The Acquisition of Reflexive Pronouns in English and Danish

Table of contents

Summaryi		
Acknowledgements	iii	
1 Introduction	2	
1. Introduction		
2.1 Universal Grammar and the Dringinlag & Decemptors Theory	····· /	
2.1 Universal Grammar and the Frinciples & Farameters Theory	0	
2.1.1 Levels of Representation		
2.1.2 Thea Cherron		
2.1.5 X-bai Theory		
2.2 Acquiring Syntax		
3 Covernment and Binding Theory		
3.1 C command		
3.2 Binding Principles		
3.2.1 Principle A		
3 2 2 Principle R		
3 2 3 Principle C		
4 Acquisition of Principle A		
4.1 Acquisition data	17	
4 2 Principle B		
5 Acquisition of Principle B: Challenges to Chomsky's Binding Theory		
5 1 Rule I	20	
5.2 Reformulation of Principle B	23	
5.2 1 Pragmatic Principle		
5.2.2 Ouantificational Assymmetry		
5.2.3 No Ouantificational Asymmetry		
5.3 Discussion		
6. Theories about Principle B		
6.1 Influence of Children's Grammar.		
6.2 Knowledge vs. Obedience		
6.3 Production		
7. Discussion	41	
7.1 Methodology		
7.2 Innateness Hypothesis		
7.3 Lexical Parameterization Hypothesis	44	
7.4 Maturation Hypothesis	50	
7.5 Comprehension vs. Production		
8. Delay of Principle A and B in Danish	53	
8.1 Danish Binding	53	
8.1.1 Long Distance Binding		
8.2 Acquisition studies		

8.3 Morphological Approach	
8.4 LF-movement of SE-anaphors	
8.5 Comprehension of <i>sig/sig selv</i> and <i>ham/hende</i>	
8.6 Production of sig/sig selv and ham/hende	
8.7 Morphology and Logical Form revisited	
8.7.1 LF movement for <i>sig</i>	
8.8 Discussion	
8.8.1 Clitic Hypothesis	
8.8.2 Parameter Hypothesis	
8.8.3 Danish vs. English	
9. Principle C	76
9.1 Principle B and C	
10. Constructivist view	
10.1 Replacement for the Innateness Hypothesis	
11. Conclusion	81
12. References	84
Appendix I: Abbreviations	90
Appendix II: Experiment stories	
rr	

1. Introduction

This chapter contains a general introduction to the structure of the paper and to the subject under investigation. See appendix I for abbreviations.

Acquiring syntax is an important part of a child's language development. This study concerns the acquisition of anaphors¹ and pronouns. The research is based on Chomsky's binding theory (BT) and the binding principles for anaphors, pronouns and R (eferring)-expressions (1981). Particularly Principle B (pronouns) will be of interest in comparison to acquisition of reflexives (Principle A) in English and Danish. The research is based on the generative syntactic framework.

To adults, *herself* and *her* in (1) both refer to *Anna* (binding indicated by coindexed indices). In (1)a it is an anaphor and in (1)b it is a pronoun:

(1) a. Anna_i recognized herself_i in the picture.

b. Annai's borther recognized heri in the picture

(Fisher 2010,4)

The same goes for the Danish equivalents:

(2) a. Anna_i genkendte sig selv_i på billedet

b. Annas_i bror genkendte hende_i på billedet.

The exmples are grammatical in terms of binding and for interpreting who *herself/sig selv* and *her/hende* refers to. The reflexive examples in (1a) and (2a) would have been ungrammatical (marked with *) if *herself* was coindexed with someone that is not *Anna* as it would have been outside the reflexive binding domain. The same goes for the pronouns where coindexation with the *brother/bror* is ungrammatical because it would be locally bound and pronouns may not be bound locally. Hence, the locality constraints/governing categories differ between the elements. Reflexives are locally bound and pronouns are not. Children acquiring English and Danish interpret pronouns differently than adults, as shown in (3) and (4):

- (3) * Joe_i thinks that Fred_{i} criticised him_i
- (4) *Joe_i tror at Frederik_i kritiserede ham_i

(Vikner 2010,9)

¹ Anaphors are reciprocals and reflexives. In this paper *anaphor* refers to reflexives only.

