2009) offered was optionality. They stated that although adult English has right-headed compounds, there is evidence that monolingual English children differ from adults by occasionally forming left-head compounds. In other words, the monolingual child's grammar goes through a stage in which there is some optionality. For a bilingual child, this developmental stage could be a source of cross-linguistic influence, which is exactly what they found for the Persian-English bilingual children. This explanation is based on Müller and Hulk (2001), who argue that object omissions in Romance-Germanic bilingual children are due to a developmental stage in their Romance language. Romance-Germanic bilingual children linger longer than their monolingual peers in a developmental stage where they drop objects, probably under the influence of their other, Germanic language. Foroodi-Nejad and Paradis suggest that convergence could occur in those instances where there is optionality in both (child) languages but where the adult preferences are opposed. The results of the present experiments are partially in line with their suggestion. Dutch and English sentences with quantified subjects can receive a distributive or a collective interpretation. It is optional which of the two interpretations is chosen, but not just for children, it is optional for adults, too. The monolingual Dutch and English adult preferences show that the distributive interpretation is preferred – albeit to a greater extent in Dutch than in English (van Koert et al., to appear; van Koert, submitted). Yet, the monolingual children's preferences are opposed: whereas the monolingual Dutch children consistently prefer the distributive interpretation, the monolingual English children have no preference (van Koert et al., to appear; van Koert, submitted). The bilingual children show identical quantifier interpretation preferences in Dutch and English. Thus, convergence seems to also occur in those cases where optionality exists in both languages but where the child preferences diverge.

6.6. Conclusion

The present study conducted two experiments with simultaneous English-Dutch bilingual children. Experiment I explored their quantifier interpretation preferences and Experiment II examined their comprehension of binding, i.e. their understanding of biclausal sentences containing local quantified noun phrase antecedents and object reflexives and pronouns. There were two main findings. First, these results confirm Van Koert *et al.*'s (2015; to appear) hypothesis for monolingual Dutch and English children. Their hypothesis can now be extended to bilingual children, as the bilingual children's quantifier interpretation preferences corresponded to their performance on binding. It was found that when the bilingual children's quantifier interpretation preferences diverged from the monolingual norm – in either language – their comprehension of binding also differed from that of the monolingual children. Secondly – and most surprisingly – the bilingual children were seen to perform

similarly in both languages; that is, they showed the same effects in their Dutch as in their English for both their quantifier interpretation preferences and their comprehension of binding. This convergence is an unexpected finding for simultaneous bilingual children, especially in a comprehension study. Future research into simultaneous bilingual children will have to address whether convergence is an exception to the norm.

Chapter 7
Conclusion

The main objective of the studies presented in this dissertation is to explore the interaction between quantifiers and binding. The previous chapters investigate monolingual and bilingual children's quantifier interpretation preferences and their comprehension and production of object reflexives and pronouns. Chapters 2 and 3 compare and contrast the behaviour of monolingual Dutch with English children on their comprehension of object reflexives and pronouns and their quantifier interpretation preferences. Chapter 2 finds that the quantificational asymmetry is a language-specific phenomenon that occurs in English but not in Dutch. It is hypothesised that this difference stems from diverging quantifier interpretation preferences. Chapter 3 tests the hypothesis that Dutch children prefer the distributive interpretation of sentences containing quantified noun phrase (QP) subjects, whereas English children prefer the collective reading. This hypothesis is confirmed. Chapters 4 and 5 investigate the behaviour of Turkish-Dutch bilingual children on their comprehension of object reflexives and pronouns and compared it to that of Turkish-English bilingual children (Marinis & Chondrogianni, 2011) and monolingual Dutch children. It is found that the Turkish-Dutch bilingual children differ from their Turkish-English bilingual peers, but that they are very similar to their monolingual Dutch peers with regard to their behaviour on the QP conditions. Finally, Chapter 6 explores English-Dutch bilingual children's performance on object reflexives and pronouns and on quantifier interpretation preferences. The results show that there is an interaction between the bilingual children's quantifier interpretation preferences and their behaviour on the QP conditions in the binding task. Furthermore, they behave similarly in Dutch and in English, thereby showing convergence.

These studies were conducted to answer the research questions which were posed in Chapter 1 and which are repeated here:

(i) Do we find a quantificational asymmetry in Dutch children and how do we account for its presence or absence?

(ii) What are the quantifier interpretation preferences in monolingual Dutch and monolingual English?

(iii) What kind of interaction is there between binding and quantifier interpretation preferences?

(iv) What kind of interaction is there between binding and quantifier interpretation preferences in bilingual children?

This concluding chapter is organised as follows. Section 7.1 answers research questions (i) – (iii) and discusses the relation between quantifier interpretation preferences and binding. Section 7.2 answers research question (iv) and discusses the role of bilingualism in the comprehension of binding and its interaction with quantifier interpretation preferences. In addition, remaining issues are addressed. Finally, Section 7.3 considers some consequences for the theory.

7.1. Interaction between binding and quantifiers

Research questions (i) – (iii) concern binding and quantifiers. Let us first look at binding. Although both monolingual Dutch and English children perform more non-target-like on their comprehension of object pronouns than on their comprehension of object reflexives – both show the so-called delay of Principle B effect (DPBE) – the results of the present studies reveal that there is a difference between these children. This difference pertains to those conditions where the local antecedent is a QP and the object is a pronoun, as in (1), or a reflexive, as in (2).

(1) The kangaroo says every sheep is scratching him.

(2) The horse says every rabbit is scratching himself.

Whereas monolingual Dutch children perform non-target-like on (1) and target-like on (2), monolingual English children perform target-like on (1) and non-target-like on (2). The monolingual English children show a quantificational asymmetry (QA) and an inversed quantificational asymmetry (IQA), which the monolingual Dutch children do not display. This result is a first answer to research question (i). To explain these diverging findings we hypothesised that monolingual Dutch children have different quantifier interpretation preferences from monolingual English children, causing them to interpret the QP antecedent differently from each other.

Monolingual Dutch children are hypothesised to prefer a distributive interpretation of the predicate in which the QP antecedent appears and the study in Chapter 3, which tested this hypothesis, confirms this, thereby answering research question (ii) for Dutch. When a predicate including a QP antecedent receives a distributive interpretation, the object pronoun or reflexive is interpreted as a variable and, hence, distributed. The distributive interpretation of (1) entails that there are multiple scratching events and that there is a one-to-one relation between the members of the set of the antecedent and members of the set of the object. For a Dutch adult, this interpretation is excluded, because local binding of object pronouns is ungrammatical. Dutch children, however, incorrectly accept locally bound object pronouns, as shown in Chapter 2; thus, their grammar does not forbid local binding of pronouns. The standard binding theory (Chomsky, 1981) cannot account for this, but a

theory such as the Asymmetrical Grammar Hypothesis (Hendriks & Spenader, 2005/2006) can account for this, because this theory has placed less emphasis on pronouns and more on reflexives. This theory still includes Principle A, which governs the behaviour of reflexives, but it has no Principle B. Instead, Principle B effects are derived on the basis of the grammar and pragmatics. It can, therefore, justify children's failure to reject locally bound object pronouns. Research question (iii) is, then, answered for Dutch, too.

Monolingual English children also incorrectly accept locally bound object pronouns, but only when the antecedent is an NP. This is in line with a theory such as the Asymmetrical Grammar Hypothesis. Based on their behaviour on sentences such as (1) and (2), monolingual English children are hypothesised to prefer a collective interpretation of the QP antecedent, which is what Chapter 3 finds. This completes the answer to research question (ii). When a predicate containing a QP subject receives a collective interpretation, the object gets a singleton interpretation. The collective interpretation of (1) entails that there is one scratching event that is carried out by the whole set of QP antecedents. This event affects the singleton object. In the collective interpretation the object cannot be bound by the local QP antecedent, because the singleton object and the collective event do not mesh. This is the answer for English to research question (iii).