Acquisition studies have found that children, unlike adults, interpret *him* as a reflexive rather than a pronoun even at the age of 6;6 (year;month), which I deal with in chapter 5 and 6. They allow the two indices to be equal (i=j) in the local domain. The coindexation of *him/ham* with *Fred/Frederik* creates a problem for interpretation, as it violates Principle B where pronouns should be non-locally bound. Adults know that *him/ham* cannot function as a reflexive, but must refer to *Joe*. Rather than being coindexed, the pronoun *him* and its local antecedent *Fred* should be disjoint in reference:

(5) Joe_i thinks that $Fred_j$ criticised him_i

Interestingly, children do not make such mistakes with reflexives:

- (6) * Joe_i thinks that Jim_i photographed himself_i
- (7) * Joe_i tror at Jim_j fotograferede ham selv_i

Both are violations of Principle A. Children seem to know this, as they interpret reflexives correctly as in (8) at age 3.

(8) Joe_i thinks that Jim_j photographed himself_j

Himself/ham selv can only refer to *Jim*, which is the closest possible antecedent whereas a pronoun cannot be bound to its closest antecedent as in (3). These conditions, is what Chomsky expressed in the BT for English, but can these account for the Danish binding system and acquisition data? Can Chomsky's division of the elements into [+/- pronominal] and [+/- anaphor] adequately describe *sig* (chapter 8)? Based on the following, I hypothesize that it cannot.

The situation is more complicated for Danish, as I will explain in chapter 8. Besides pronouns and reflexives as in English, Danish speakers can also use the reflexive pair *sig/sig selv* (SE-anaphor and SELF-anaphors). *Sig* can both be locally bound and long-distance bound (LD). Both *sig* and *sig selv* are anaphors in terms of binding; a particular binder (subject) must bind them. *Sig selv* is also an anaphor in terms of domain as it must be bound locally like *himself*. *Sig*, is a domain-anaphor but a binder- pronominal (Vikner 1985) because it may only be bound locally in certain cases as in in (10), otherwise it is LD bound as in (9).

- (9) Anne_i bad Bo_j om at fotografere sig_{i/*j}Anne asked Bo to photograph REFL
- (10) Anne_i vaskede sig_i Anne washed REFL

(Vikner 1985, 10)

In terms of binding and domain constraints, *sig* can function both as a pronoun and a reflexive, but it is within the class of reflexive pronouns (cf. the reflexive constructions above) (Allan et al 1995, 140-163, Vikner 1985). I will refer to *sig* as a SE-anaphor, but Vikner's (1985) notion of it being a binder-pronominal and a domain-anaphor should be kept in mind. I discuss its status briefly in chapter 8.

Acquisition of Danish reflexives might be different because of *sig*'s different binding properties, compared to English reflexives. I will examine how delayed *sig* is compared to pronouns and the more obvious reflexive *sig selv* based on theories and studies of *sig*'s characteristics, which may explain a possible delay. Jakubowicz (1994) suggested that *sig* is a clitic-like element like French object pronouns. The characteristics *sig* share with clitics may cause a delay. Olsen (1992) used a morphological approach and argued that *sig* does not have phi-features and thus cannot be interpreted before having received these through movement at LF (logical form). Children might struggle with this movement and may not be able to assign an appropriate LF representation. I will deal with both suggestions in accounting for whether *sig* is acquired later than the pronouns *ham/hende* based primarily on Olsen's study (1992).

I wanted to investigate the possible explanations for the pronoun delay compared to the fast acquisition of reflexives for English children and compare to acquisition of Danish SE- and SELF-anaphors and pronouns. A delay of 4 years has been found between reflexives and pronouns in English. The former is acquired at age 3, the latter at age 6 or later. This is an interesting problem in light of innateness and Universal Grammar (UG) because the BT principles are considered part of UG (the language faculty) and they should all be available to the child simultaneously, which seems not to be the case. Generative research has sought to account for the findings as being compatible with innateness.

Many aspects of the kind of grammatical knowledge children do/do not possess have been examined over the years (X-bar structure, θ -roles etc). For Principle B, the results have been inconsistent with no clear explanation for the violations contra children's fast acquisition of reflexives. I will discuss previous findings and theories. Danish *sig/sig selv* have no one-to-one correlation in English, which I hypothesize, may result in different acquisition patterns for Danish children. What sort of influence does the "extended" Danish grammar have on acquisition compared to that of English children? My hypothesis is that the binding restrictions for Danish *sig/sig selv* show a delay similar to the pronouns *ham/hende*, presumably around age 6 as for English children's interpretation of pronouns. Because

English do not have an equivalent for *sig*, I will compare the Danish data I find to acquisition data from Norwegian and Icelandic. They have the SE-anaphor, so I can compare to see whether the Danish data I find is atypical, e.g. whether Danish *sig* is acquired sooner or later than the Norwegian?

The inconsistent Principle B findings, on the surface, seem to argue against innateness. Yet, I hypothesize that UG can account for the findings. The delay can be caused by children not having set the parameter values correctly for a particular aspect of binding, here pronouns, but still have an innate principle stating that binding restrictions are necessary in the language. I base this on the Lexical Parameterization Hypothesis by Wexler & Manzini (1987), which states that children choose a subset value for binding domains initially (presumably local binding) and only include more parameter values (non-local binding) from positive evidence that it is grammatical, gradually maturing and expanding their grammar (the Maturation Hypothesis). I deal with these hypotheses in chapter 6 and 7.

Many attempts have been made to account for the acquisition problem. A number of possible explanations come to mind when hearing there is a pronoun delay, such as initial misclassification of pronouns as reflexives in the lexicon, or influence from other linguistic modules acquired at the same time. One of the major theories is a reformulated BT (Reinhart 1983) suggesting incomplete pragmatic knowledge rather than incomplete syntactic knowledge. Children know Principle B in bound variable interpretations (e.g. structures with quantifiers) but pragmatics control interpretation of pronouns in accidental coreference examples, as in (3) (see chapter 5). Another suggestion is maturation, where the necessary parameter value for nonlocal binding of pronouns has not yet matured at age 6. Other researchers find that children know the principle but do not obey it at all times, or that children guess in the experiments because the cognitive ability to process the sentences is not matured. I will address all of these in chapter 6 and 7, to try to account for the problems with pronouns in English in comparison to my research on acquisition of Danish pronouns and reflexives.

Principle C has not received much attention in comparison to Principle A and B. Principle C has been found, to be acquired fast as well, but it has also been claimed to be more pragmatic than syntactic. The difficulties with pronouns have led researchers to suggest the pragmatic account above. Since both principles have been argued to be connected to pragmatics, and because both elements require non-local binding, a pragmatic connection between them may shed some light on the DPBE (delay of Principle B effect)? This depends

on whether I find support for Principle B being pragmatic and that syntax is not causing the DPBE.

Finally, the ages above (6;6) are based on interpretation of pronouns. As comprehension is usually assumed to precede production in language development (Hoff 2007), I hypothesize that production data will show that pronouns are more delayed in production than in comprehension (i.e later than age 6;6).

The paper will be structured as follows: In chapter 2, I introduce the modular organisation of grammar, which is essential to a discussion of syntax acquisition, and UG. In chapter 3, I present the Government and Binding Theory (BT) and the syntactic constraints of Principles A, B and C. I also briefly outline acquisition of the lexicon. In chapter 4, I outline the acquisition data from Principle A before moving on to Principle B and one of the fundamental questions to my research: Do children obey/know Principle B at any stage/in any context before they begin to show clear knowledge of it at the age of 6? Chapter 5 addresses the challenges to Chomsky's original BT, and the acquisition data these have yielded in favour of a pragmatic reformulation, dividing Principle B into a syntactic and a pragmatic principle. In chapter 6, I move on to explanations based on influence from other aspects of grammar to further answer the question of obedience vs. knowledge of Principle B. In chapter 7, I discuss the results in light of various syntactic acquisition theories such as innateness, maturation, Lexical Parameterization hypothesis plus the possible influence of methodology. Chapter 8 introduces the Danish pronominal system and acquisition data, which are discussed and compared to English. Chapter 9 deals with Principle C vs. Principle B before moving on to chapter 10, in which I discuss a constructivist view of pronoun acquisition. In chapter 11, I draw my conclusions. One of which is that, despite the delay, Principle B is part of UG. The parameter value for pronouns and LD sig needs to mature from the universal principles, unlike the value for reflexive binding, whose binding properties are within the smallest subset of binding.

2. Modules of Grammar

In this chapter, I will introduce the Principles and Parameters Theory (PPT), which is a syntactic framework within generative grammar. One of PPTs characteristics is that grammar can be divided into modules/sub-theories which each help account for linguistic expressions and their structures. I will present the modules of relevance to my research: X-bar theory, levels of representation for sentences, and θ -theory. These are all important when studying acquistion of BT.For further introduction to modules, see Atkinson 1992. First, I outline the PPT.