7.2. Binding and quantifiers in a bilingual setting

Research question (iv) concerns the bilingual perspective on binding and on the interaction between binding and quantifier interpretation preferences. Let us consider binding first. Our findings from Chapter 4 show that Turkish-Dutch bilingual children behave similarly to the monolingual Dutch children, because they show the DPBE but no QA or IQA. This similarity holds not only for comprehension but also for production, because both the monolingual Dutch children and the Turkish-Dutch bilingual children produce more target-like reflexives than pronouns, as shown in Chapter 5. Thus, the Turkish-Dutch bilingual children reveal no signs of cross-linguistic influence from Turkish onto Dutch in this task. By contrast, Chapter 6 shows that the English-Dutch bilingual children perform differently from their monolingual Dutch and from their monolingual English peers on their comprehension of binding. These bilingual children show a DPBE, like their monolingual peers, in their Dutch and in their English; yet, they also show an IQA in both languages, but no QA. Hence, the English-Dutch bilingual children show bidirectional cross-linguistic influence in their comprehension of binding.

The combination of these two findings evokes the following question: Why do Turkish-Dutch (and Turkish-English) bilingual children fail to show influence from Turkish on the QP conditions, especially since English-Dutch bilingual children show bidirectional cross-linguistic influence? Surely their quantifier system must influence the Dutch (or English) quantifier system to the same extent that the Dutch and English quantifier systems influence each other in an English-Dutch bilingual child? A possible answer to this issue may

lie in the differences between the quantifiers across Dutch, English and Turkish. All three languages have three universal quantifiers; however, their meanings differ slightly. According to the literature, Dutch contains two distributive quantifiers and one collective quantifier (Broekhuis & den Dikken, 2012; van der Ziel, 2012), just like English (Beghelli & Stowell, 1996; Tunstall, 1998; Vendler, 1967). Turkish, however, has one distributive quantifier (*her* ('each/every')) and two collective quantifiers (*bütün* ('all') and *tüm* ('all')).[1] Although future research needs to confirm this, it seems likely that monolingual Turkish quantifier interpretation preferences reflect this two-way divide. Monolingual Turkish children could prefer a distributive situation for sentences beginning with *her* ('each/every') and a collective situation for sentences starting with *bütün* ('all') or *tüm* ('all'). Turkish-Dutch bilingual children could perhaps show influence from *her* ('each/every') on *elk* ('each/every'), because they are both distributive for children; yet, since the preferences are the same for *her* ('each/every') and *elk* ('each/every'), this influence may fail to show in the results. Turkish-English bilingual children may receive more collective evidence in general than Turkish-Dutch bilingual children. It could be that Turkish-English bilingual children show influence from *bütün* ('all') or *tüm* ('all') on *every*, because these two Turkish quantifiers are collective and *every* is optionally collective in child English. Yet, again, if the preferences are the same for *bütün* ('all') or *tüm* ('all') and *every*, then this influence will not be visible. If future research confirms this, then this might be the reason why cross-linguistic influence cannot be seen in the results.

Our results show that the English-Dutch bilingual children do not only perform similarly in both languages on binding, they also exhibit the same quantifier interpretation preferences in both languages. The results in Chapter 6 show that if children's quantifier interpretation preferences diverge from the monolingual norm, their comprehension of sentences containing local QP antecedents and object reflexives or pronouns is also affected. Therefore, this is another piece of evidence in favour of our hypothesis that children's quantifier interpretation preferences are connected to their binding performance. We conclude that these bilingual children show bidirectional cross-linguistic influence. A remaining issue is whether these children's diverging quantifier interpretation preferences represent a developmental stage or a qualitative change. On the one hand, Chapter 3 reveals that monolingual English children's quantifier interpretation preferences are still not exactly adult-like at age 9, which means that even monolingual children take a long time to grasp the precise meaning of quantifiers. This suggests that the bilingual children's converging quantifier interpretation preferences could be a developmental stage. On the other hand, studies into simultaneous bilingual adults have shown bidirectional cross-linguistic influence in object category boundaries (Ameel, Malt, Storms & Van Assche, 2009), which indicates that qualitative changes are indeed possible for bilinguals. Quantifier interpretation preferences are different from object category boundaries, because they are more subtle, which

[1] I would like to thank Tuba Yarbay Duman and Canan Kıran for their help on Turkish quantifiers.

could be a cause for qualitative change. Future research needs to establish whether the bilingual children's converged preferences constitute a developmental stage or a qualitative change.

7.3. Consequences for the theory

This dissertation has shown that for QP antecedents the standard binding theory cannot be maintained. Contrary to English children, Dutch children do not improve their performance on the QP/Pronoun condition compared to the NP/Pronoun condition. We explain the Dutch children's behaviour by arguing that the object pronoun is a variable under the distributive interpretation preference of the quantifier. As such, the object pronoun is locally bound. We argue that English children improve their performance on object pronouns when the antecedent is a QP, not because co-reference overrules Principle B, but because a collective interpretation of the quantifier does not mesh with the variable interpretation of the pronoun. In other words, English children also allow locally bound pronouns, but their collective preference forbids this in sentences with QP antecedents. Since the Dutch children's results reveal that locally bound pronouns are in principle possible – regardless of the antecedent – the combined results of the Dutch and English children are better understood in a theory without Principle B. It may well be that Principle B effects are part of the pragmatic knowledge that children need to acquire. Thus, we state that children's quantifier interpretation preferences interact with their comprehension of sentences containing local QP antecedents. This is why monolingual Dutch children, monolingual English children and English-Dutch children differ from one another in their understanding of sentences containing local QP antecedents: their quantifier interpretation preferences differ from one another. When quantifier interpretation preferences do not differ from each other, which could possibly be the case for monolingual Dutch and Turkish-Dutch bilingual children and for monolingual English and Turkish-English bilingual children, no differences between the comprehension of sentences containing local QP antecedents are found.

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Summary

Binding and quantification in monolingual and bilingual language acquisition

Although children acquire languages easily, sometimes they still encounter difficulties with interpreting words correctly. Examples of these words are reflexives (cf. *himself*), pronouns (cf. *him*) and quantifiers (cf. *every*). Children acquiring languages such as Dutch and English have been shown to incorrectly interpret these words (Chien & Wexler, 1990; Crain, Thornton, Boster, Conway, Lillo-Martin & Woodams, 1996; Hendriks, Koops van 't Jagt & Hoeks, 2012; Koster, 1993; Philip & Coopmans, 1996; *inter alios*). The present dissertation reinvestigates these issues and focusses on the interaction between quantifiers and reflexives or pronouns from a (bilingual) first language acquisition perspective.

Chapter 2 reports that children acquiring languages such as Dutch and English have often been found to experience difficulties with correctly interpreting sentences containing local NP antecedents and object pronouns, as in (1).

(1) The kangaroo says the sheep is scratching him.

The local NP antecedent is *the sheep* and the object pronoun is *him* in (1). What happens in about half of the time is that children think *him* refers to *the sheep* instead of to *the kangaroo*. Thus, in a comprehension task they will incorrectly accept this sentence as a description of a scene where the sheep is scratching itself. This behaviour has been labelled the delay of Principle B effect. The term *Principle B* refers to the standard binding theory, in which the distribution of pronouns was captured by Principle B, whereas the distribution of reflexives was described by Principle A (Chomsky, 1981). The delay in *the delay of Principle B effect* refers to children's less target-like performance on (1) as compared to their performance on sentences containing object reflexives, as in (2).

(2) The horse says the rabbit is scratching himself.

Children know that (2) cannot mean that the rabbit is scratching the horse; hence, they correctly reject (2) for such a scene in a comprehension task.

Interestingly, English children have been shown to perform more target-like on sentences containing object pronouns when the local antecedent is a QP (Chien & Wexler, 1990; Marinis & Chondrogianni, 2011; van der Lely & Stollwerck, 1997). Thus, they do not show the delay of Principle B effect (DPBE) in sentences such as (3), where the QP antecedent is *every sheep*.

(3) The kangaroo says every sheep is scratching him.

English children find it relatively easy to correctly reject a scene where three sheep are scratching themselves for (3) in a comprehension task. The difference between English children's non-target-like performance on (1) and their target-like behaviour on (3) has been labelled the quantificational asymmetry (QA) (Elbourne, 2005). Chapter 2 asks whether Dutch children also display this QA, since previous research found mixed results for Dutch (Drozd & Koster, 1999; Philip & Coopmans, 1996).

Local QP antecedents do not only influence English children's behaviour on object pronouns, they also affect their performance on object reflexives. However, English children do not perform more target-like when a QP antecedent precedes the object reflexive, as in (4); rather, they perform less target-like.

(4) The horse says every rabbit is scratching himself.

Since English children perform less well on (4) than on (2) and since this is the reverse effect from the QA, this phenomenon has been termed the inversed quantificational asymmetry (IQA) (Marinis & Chondrogianni, 2011). Despite the lack of attention given to this, studies including QP antecedents and object reflexives found this effect (Chien & Wexler, 1990; Marinis & Chondrogianni, 2011; van der Lely & Stollwerck, 1997). Hence, Chapter 2 asks whether Dutch children display the IQA, too.

Chapter 2 reports on a picture verification task in which 29 monolingual Dutch children between the ages of six and ten participated. The task entailed that children saw a picture, heard a sentence and then had to judge whether these sentence-picture pairs matched each other *yes* or *no*. Sentences were of the type (1) – (4). The results reveal that monolingual Dutch children do show a DPBE but do not show a QA and IQA. Thus, the only difference between Dutch and English children is on the QP conditions. To account for this difference, Chapter 2 hypothesises that Dutch children have different quantifier interpretation preferences from English children; this hypothesis is tested in Chapter 3.

The QA has been taken as evidence that children know Principle B. It has been suggested that children err on sentences like (1), because they are confused between the co-referential interpretation of pronouns and the interpretation that is yielded by Principle B. In special discourse circumstances, pronouns may co-refer with their local antecedents, such as in (5).

(5) (You know what Mary, Sue and John have in common? Mary admires John, Sue admires him,) and John admires him too.
(example from Heim, 1994, p. 216; emphasis in the original; derived from Evans, 1980, p. 356)

A co-referential interpretation of pronouns can only occur with NP antecedents, as they refer to a certain referent, e.g. *John* in (5). Quantifiers have no reference, because they do not pick out a specific referent, but rather refer to a set in a particular context. As such, quantified expressions can never co-refer with pronouns. If quantified expressions cannot co-refer, then children can only rely on their knowledge of Principle B to correctly reject a reflexive meaning for (1). Thus, tasks that reveal a QA have been taken to show that English children know Principle B; their knowledge is only clouded because of the additional co-referential interpretations of pronouns. When such an additional interpretation is removed, English children perform as target-like on object pronouns as on object reflexives.

The results of the monolingual Dutch children, nevertheless, seem to defy this explanation. They perform as non-target-like on the Dutch translation equivalent of (1) as on (3); thus they do not differentiate between sentences in which pronouns have an additional co-referential interpretation, as in (1), and those in which pronouns only have their Principle B interpretation, as in (3). Therefore, this line of reasoning cannot be maintained cross-linguistically. Another problem is the IQA: if English children have Principle A – i.e. they know what reflexives may and may not refer to – why do they perform less target-like on QP antecedents than on NP antecedents?

To answer these questions more straightforwardly, Chapter 2 hypothesises that monolingual Dutch children prefer a distributive interpretation of the quantifier *elk*, whereas monolingual English children prefer a collective interpretation of the quantifier *every*. To test this hypothesis, we carried out a picture selection task in Chapter 3. Ambiguous predicates, such as *tickling a turtle* in (6), give rise to two possible interpretations: a distributive and a collective one.

(6) Every bear is tickling a turtle.

The distributive interpretation comes about when the quantified subject, *every bear*, has wide scope and, thus, ranges over the indefinite object, *a turtle*. In that case, the predicate, such as *tickling a turtle* in (6), is applied to each of the individuals denoted by the quantified subject: each of the individual bears in the set has the property of tickling a turtle. The indefinite object is distributed. In other words, for a picture to match this interpretation, it should show three bears, each tickling their own turtle. The collective reading, by contrast, arises when the indefinite object, *a turtle*, has wide scope and, hence, ranges over the quantified subject, *every bear*. The indefinite object receives a singleton reading. In that case, the predicate is applied to the set as a whole: the whole set has the property of tickling the turtle. A picture that matches this reading should display three bears together tickling one turtle.

We tested 77 monolingual Dutch children and 75 monolingual English children between the ages of five and ten on a picture selection task in Chapter 3. Children saw two pictures: a distributive situation and a collective situation. Then they heard sentences such as (6) and were asked to point to the picture

that best matched the sentence they heard. The results show that the Dutch children consistently choose the distributive picture for sentences starting with *elk*-subjects. The English children, however, choose the distributive picture as frequently as they choose the collective picture for sentences beginning with *every*-subjects.

It is clear that Dutch children prefer a distributive interpretation of *elk*-subjects and this preference explains their performance on sentences such as (3) and (4). A distributive interpretation entails that the quantified subject receives wide scope, causing the object to be distributed. In other words, for each sheep in (3), there should be a *him* that this sheep is scratching. This is exactly what children see in the mismatching pictures: three sheep each scratching itself. Therefore, Dutch children perform as poorly on (3) as they do on (1) and show no QA. This explanation holds for reflexives, too. For each rabbit in (4), there should be a *himself* that this rabbit is scratching. This is what children see in the matching pictures, but not what they see in the mismatching pictures, as those display three rabbits together scratching the horse. Thus, they correctly reject the mismatching pictures for (4) and they show no IQA.

Although English children show no preference for either interpretation, it is clear that *every* has much more collective potential than *elk* has for Dutch children – *elk* has no collective potential at all. Whenever English children give a collective interpretation to *every*-subjects, the object receives wide scope and, hence, it gets a singleton interpretation. There is a *him* such that every sheep is scratching *him*. In other words, the object *him* in (3) receives a singleton reading; therefore, there should be a set of several sheep scratching one other character. This is what English children see in the matching pictures: there are three sheep who are together scratching one kangaroo. By contrast, the mismatching pictures show three sheep each scratching itself and this does not correspond to the collective interpretation, which is why English children correctly reject the mismatching picture much more frequently than their Dutch peers. Therefore, English children show a QA.

The same holds for the reflexive condition. When (4) receives a collective interpretation, the object *himself* receives a singleton interpretation, which forbids it to be bound to the local QP antecedent, as a group cannot together perform a reflexive action. This is the reason why English children incorrectly accept the mismatching picture, showing three rabbits scratching the horse, much more frequently than Dutch children. Thus, English children show an IQA. In addition, it explains why they incorrectly reject the matching picture, which displays three rabbits each scratching itself, more frequently than the Dutch children, who hardly reject the matching picture for (4).

Chapters 2 and 3 describe the interaction between quantifiers and reflexives or pronouns in monolingual Dutch and English acquisition. What happens in a bilingual setting? Chapter 4 investigates Turkish-Dutch bilingual children and compares their performance to that of Turkish-English bilingual children, tested by Marinis and Chondrogianni (2011). Turkish has, in addition to reflexives and pronouns, a quasi-reflexive element *kendisi* ('self.3SG') that can either refer to the local or to the distant antecedent, as illustrated in (7).