2.1 Universal Grammar and the Principles & Parameters Theory

Within the generative framework, language is considered innate. This is expressed by UG, which is the innate basis of the language faculty. UG includes principles that are shared by all languages, and parameters whose values are specific for a given language to account for cross-linguistic variation (Chomsky 1986,26). UG is part of the PPT. The child uses the underlying universal principles for language and sets the parameter values according to linguistic experience (e.g. subject-verb-object wordorder for Danish). UG is referred to as an "innate linguistic endowment" (Haegeman 1991,12) with parameters that can be turned on or off depending on the properties of the given language. A principle may be that all sentences have subjects, and the parameter is set to whether it should be overtly pronounced or not (English vs. Italian). This is referred to as the pro-drop parameter (Cook & Newson 1996,55). Adult speakers know what utterances are acceptable and which are not, which argues in favour of innateness. Even so, children's grammars still differ from adults' in some respects during acquisition, despite ungrammatical forms not being available in the input because adults know it is wrong. The children would not hear pronoun co-reference errors and replicate it in production, e.g. when used deicticially by the adult.

UG provides the child with a set of parameters but are unlike other language rules. An example is phrase structure, which is described in terms of the X-bar theory (section 2.1.3). Depending on the language being acquired, the parameters can change between different values within the child's grammar. A principle such as X-bar accounts for all languages and is part of UG. This means that children do not have to learn the internal structure of a phrase (Atkinson 1992,70), which is shown in a hierarchi placement of clause constituents as in (13). How UG can account for fast acquisition of reflexives and the late acquisition of pronouns have been a big debate. Innate endowment cannot solely account for language acquisition. If it could, children should, in theory, start talking (and use complex language) right after birth. Some things are either learned, or UG interacts with a maturation process. Overall, UG (innateness) guides the language development (Borer & Wexler 1987) – despite the fact that lexical items such as pronouns are acquired/matured relatively late (see chapter 7).

The architecture of language is modular (Thornton & Wexler 1999, 2). Input is sent to a syntactic component concerned with interpretation and output is sent to a pronounciation module. A structure goes through several levels of representations.

2.1.1 Levels of Representation

The organization of grammar is shown in (11). There are several levels of representation for every sentence. The underlying structure is called D-structure and is related to the lexicon. It is a representation of theta-relations in the structure (Chomsky 1995,131). To illustrate, consider (12). (12) shows how the D-structure is related to S-structure through *Move-* α ("move anything anywhere") (Haegeman 1991,445; Baltin 1991). The active and passive are two instantiations of S-structure. S-structure shows the surface form where the consituents have been moved from their positions in D-structure, to create an active and a passive sentence. The next levels have to do with pronounciation (phonological form, PF) and interpretation of sentences (the conceptual structure of language): LF. The organization is as follows and specified by UG (Chomsky 1995,131):

(11)



Figure 1: Levels of representation. Adapted from Haegeman 1991,448

(12)	S-structure:	The boy kissed the girl	active
		The girl was kissed by the boy	passive

The S-structures are derived from D-structure movements:

[-ed [the boy] kiss [the girl]]]

The relation between D-and S-structure is referred to as overt syntax as the movements are visible and reflected at PF. The movements at LF are semantic and covert, which I will show in chapter 8 in relation to Danish SE-anaphors.

2.1.2 Theta Criterion

Arguments are assigned semantic/thematic roles, known as theta-roles (θ -roles). Every element in a structure must be licensed. In (12), the boy is the AGENT (the 'doer' of the action) and the girl is the THEME (the entity affected by the action). The Theta Criterion (Chomsky 1981) ensures that all arguments are assigned one and only one θ -role by the verb and that all θ -roles of a predicate are assigned to appropriate structures in a one-to-one relation.

2.1.3 X-bar Theory

The X-bar theory is a constraint on all syntactic categories, which means that all phrases abide by it. It illustrates structures and the relations between the components hierarchially.

Important notions are head (X°), maximal projection (XP)², complement and specifier.

Consider (13) and (14):

(13)



Figure 2: X- bar structure. Adapted from Haegeman 1991.

(14) Louise bought the book



Figure 3: Example sentence. Adapted from Haegeman 1999, 232.