(7) Elif$_i$ Mehmet'in$_j$ kendi-si-ni$_{i/j/k}$ beğendigini söyledi.
Elif Mehmet.GEN self.3SG.ACC like.3SG.POSS.ACC say.3SG.PAST
'Elif$_i$ said that Mehmet$_j$ likes her$_{i/k}$/himself$_j$.'
(example from Marinis & Chondrogianni, 2011, p. 205; adapted from Gürel, 2002, pp. 27-28)

Kendisi ('self.3SG') is inflected for accusative case in (7). This quasi-reflexive element may cause Turkish-Dutch bilingual children to transfer its characteristics to Dutch reflexives. If they do so, they are expected to incorrectly accept distant antecedents for object reflexives in the Dutch comprehension task. The same picture verification task as in Chapter 2 was used to test 33 Turkish-Dutch bilingual children between the ages of six and ten. It is found that the Turkish-Dutch bilingual children do not transfer the characteristics of the quasi-reflexive to the Dutch reflexives. Likewise the Turkish-English bilingual children had been found to perform similarly to their monolingual English peers on the reflexives. By contrast, the results show that the Turkish-Dutch bilingual children behave differently from their Turkish-English peers on the QP conditions.

The next step is to compare the Turkish-Dutch bilingual children's performance to that of the monolingual Dutch children. The bilingual children were first exposed to Dutch between the ages of one and four. Since they have had less exposure to Dutch input than their monolingual Dutch peers, the question is whether they show a (greater) delay. The results show that the Turkish-Dutch bilingual children behave exactly like the monolingual Dutch children: they display a DPBE, no QA and no IQA. Since the Turkish-English bilingual children also perform similarly to their monolingual English peers on the QP conditions, the conclusion is drawn that Turkish has no cross-linguistic influence on these bilingual children's Dutch or English.

Chapter 5 also examines Turkish-Dutch bilingual children but differs from Chapter 4 in three respects. Firstly, Chapter 5 investigates the comprehension of Dutch reflexives and pronouns by younger bilingual children than those reported on in Chapter 4. Secondly, Chapter 5 includes a Dutch production task. Thirdly, Chapter 5 explores the comprehension of Turkish reflexives and pronouns by Turkish-Dutch bilingual children.

The comprehension task consisted of a picture selection task, which was used to test 21 Turkish-Dutch bilingual children between the ages of four and seven. They were compared to 24 monolingual Dutch children between the ages of four and seven. These children were significantly younger than the ones reported on in Chapters 2 and 4. The picture selection task contained two pictures for each test sentence: one picture displayed a reflexive action and the other showed a non-reflexive action. Test sentences were of the type given in (8) and (9).

(8) This is the prince. This is the farmer. The prince is pinching himself.

(9) This is the pirate. This is the wizard. The pirate is biting him.
(based on Spenader, Smits & Hendriks, 2009)

The test sentences in (8) and (9) are monoclausal, which are more appropriate for younger children than the biclausal sentences in (1) and (2). In addition, this new task did not measure children's understanding of QP antecedents. The results from the comprehension task show that the Turkish-Dutch bilingual children perform exactly like the monolingual Dutch children. Therefore, quantity of input seems to have little effect on the Turkish-Dutch bilingual children's knowledge of reflexives and pronouns.

The production task consisted of elicitation of reflexives and pronouns. Children saw a picture of the protagonists performing some kind of action and were then asked to finish the sentence uttered by the experimenter. Examples are given in (10) and (11).

(10) Experimenter: 'This is the princess. This is granny.'
Experimenter: 'And what is the princess doing? (She's?)'
Target answer: '(The princess/she's) biting herself.'

(11) Experimenter: 'This is grandpa. This is the pirate.'
Experimenter: 'And what is grandpa doing to the pirate? (He's?)'
Target answer: '(Grandpa/he's) hitting him.'

The results show that the Turkish-Dutch bilingual children as well the monolingual Dutch children produce more correct reflexives than correct pronouns. Thus, they show a DPBE in their production. Furthermore, the Turkish-Dutch bilingual children omit more objects in the reflexive and especially in the pronoun condition. We suggest that this can be due to cross-linguistic influence from Turkish, as Turkish allows null objects. It could be that these Turkish-Dutch bilingual children remain for a longer period of time in the object drop stage, which monolingual Dutch children also experience.

The comprehension of Turkish reflexives and pronouns is measured using the same picture verification task that was described in Chapters 2 and 4. The test sentences were translated to Turkish and the control conditions were altered, so that the preferred interpretation of the quasi-reflexive element could be measured. A group of 22 Turkish-Dutch bilingual children were tested by a native speaker of Turkish. The results show that these Turkish-Dutch bilingual children display no DPBE in their Turkish; in other words, they perform equally well on reflexives and pronouns. The results of the control conditions reveal that they prefer to interpret the quasi-reflexive element *kendisi* ('self.3SG') as a reflexive rather than as a pronoun. This is different from monolingual Turkish adults, who show no preference in unbiased contexts (Demirci, 2001).

We conclude from the studies conducted in Chapter 5 that there is no cross-linguistic influence from Turkish on Dutch in the comprehension of Dutch reflexives and pronouns. For the production of Dutch reflexives and pronouns, it seems that Turkish-Dutch bilingual children remain for a longer period of time than their monolingual Dutch peers in a stage where the object can be optionally dropped. Whether Turkish-Dutch bilingual children show cross-linguistic influence from Dutch to Turkish is difficult to conclude, as the only study that investigated monolingual Turkish children on their comprehension of reflexives and pronouns used a very different methodology. Since those monolingual Turkish children showed less target-like behaviour on the reflexives than on the pronouns (Aarssen & Bos, 1999), it might be that these Turkish-Dutch bilingual children are influenced by their Dutch and, hence, show more target-like behaviour on the reflexives in comparison to their monolingual Turkish peers.

Chapter 6 dives into another language pair: English-Dutch bilingual children. Since Dutch and English differ from each other on the quantifier interpretation preferences and on binding, the question is whether these English-Dutch bilingual children also show an interaction between quantifiers and reflexives or pronouns, just like their monolingual peers. To determine the English-Dutch bilingual children's quantifier interpretation preferences we used the same picture selection task as in Chapter 3. We employed the same picture verification task as in Chapters 2 and 4 in order to measure the bilingual children's performance on sentences containing QP antecedents and object reflexives and pronouns. A group of 29 English-Dutch bilingual children participated. They were aged between six and ten. All the children had been exposed to English from birth onwards. Most of them had been exposed to Dutch from birth onwards but for some of them their first exposure to Dutch occurred between nine months and four years of age. All of them lived in the Netherlands and attended Dutch primary schools at the time of testing. Their performance is compared to the monolingual children's performance reported on in Chapters 2 and 3.

The results of the picture selection task measuring the children's quantifier interpretation preferences reveal that the bilingual children select fewer distributive situations for *elk*-subjects than their monolingual Dutch peers. In addition, the bilingual children opt for the collective picture for *every*-subjects in fewer instances than their monolingual English peers. Moreover, the bilingual children perform similarly in both languages, meaning that they do not differentiate their languages with regard to their quantifier interpretation preferences. We find the same for the results of the picture verification task. The bilingual children do not distinguish between their Dutch and their English, as their results show an IQA but no QA in Dutch and in English.

Chapter 6 reveals two important findings: (i) the bilingual children show convergence, in the sense that their quantifier interpretation preferences in Dutch and English are more similar to each other than to those of monolingual Dutch and English children; (ii) the bilingual children show an interaction between their quantifier interpretation preferences and their behaviour on

sentences containing QP antecedents and object reflexives and pronouns, just like their monolingual Dutch and English peers. The first finding was unexpected, as unidirectional cross-linguistic influence is typically found. The second finding supports our hypothesis that there is an interaction between children's quantifier interpretation preferences and their interpretation of sentences with QP antecedents and object reflexives and pronouns. This holds for monolingual as well as for bilingual children.

A remaining issue is why the English-Dutch bilingual children show convergence, whereas the Turkish-Dutch (and Turkish-English) bilingual children do not show signs of cross-linguistic influence in their comprehension of sentences with QP antecedents and object reflexives and pronouns. It is suggested that the Turkish quantifier system on the one hand supports the child English interpretations, because it has two collective quantifiers and one distributive quantifier. On the other hand, the Turkish quantifier system may support the child Dutch interpretations, as the distributive quantifier can only receive distributive interpretations, just like the Dutch *elk*.

An important theoretical consequence of these acquisition findings is that the standard binding theory cannot account for children's behaviour on QP conditions. Dutch children do not improve on the QP conditions. Our explanation comprises that the distributive preference causes the object pronoun to be understood as a variable, which can be locally bound. A collective interpretation entails that the object pronoun cannot be interpreted as a variable. It is not the case that English children cannot have a locally bound pronoun because the co-referential interpretation is blocked; rather, their preference for a collective interpretation forbids a locally bound interpretation of the pronoun. To justify children's behaviour on QP conditions, their quantifier interpretation preferences should therefore be taken into consideration. This holds for monolingual as well as for bilingual children. Depending on their languages' quantifier systems, bilingual children may show convergence in their quantifier interpretation preferences, which permeate their behaviour on sentences containing QP antecedents and object reflexives and pronouns.

Samenvatting in het Nederlands

Binding en kwantificatie in eentalige en tweetalige taalverwerving

Hoewel kinderen hun moedertaal snel leren, ondervinden ze soms toch nog problemen met het correct interpreteren van sommige woorden. Voorbeelden van dit soort woorden zijn reflexieven (bijv. *zichzelf*), pronomina (bijv. *hem*) en kwantoren (bijv. *elk*). Uit eerder onderzoek is gebleken dat kinderen die talen zoals het Nederlands en het Engels verwerven, moeite hebben met het correct interpreteren van zulke woorden (Chien & Wexler, 1990; Crain, Thornton, Boster, Conway, Lillo-Martin & Woodams, 1996; Hendriks, Koops van 't Jagt & Hoeks, 2012; Koster, 1993; Philip & Coopmans, 1996; *onder andere*). De huidige dissertatie kijkt opnieuw naar deze woorden en onderzoekt de interactie tussen kwantoren en reflexieven of pronomina vanuit een perspectief van (tweetalige) eerstetaalverwerving.

In hoofdstuk 2 staat dat kinderen die talen zoals het Nederlands en het Engels verwerven vaak problemen ondervinden met het correct interpreteren van zinnen met zogenaamde lokale NP-antecedenten en objectpronomina, zoals in (1).

(1) De kangoeroe zegt dat het schaap hem krabt.

In (1) is het lokale NP-antecedent *het schaap* en het objectpronomen is *hem*. Wat er gebeurt, is het volgende: kinderen denken dat *hem* naar *het schaap* kan verwijzen, in plaats van naar *de kangoeroe*. Daarom accepteren ze in een begripstaak deze zin onterecht als beschrijving van een situatie waarin het schaap zichzelf krabt. Dit gedrag wordt ook wel *het effect van de vertraging van Principe B* genoemd. De term *Principe B* verwijst naar de standaard bindingstheorie, waarin de distributie van pronomina verklaard wordt door Principe B, terwijl de distributie van reflexieven beschreven wordt door Principe A (Chomsky, 1981). De vertraging in *het effect van de vertraging van Principe B* verwijst naar de prestatie van kinderen op zinnen als in (1), die afwijkend is van de volwassen norm, in vergelijking tot hun prestatie op zinnen met objectreflexieven, zoals in (2), die aan de volwassen norm voldoet.

(2) Het paard zegt dat het konijn zichzelf krabt.

Kinderen weten dat de zin in (2) niet kan betekenen dat het konijn het paard krabt. Vandaar dat ze (2) in een begripstaak terecht afwijzen voor een situatie die dat uitbeeldt.

Een interessante bevinding is dat Engelse kinderen meer naar de volwassen norm presteren op zinnen met objectpronomina wanneer het lokale

antecedent een gekwantificeerde uitdrukking is (QP, afkorting van 'quantifier phrase') (Chien & Wexler, 1990; Marinis & Chondrogianni, 2011; van der Lely & Stollwerck, 1997). Zij laten daar niet *het effect van de vertraging van Principe B* zien op de Engelse vertaling van zinnen zoals (3), waar het QP-antecedent *elk schaap* is.

(3) De kangoeroe zegt dat elk schaap hem krabt.

Engelse kinderen vinden het relatief gemakkelijk om in een begripstaak een situatie waarin drie schapen zichzelf aan het krabben zijn terecht af te wijzen voor (3). Het verschil tussen de van de volwassen norm afwijkende prestatie van Engelse kinderen op (1) en hun prestatie op (3) die aan de volwassen norm voldoet wordt ook wel *de kwantificationele asymmetrie* genoemd (Elbourne, 2005). In hoofdstuk 2 vragen we ons af of Nederlandse kinderen deze kwantificationele asymmetrie ook zouden laten zien, aangezien eerder onderzoek gemengde resultaten opleverde voor het Nederlands (Drozd & Koster, 1999; Philips & Coopmans, 1996).

Lokale QP-antecedenten beïnvloeden niet alleen het begrip van objectpronomina door Engelse kinderen, ze hebben ook invloed op hun begrip van objectreflexieven. Toch voldoen Engelse kinderen niet meer aan de volwassen norm wanneer een QP-antecedent voorafgaat aan objectreflexief, zoals in (4). In tegendeel, ze scoren juist afwijkend van de volwassen norm.

(4) Het paard zegt dat elk konijn zichzelf krabt.

Aangezien Engelse kinderen minder goed op (4) dan op (2) presteren en aangezien dit het omgekeerde effect is van de kwantificationele asymmetrie, wordt dit fenomeen ook wel *de omgekeerde kwantificationele asymmetrie* genoemd (Marinis & Chondrogianni, 2011). Ondanks dat er aan dit Engelse fenomeen weinig aandacht besteed is, hebben studies die naar QP-antecedenten en objectreflexieven gekeken hebben dit effect wel gevonden bij Engelse kinderen (Chien & Wexler, 1990; Marinis & Chondrogianni, 2011; van der Lely & Stollwerck, 1997). Daarom vragen we ons in hoofdstuk 2 af of Nederlandse kinderen de omgekeerde kwantificationele asymmetrie ook laten zien.

In hoofdstuk 2 wordt er gerapporteerd over een *picture verification task* ('plaatjes-beoordelingstaak') waaraan 29 eentalige Nederlandse kinderen tussen de zes en tien jaar oud hebben meegedaan. De taak hield in dat kinderen een plaatje zagen, daarbij een zin hoorden en dan moesten beoordelen of de zinnen wel of niet bij de plaatjes pasten. De testzinnen zagen eruit als de zinnen in (1) – (4). De resultaten tonen aan dat eentalige Nederlandse kinderen wel een effect van de vertraging van Principe B laten zien, maar geen kwantificationele asymmetrie en geen omgekeerde kwantificationele asymmetrie. Het enige verschil tussen de Nederlandse en Engelse kinderen zit in de QP-condities. Om dit verschil te verklaren wordt in hoofdstuk 2 de hypothese opgesteld dat Nederlandse kinderen andere voorkeurslezingen van

kwantoren hebben dan Engelse kinderen. Deze hypothese wordt in hoofdstuk 3 getoetst.

De kwantificationele asymmetrie werd gezien als bewijs dat kinderen Principe B kennen. Er werd beweerd dat kinderen de fout ingaan bij zinnen als (1), omdat ze verward raken tussen de co-referentiële interpretatie van pronomina en de interpretatie volgens Principe B. Pronomina kunnen co-refereren met hun lokale antecedenten, maar alleen in speciale discourse-omstandigheden, zoals in (5).