In (14), the head of the phrase is *bought* and hence the phrase it heads is a verb phrase (VP) which is the maximal projection. *Louise* is in specifier position and the complement of *bought* is *the book* – the object Louise bought. For further introduction see Chomsky (1986) or Haegeman (1991,94-96). (14) can also be shown in a "flattened tree": [_{VP} Louise bought [_{DP} the book]]. I will use both structures.

² The X covers all phrases: VP (verb phrase) NP (noun phrase) PP (preposition phrase), AdvP (adverbial phrase), AdjP (adjective phrase). Functional heads: IP and CP (inflectional and complementiser phrase).

2.2 Acquiring Syntax

Acquisition of syntax is essential to language development, as it is knowledge about sentence structure (and the modules above) that work together to form language. Language acquisition is generally described in the following stages: babbling, one-word stage, two-word stage, telegraphic stage, word spurt and a multiword stage (for details see Hoff 2007). Of concern here is the emergence of sentence structures from age 2 and up. Children typically start out with object words, and gradually "build up" sentences, adding to the complexity with age (Radford 1990). Early sentences often lack lexical items, e.g. *see ball* where a subject is missing (Clahsen 1992, 66). This was referred to as the pro-drop parameter above. What is the trigger for English children to notice that English is not a pro-drop language as opposed to Italian children, where pro drop is grammatical? Similarly it can be asked what triggers the child to notice that pronouns may not be locally bound?

2.2.1 Interpretation of Reflexives and Pronouns

At a given stage, children start to show an understanding of how reflexives and pronouns should be interpreted. It is the appearance of this stage in childrens language that is investigated here. The child's ability to resolve anaphora and pronoun reference depends on sentence structure. Consider (15):

- (15) a. John hurt himself
 - b. *himself arrived on time

(Haegeman and Gueron 1999,362)

To adults, it is clear why (b) is ungrammatical. In (15)a, *himself* is referentially dependent on *John*; i.e. John is the antecedent of *himself*, hence the grammaticality. (15)b show that the distribution of reflexives is not free as *himself* lacks an antecedent (something to refer to). The same applies to pronouns, which need a proper antecedent and correct binding to be grammatical. What kind of errors do children make with regards to pronouns and their antecedents? My focus will be on pronoun errors³ for English as in (16), where the pronoun is interpreted as a reflexive and on reflexive and pronoun errors in Danish.

(16) *Pete_i washes him_i

³ There are also antecedent errors, where the child does not interpret the pronoun reflexively but choose another wrong antecedent (Koster 1993,2).

After Chomsky's publication of *Lectures on Government and Binding* (1981), the acquisition research on the topic intensified. Wexler & Chien (1985) found that children correctly interpret sentences with R-expressions and reflexives (correct coindexation):

- (17) He_i washed Luke Skywalker_i
- (18) Luke Skywalker_i washed himself_i.

But not pronouns

(19) *Luke Skywalker, washed him,

(Hamann 2011, 247)

In (19) children allowed *him* and *Luke Skywalker* to corefer 50% of the time, showing a pronoun error and a DPBE. Why do children show knowledge of coreference for reflexives/R-expressions but not for pronouns? The structural constraints for these lexical items are expressed in the three binding principles, which essentially involve the same mechanisms: c-command and a locality constraint (chapter 3). Why do they develop differently? Of further interest to this research, is the different possible interpretations of pronouns and the effects these may have on acquisition. In (20) the possible interpretations are indicated below the pronoun and the antecedent. (MB= Mama Bear and SW=Snow White):

(20) Mama Bear is washing her face

MB	SW	deictic
MB	MB	coreference
MB	$\lambda x(x \text{ is washing } x' \text{ s face})$	bound variable

(Thornton & Wexler 1999,11)

In the deictic interpretation, the pronoun refers to an individual outside the sentence (SW) whose face MB is washing. With coreference, MB is washing MB because the pronoun picks MB as referent. The bound variable interpretation is only possible if the pronoun c-commands the antecedent. The pronoun is interpreted as bound by a lambda operator, which takes individuals as its argument. Its denotation is a set of individuals who wash their own faces. Here, the result is a proposition that is true if MB is in that set of individuals and false otherwise. Bound variables are best exemplified with quantifiers such as *every bear is*

touching her, where the quantificational NP does not have inherent reference. The pronoun it binds cannot pick up a referent. The pragmatic reformulations of BT have been based on the latter interpretation (chapter 5), where pragmatics rule out the coreference interpretation.