(5) (Weet je wat Marie, Suus en Jan gemeen hebben? Marie bewondert Jan, Suus bewondert hem,) en Jan bewondert hem ook.
(voorbeeld uit Heim, 1994, p. 216; nadruk in het origineel; gebaseerd op Evans, 1980, p. 356)

Een co-referentiële interpretatie van pronomina kan alleen voorkomen met NP-antecedenten, omdat deze naar een bepaalde referent verwijzen, bijv. *Jan* in (5). Kwantoren kunnen niet verwijzen, omdat ze geen specifieke referent selecteren, maar naar een set in een bepaalde context verwijzen. Op die manier kunnen gekwantificeerde uitdrukkingen nooit co-refereren met pronomina. Als gekwantificeerde uitdrukkingen niet kunnen co-refereren, dan kunnen kinderen alleen maar terugvallen op hun kennis van Principe B om terecht de reflexieve betekenis voor (1) af te wijzen. Daarom worden taken die een kwantificationele asymmetrie aantonen gezien als bewijs dat Engelse kinderen Principe B kennen. Hun kennis van Principe B wordt alleen vertroebeld door de extra co-referentiële interpretatie van pronomina. Wanneer de extra co-referentiële interpretatie geblokkeerd wordt, presteren Engelse kinderen net zo goed op objectpronomina als op objectreflexieven.

Echter, de resultaten van de eentalige Nederlandse kinderen lijken deze verklaring te weerleggen. Zij presteren net zo afwijkend van de volwassen norm op (1) als op (3). Ze maken dus geen verschil tussen zinnen waarin pronomina een extra co-referentiële interpretatie hebben, zoals in (1), en zinnen waarin pronomina slechts een Principe B interpretatie hebben, zoals in (3). Daarom kan deze redenering cross-linguïstisch gezien niet volgehouden worden. Een ander probleem is de omgekeerde kwantificationele asymmetrie: als Engelse kinderen Principe A kennen – met andere woorden ze weten waar reflexieven wel of niet naar mogen verwijzen – waarom presteren ze dan meer afwijkend van de volwassen norm op QP-antecedenten dan op NP-antecedenten?

Om deze vragen te beantwoorden wordt in hoofdstuk 2 de hypothese opgesteld dat eentalige Nederlandse kinderen de voorkeur geven aan een distributieve interpretatie van de kwantor *elk*, terwijl eentalige Engelse kinderen de voorkeur geven aan een collectieve interpretatie van de kwantor *every*. Om deze hypothese te toetsen voeren we een *picture selection task* ('plaatjes-kiezentaak') uit in hoofdstuk 3. Ambigue predicaten, zoals *een schildpad kietelen* in (6), leiden tot twee mogelijke interpretaties: een distributieve en een collectieve.

(6) Elke beer kietelt een schildpad.

De distributieve interpretatie komt tot stand als het gekwantificeerde subject, *elke beer*, bereik heeft over het indefiniete object, *een schildpad*. In dat geval wordt het predicaat, zoals *een schildpad kietelen* in (6), toegepast op elk van de individuen die worden aangeduid met het gekwantificeerde subject. Met andere woorden, elk van de individuele beren in de set heeft de eigenschap dat hij een schildpad kietelt. Voor het indefiniete object geldt dat het gedistribueerd is. Als een plaatje met deze interpretatie overeenkomt moet het drie beren tonen die elk hun eigen schildpad aan het kietelen zijn. Daarentegen komt de collectieve interpretatie tot stand wanneer het indefiniete object, *een schildpad*, bereik heeft over het gekwantificeerde subject, *elke beer*. Het indefiniete object krijgt dan een individuele interpretatie. In dit geval wordt het predicaat toegepast op de set als geheel, want de hele set heeft de eigenschap dat er een schildpad wordt gekieteld. Een plaatje dat overeenkomt met deze lezing moet drie beren tonen die samen één schildpad kietelen.

In hoofdstuk 3 hebben we 77 eentalige Nederlandse kinderen en 75 eentalige Engelse kinderen in de leeftijd van vijf tot tien jaar getest op een *picture selection task*. Kinderen zagen twee plaatjes: één daarvan toonde een distributieve situatie en de andere een collectieve situatie. Daarna hoorden ze zinnen zoals in (6) en werden ze gevraagd naar het plaatje te wijzen dat het beste bij de zin paste die ze hoorden. De resultaten tonen aan dat de Nederlandse kinderen consequent het distributieve plaatje selecteren voor zinnen die met *elk*-subjecten beginnen. Aan de andere kant kiezen de Engelse kinderen het distributieve plaatje net zo vaak als het collectieve plaatje voor zinnen die met *every*-subjecten beginnen.

Het is duidelijk dat Nederlandse kinderen de voorkeur geven aan een distributieve lezing van *elk*-subjecten en deze voorkeur verklaart hun gedrag op zinnen als (3) en (4). Een distributieve lezing houdt in dat het gekwantificeerde subject bereik heeft over het object waardoor het object gedistribueerd wordt. Met andere woorden, voor ieder schaap in (3) zou er een *hem* moeten zijn die gekrabd wordt door dat schaap. Dit is precies wat kinderen zien in de niet-bijpassende plaatjes, want die laten drie schapen zien die elk zichzelf krabben. Daarom presteren Nederlandse kinderen net zo slecht op (3) als op (1) en laten ze geen kwantificationele asymmetrie zien. Deze uitleg geldt ook voor de reflexieven. Voor ieder konijn in (4) zou er een *zichzelf* moeten zijn die gekrabd wordt door dat konijn. Kinderen zien dit in de bijpassende plaatjes maar niet in de niet-bijpassende plaatjes, want die tonen drie konijnen die samen het paard krabben. Daarom wijzen ze terecht de onjuiste plaatjes voor (4) af en laten ze geen omgekeerde kwantificationele asymmetrie zien.

Hoewel Engelse kinderen geen voorkeur voor de ene of voor de andere interpretatie laten zien, is het duidelijk dat *every* veel meer collectieve potentie heeft dan dat *elk* heeft voor Nederlandse kinderen, want *elk* heeft totaal geen collectieve potentie. Telkens als Engelse kinderen een collectieve lezing aan *every*-subjecten geven, heeft het object het grootste bereik en krijgt het daarom

een individuele lezing. Er is dus een *hem* zodanig dat ieder schaap *hem* krabt. Met andere woorden, het object *hem* in (3) krijgt een individuele lezing en daarom zou er een set van meerdere schapen moeten zijn die deze *hem* krabt. Dit scenario zien Engelse kinderen in de bijpassende plaatjes, want die laten drie schapen zien die gezamenlijk een kangoeroe krabben. Daarentegen laten de niet-bijpassende plaatjes drie schapen zien waarvan elk zichzelf krabt. Dit komt niet overeen met de collectieve interpretatie. Vandaar dat Engelse kinderen het niet-bijpassende plaatje veel vaker terecht afwijzen dan hun Nederlandse leeftijdsgenoten. Dit is ook de reden waarom Engelse kinderen een kwantificationele asymmetrie laten zien.

Hetzelfde geldt voor de reflexiefconditie. Wanneer (4) collectief geïnterpreteerd wordt, krijgt het object *zichzelf* een individuele lezing. Deze lezing maakt het onmogelijk voor het object om gebonden te worden aan het lokale QP-antecedent, omdat een groep niet gezamenlijk een reflexieve actie kan uitvoeren. Dit is de reden dat Engelse kinderen onterecht het niet-bijpassende plaatje, dat drie konijnen toont die samen het paard krabben, veel vaker accepteren dan hun Nederlandse leeftijdsgenoten. Daarom laten Engelse kinderen wel een omgekeerde kwantificationele asymmetrie zien. Bovendien verklaart dit waarom ze onterecht het bijpassende plaatje, dat drie konijnen toont die elk zichzelf krabben, vaker afwijzen dan de Nederlandse kinderen, die dat nauwelijks doen voor (4).

In hoofdstuk 2 en 3 wordt de interactie tussen kwantoren en reflexieven of pronomina beschreven met betrekking tot eentalige Nederlandse en Engelse taalverwerving. Maar wat gebeurt er in een tweetalige context? In hoofdstuk 4 worden tweetalige Turks-Nederlandse kinderen onderzocht en hun prestaties worden vergeleken met die van tweetalige Turks-Engelse kinderen, die getest zijn door Marinis en Chondrogianni (2011). Het Turks heeft, naast reflexieven en pronomina, een quasi-reflexief element *kendisi* ('zelf.3SG') dat zowel naar het lokale antecedent kan verwijzen als naar het antecedent dat verderop staat, zoals in (7) wordt geïllustreerd.

(7) Elif$_i$ Mehmet'in$_j$ kendi-si-ni$_{i/j/k}$ beğendigini söyledi.
Elif Mehmet.GEN zelf.3SG.ACC leuk vind.3SG.POSS.ACC zeg.3SG.PAST
'Elif$_i$ zei dat Mehmet$_j$ haar$_{i/k}$/zichzelf$_j$ leuk vindt'
(voorbeeld uit Marinis & Chondrogianni, 2011, p. 205; aangepast van Gürel, 2002, pp. 27-28)

Dit quasi-reflexieve element zou ervoor kunnen zorgen dat tweetalige kinderen deze eigenschappen ook toekennen aan de Nederlandse reflexieven. Als ze dat doen, dan is de verwachting dat ze de antecedenten die verderop in de zin staan onterecht accepteren voor de objectreflexieven in de Nederlandse begripstaak. Dezelfde *picture verification task* als in hoofdstuk 2 werd gebruikt om 33 tweetalige Turks-Nederlandse kinderen in de leeftijd van zes tot tien jaar te testen. We vinden dat de tweetalige Turks-Nederlandse kinderen de eigenschappen van het quasi-reflexieve element niet toekennen aan de Nederlandse reflexieven. Evenzo was er al eerder gevonden dat de tweetalige

Turks-Engelse kinderen vergelijkbaar presteren als hun eentalige Engelse leeftijdsgenoten op de reflexieven. Aan de andere kant laten de resultaten zien dat de tweetalige Turks-Nederlandse kinderen zich heel anders gedragen dan hun tweetalige Turks-Engelse leeftijdsgenoten op de QP-condities.

De volgende stap is om de prestaties van de tweetalige Turks-Nederlandse kinderen te vergelijken met die van de eentalige Nederlandse kinderen. De tweetalige kinderen werden tussen hun eerste en vierde verjaardag voor het eerst blootgesteld aan het Nederlands. Aangezien zij minder input van het Nederlands hebben gehad dan hun eentalige Nederlandse leeftijdsgenoten, vroegen wij ons af of zij een (grotere) achterstand zouden laten zien. De resultaten duiden aan dat de tweetalige Turks-Nederlandse kinderen zich precies hetzelfde gedragen als de eentalige Nederlandse kinderen. Ze laten wel een effect van de vertraging van Principe B zien, maar geen kwantificationele asymmetrie en ook geen omgekeerde kwantificationele asymmetrie. Omdat de tweetalige Turks-Engelse kinderen zich ook hetzelfde gedroegen als hun eentalige Engelse leeftijdsgenoten op de QP-condities, wordt geconcludeerd dat het Turks geen cross-linguïstische invloed heeft op het Nederlands of het Engels van deze tweetalige kinderen.

In hoofdstuk 5 bekijken we ook tweetalige Turks-Nederlandse kinderen maar vanuit drie andere perspectieven dan in hoofdstuk 4. Ten eerste onderzoeken we in hoofdstuk 5 jongere tweetalige kinderen dan in hoofdstuk 4 op hun begrip van reflexieven en pronomina. Ten tweede zit er een Nederlandse productietaak in hoofdstuk 5. Ten derde onderzoeken we tweetalige Turks-Nederlandse kinderen op hun begrip van Turkse reflexieven en pronomina.

De begripstaak bestond uit een *picture selection task*, die gebruikt werd om 21 tweetalige Turks-Nederlandse kinderen in de leeftijd van vier tot zeven jaar te testen. Ze werden vergeleken met 24 eentalige Nederlandse kinderen in de leeftijd van vier tot zeven. Al deze kinderen waren significant jonger dan degenen die beschreven zijn in hoofdstuk 2 en 4. De *picture selection task* toonde twee plaatjes voor elke testzin: het ene plaatje toonde een reflexieve actie en het andere een niet-reflexieve actie. Testzinnen zagen eruit als (8) en (9).

(8) Dit is de prins. Dit is de boer. De prins knijpt zichzelf.

(9) Dit is de piraat. Dit is de tovenaar. De piraat bijt hem.
(gebaseerd op Spenader, Smits & Hendriks, 2009)

De testzinnen in (8) en (9) zijn monoclausaal. Dit soort zinnen is geschikter voor jonge kinderen dan de biclausale zinnen in (1) en (2). Daarbij mat de nieuwe taak niet het begrip van QP-antecedenten. De resultaten van de begripstaken tonen aan dat de tweetalige Turks-Nederlandse kinderen precies zoals de eentalige Nederlandse kinderen presteren. Daarom lijkt de hoeveelheid input weinig effect te hebben op de kennis van Nederlandse reflexieven en pronomina van deze tweetalige Turks-Nederlandse kinderen.

De productietaak bestond uit het uitlokken van reflexieven en pronomina. Kinderen zagen een plaatje van twee personages die een bepaalde actie uitvoerden en hun werd gevraagd om de zin die experimentator uitsprak af te maken. Voorbeelden staan in (10) en (11).

(10) Experimentator: 'Hier zie je de prinses. Hier zie je oma'
Experimentator: 'En wat doet de prinses? (Die?)'
Beoogde antwoord: '(De prinses/zij/ze/die) bijt zichzelf.'

(11) Experimentator: 'Hier zie je opa. Hier zie je de piraat.'
Experimentator: 'En wat doet opa met de piraat? (Die?)'
Beoogde antwoord: '(Opa/hij/die) slaat hem.'

De resultaten laten zien dat zowel de tweetalige Turks-Nederlandse kinderen als de eentalige Nederlandse kinderen meer correcte reflexieven dan correcte pronomina produceren. Zij laten dus het effect van de vertraging van Principe B zien in hun productie. Verder laten de tweetalige Turks-Nederlandse kinderen meer objecten achterwege in de reflexief- maar vooral in de pronomenconditie. We suggereren dat dit te wijten zou kunnen zijn aan cross-linguïstische invloed van het Turks, omdat het Turks nul-objecten toestaat. Het zou kunnen dat deze tweetalige Turks-Nederlandse kinderen zich langer in de objectdropfase bevinden dan de eentalige Nederlandse kinderen, die deze fase ook meemaken.

Het begrip van de Turkse reflexieven en pronomina werd gemeten met dezelfde *picture verification task* als in hoofdstuk 2 en 4. De testzinnen zijn naar het Turks vertaald en de controlecondities zijn aangepast, zodat de voorkeurslezing van het quasi-reflexieve element gemeten kon worden. Een moedertaalspreker van het Turks testte 22 tweetalige Turks-Nederlandse kinderen. De resultaten tonen aan dat deze tweetalige Turks-Nederlandse kinderen geen effect van de vertraging van Principe B laten zien. Met andere woorden, ze presteren even goed op de reflexieven als op de pronomina. De resultaten van de controlecondities wijzen uit dat ze het quasi-reflexieve element *kendisi* ('zelf.3SG') liever als reflexief dan als pronomen interpreteren. Ze verschillen hierin van eentalige Turkse volwassenen die geen voorkeur laten zien in dit soort contexten (Demirci, 2001).