3. Government and Binding Theory

In this chapter, I will present the BT and Principles A, B and C.

The BT is a syntactic theory based on the PPT, published by Chomsky (1981). The binding principles were meant to systemize the characteristics and constraints on "relations of anaphors, pronouns, names and variables to possible antecedents" (Chomsky 1981,6). The name refers to two central subtheories. *Government*: an abstract syntactic relation and *binding*, which deals with the referents of pronouns, anaphors and R- expressions as shown in (17), (18) and (19). These elements are one of three key aspects for the theory. The other two aspects concern the syntactic domain, which makes up the binding domain, and the structural condition on the syntactic relation between the element and its (potential) binder (Asudeh 2006,23). Binding is determined by c-command, e.g. whether or not a name or pronoun can refer to the same person. This is illustrated in 0 and (29). Hence A(rgument)-binding, describes the different interpretations of the elements (Chomsky 1981,188)

3.1 C-command

The binding principles involve c-command defined as:

(21) X c-commands Y if and only ifa. all nodes that dominate X also dominate Yb. X does not dominate Y, andc. Y does not dominate X.

(Vikner 2010,2)

The binding element must be in a structurally dominant position (one of the aspects mentioned above):

(22)



Figure 4: illustration of c-command (Adapted from Vikner 2010,2)

In (22), *Fred* c-commands *himself*. Had *himself* been placed further away, it would not have been a suitable antecedent as it needs to be local as in (15). The antecedent must obey the locality constraints (section 3.2) and must bind an element (e.g. pronoun or reflexive) that match in phi-features (person, number, gender) (Radford 2004,92). Put simply, if you can get from X (*Fred*) to Y (*himself*) by going "one step up" from X and then climb downwards until you reach Y, then there is c-command. *Himself* is c-commanded and bound by *Fred* in (22). C-command and correct placement of the antecedent is essential to anaphora interpretation and expressed in the BT principles.

3.2 Binding Principles

Chomsky (1982, 78-89) classified the elements in his binding principles as [+/- anaphor] and [+/- pronominal]. A noun that is [-anaphor, -pronominal] is an R-expression. One that is [-anaphor, +pronominal] is a pronoun and [+anaphor, -pronominal] is a reflexive. As mentioned in chapter 1, this classification has since been discussed in light of SE-anaphors and their binding properties and characterstics (Everaert 1991,85) (chapter 8).

The binding principles are:

Principle A: An anaphor must be bound in its governing category.

Principle B: A pronominal is free in its governing category.

Principle C: An R-expression is free everywhere.

(Chomsky 1981,188)

Bound means c-commanded and coindexed in the sense that:

(23) α bind β iff α and β are coindexed and α c-commands β

(Wexler & Manzini 1987,48).

Researchers often use the terms *local* and *non-local* instead of *governing category* (GovC). The definition of the latter has been debated but the common notion is that it corresponds to *local* vs *nonlocal* based on Chomsky's definition:

(24) γ is a governing category for α iff γ is the minimal category which contains α and has a subject.

(Chomsky 1981,188)

Can these binding principles and the definition of GovC in (24) apply to all languages (Danish for my purpose)? Considering the syntactic differences cross-linguistically it seems it cannot be applied to all languages. I will return to this in section 7.3 in relation to the Lexical Parameter Hypothesis (LPH). I will now present the principles in relation to English.

3.2.1 Principle A

Principle A concerns anaphors (reflexive pronouns like *himself/herself/myself*, and for Danish *sig selv, hamselv/hendeselv*). Reflexives must be c-commanded by their syntactic antecedent that must match in phi-features. The fact that reflexives should be bound and c-commanded within a local domain is seen in the ungrammaticality of (25).

(25) * Anna₁ said that Paul recognized herself₁ in the picture

(Fischer 2010,4)

(25) shows that binding in itself is not enough. The binding also needs to be local:

(26) Anna₁ recognized herself₁ in the picture

(Fischer 2010, 4)

The main difference between (25) and (26) is the smaller distance between the antecedent and the anaphor. This shows that binding needs to be in a local domain for reflexives. Further, it requires a proper antecedent, which is why (27) is ungrammatical:

(27) * Herself likes the picture.

For tree structure of Principle A, see (29).