We concluderen uit de studies die uitgevoerd zijn in hoofdstuk 5 dat het begrip van Nederlandse reflexieven en pronomina niet onderhevig is aan cross-linguïstische invloed vanuit het Turks op het Nederlands. Met betrekking tot de productie van Nederlandse reflexieven en pronomina lijkt het dat de tweetalige Turks-Nederlandse kinderen langer dan hun eentalige Nederlandse leeftijdsgenoten in een fase blijven steken waarin het object optioneel weggelaten kan worden. Of tweetalige Turks-Nederlandse kinderen cross-linguïstische invloed vanuit het Nederlands op het Turks laten zien is moeilijk te zeggen, aangezien de enige studie die eentalige Turkse kinderen heeft onderzocht op hun begrip van reflexieven en pronomina een heel andere methodologie gebruikte. Omdat die eentalige Turkse kinderen slechter presteerden op de reflexieven dan op de pronomina (Aarssen & Bos, 1999), zou

het kunnen zijn dat deze tweetalige Turks-Nederlandse kinderen beïnvloed zijn door het Nederlands en daardoor beter presteerden op de reflexieven in vergelijking tot hun eentalige Turkse leeftijdsgenoten.

In hoofdstuk 6 bekijken we een ander talenpaar, namelijk tweetalige Engels-Nederlandse kinderen. Aangezien het Nederlands en het Engels van elkaar verschillen met betrekking tot de voorkeurslezingen van kwantoren en met betrekking tot binding, is het de vraag of deze tweetalige kinderen ook een interactie tussen kwantoren en reflexieven of pronomina laten zien, net als hun eentalige leeftijdsgenoten. Om vast te stellen welke voorkeurslezingen van kwantoren de tweetalige Engels-Nederlandse kinderen hebben, hebben we dezelfde *picture selection task* als in hoofdstuk 3 gebruikt. We gebruikten dezelfde *picture verification task* als in hoofdstuk 2 en 4 om de prestaties van de tweetalige kinderen te meten op zinnen met QP-antecedenten en objectreflexieven en objectpronomina. Er deden 29 tweetalige Engels-Nederlandse kinderen mee. Ze waren tussen de zes en de tien jaar oud. Alle kinderen kregen vanaf hun geboorte input van het Engels. De meesten kregen vanaf hun geboorte ook Nederlandse input, maar voor sommigen pas vanaf negen maanden of uiterlijk vanaf vier jaar. Op het moment waarop deze tweetalige kinderen getest werden woonden ze allemaal in Nederland en gingen ze allemaal naar een Nederlandse basisschool. Hun prestaties worden vergeleken met die van de eentalige kinderen die besproken zijn in hoofdstuk 2 en 3.

De resultaten van de *picture selection task*, die de voorkeurslezingen van kwantoren meet bij de kinderen, wijzen uit dat de tweetalige kinderen minder vaak de distributieve situatie selecteren voor *elk*-subjecten dan hun eentalige Nederlandse leeftijdsgenoten. Ook kiezen de tweetalige kinderen het collectieve plaatje voor *every*-subjecten minder vaak dan hun eentalige Engelse leeftijdsgenoten. Bovendien gedragen de tweetalige kinderen zich hetzelfde in beide talen. Dit betekent dat ze hun twee talen niet onderscheiden van elkaar wat betreft de voorkeurslezingen van kwantoren. Hetzelfde vinden we voor de *picture verification task*. De tweetalige kinderen maken geen verschil tussen hun Nederlands en hun Engels, want hun resultaten laten een omgekeerde kwantificationele asymmetrie in zowel het Nederlands als het Engels zien maar geen kwantificationele asymmetrie.

Er zijn twee belangrijke bevindingen in hoofdstuk 6, namelijk (i) de tweetalige kinderen laten convergentie zien, wat inhoudt dat hun voorkeurslezingen van kwantoren in het Nederlands en Engels meer op elkaar lijken dan dat ze op die van eentalige Nederlandse en Engelse kinderen lijken en (ii) de tweetalige kinderen laten een interactie zien tussen hun voorkeurslezingen van kwantoren en hun gedrag op zinnen met QP-antecedenten en objectreflexieven en -pronomina, net zoals dat hun eentalige leeftijdsgenoten een interactie laten zien. Het eerste resultaat is onverwacht, omdat normaliter cross-linguïstische invloed niet in beide richtingen plaatsvindt. Het tweede resultaat ondersteunt onze hypothese dat er een interactie is tussen de voorkeurslezingen van kwantoren van kinderen en hun

interpretatie van zinnen met QP-antecedenten en objectreflexieven en objectpronomina. Dit geldt voor zowel eentalige als voor tweetalige kinderen.

Een resterende kwestie is waarom tweetalige Engels-Nederlandse kinderen wel convergentie laten zien, terwijl de tweetalige Turks-Nederlandse (en de Turks-Engelse) kinderen geen cross-linguïstische invloed in hun begrip van zinnen met QP-antecedenten en objectreflexieven en -pronomina laten zien. Het Turkse kwantorsysteem zou enerzijds de Engelse interpretaties van kinderen kunnen ondersteunen, omdat het Turks twee collectieve en één distributieve kwantor heeft. Anderzijds, zou het kunnen zijn dat het Turkse kwantorsysteem ook de Nederlandse interpretaties van kinderen ondersteunt, omdat de Turkse kwantor *her* ('ieder/elk') slechts distributieve lezingen kan krijgen, net zoals de Nederlandse kwantor *elk*.

Een belangrijk theoretisch gevolg van deze resultaten is dat de standaard bindingstheorie niet het gedrag van kinderen op de QP-condities kan verklaren. Nederlandse kinderen gaan niet vooruit op de QP-condities. Onze verklaring zegt dat de voorkeur voor een distributieve lezing ervoor zorgt dat het objectpronomen als variabele begrepen wordt, die lokaal gebonden kan worden. Een collectieve lezing houdt in dat het objectpronomen niet geïnterpreteerd wordt als variabele. Het is dus niet zo dat Engelse kinderen door het blokkeren van de co-referentiële lezing van het pronomen niet meer lokaal kunnen binden. In tegendeel, dat komt door hun voorkeur voor de collectieve lezing. Om het gedrag van kinderen op de QP-condities te kunnen verklaren, moeten hun voorkeurslezingen van kwantoren daarom meegenomen worden. Dit geldt voor zowel eentalige als tweetalige kinderen. Afhankelijk van de kwantorsystemen van hun talen kunnen tweetalige kinderen convergentie tonen in hun voorkeurslezingen. Dit heeft weerslag op hun gedrag op zinnen met QP-antecedenten en objectreflexieven en objectpronomina.

Curriculum vitae

Margreet van Koert was born in Nieuwkoop, Zuid-Holland, on the 30th of June, 1984. She completed the gymnasium in 2002 and subsequently started her bachelor in English language at the University of Groningen. Margreet carried out the third year of her bachelor at the University of Newcastle-upon-Tyne, UK. She graduated cum laude in 2005 and successively began with the research master in Linguistics. A year later she started with the regular master in English language. She took courses at Birkbeck College in London from January until June 2007. During 2008 and 2009 she was a research assistant to Angeliek van Hout and Bart Hollebrandse. Because of this research assistantship Margreet gained much experience in child language experiments and presented part of this work at conferences in Warsaw and London. She graduated from the RMA in 2009 and from the regular MA in 2010.

In September 2011 Margreet started the PhD project *Child L2 Acquisition of the Binding Principles in Dutch* at the University of Amsterdam. This project was supervised by Fred Weerman, Aafke Hulk and Olaf Koeneman. She presented the results of this project at local events, but also at international conferences, such as *Generative Linguistics in the Old World* in Lund (2013), *Generative Approaches to Language Acquisition* in Oldenburg (2013) and in Nantes (2015), *Generative Approaches to Second Language Acquisition* in Gainesville, FL (2013) and in Bloomington, IN (2015) and *Boston University Conference on Language Development* (2014). Finally, she collected and presented part of her data at the University of Massachusetts, Amherst, during a two-month stay in the winter of 2014.

The present dissertation contains the results of this project.