3.2.2 Principle B

Pronominals refer to nonreflexive pronouns (*he,him,she, her* and Danish *ham,hende, hun, ham*) (Vikner 2010,11). They are elements that are specified for gender, person and number (phi-features). Pronouns may, but need not, depend on another argument for interpretation and can be used deictically (e.g accompanied by pointing gestures) (Reuland 2005a, 263). Recall that (20) showed the possible interpretations of pronouns. (28) shows that pronouns need more distance to their antecedents and thus cannot be bound locally like reflexives:

(28) (a)* Anna₁ recognized her₁ in the picture

(b) Anna₁'s brother recognized her₁ in the picture

Her cannot refer to *Anna* in (28)a. To be grammatical, it should have been a reflexive or indexed with someone outside the local domain. In (28)b *her* refers to the nonlocal antecedent rather than the local (the brother) and is grammatical.

(29) shows a syntactic representation of Principle A and B in English:

(29)



(adapted from Vikner 2010,5)

In (29) *himself* can only refer to *Joe*, as it must be locally bound (within the local IP, cf. IP₂). The sentence would be ungrammatical if *Joe* was coindexed with *him*. *Him* can only be coindexed with *Fred* as pronouns may not be locally bound and *Fred* is in IP₁. *Joe* is in IP₂, the local (and ungrammatical) domain for *him*.

3.2.3 Principle C

Principle C prohibits coreference between R-expressions (e.g names) and the pronoun. Principle C states that R-expressions cannot be bound in any domain:

(30) Poirot_i attacked $him_{j/*i}$

(Haegeman & Gueron 1999,241)

R-expressions are inherently referential, meaning that they choose a referent from the discourse and have independent reference, so they must not be bound. *Poirot* selects a referent outside the sentence/from discourse rather than locally.

4. Acquisition of Principle A

In this chapter, I will present acquisition data for Principle A and the overall problem with Principle B, before discussing the pronoun data in chapter 5 and 6. I will address the fundamental question of whether children obey Principle B in some contexts before showing clear knowledge (but not adult proficiency) at age 6.

The binding principles are thought to be part of UG (Chomsky 1981), implying that children should know the meaning and usage of all three principles, but children allow incorrect coreference for pronouns until the age of 6 (chapter 5):

(31) *Anna_i touched her_i

Reflexives on the other hand, are acquired early. As shown in section 2.2.1 children have to learn that *herself* is an anaphor and that *her* is a pronoun and then all the other facts about possible antecedents and their distribution will follow from the BT principle in UG (Chomsky 1981,5) but pronouns are learned later. As part of UG, children should be able to use the principles when they have categorized anaphors, pronouns and R-expressions according to the Lexical Learning Theory suggested by Wexler & Chien (1985) (see chapter 5), but why are pronouns categorized later? Jakubowicz (1984) argued that pronouns are treated as reflexives initially, which causes the DPBE and explains the early knowledge of reflexives (see section 7.3).

4.1 Acquisition data

The findings for Principle A are compatible with UG and the innateness hypothesis. Jakubowicz (1984), and McDaniel, Cairns & Hsu (1990) found that children as young as 3 have mastered interpretation and usage of Principle A in an adult-like manner. Otsu 1981 (as cited in Grimshaw & Rosen 1990b, 363) claimed that Principle A is in place from the start and detectable as soon as children have identified anaphors. These findings for Principle A are important, as Principle B should then also be thought to be available to the child from the beginning, but instead it is delayed. Chien & Wexler (1987,1990) found that children's performance on Principle A improves rapidly as opposed to performance on Principle B, which remains relatively stable from age 3 (reach 90% for Principle A at age 3 vs. 64% for B at age 6;6). Yet they also find that children younger than 4 do not show a reliable knowledge of Principle A. These children violated the locality constraint in (32) 70% of the time (1990,270) with a picture showing Mama Bear touching Goldilocks:

(32) Is Mama Bear touching herself?

This may either demonstrate that Principle A is not reliably acquired much earlier than Principle B, or that the methods cannot reliably be used with children younger than 4. The performance may also be due to the *Charity Principle* (Crain & Thornton 1998) where children seek to please the experimenter/adult by answering *yes*. The most widely sought theory is that children acquire reflexives earlier than pronouns.

Grodzinksy and Kave (1994, 44) examine whether the fast acquisition is due to a cognitive bias towards a reflexive strategy, which masks the childs actual grammatical knowledge of reflexives. They found that this was not the case. Children performed well with reflexives because they have knowledge of Principle A, showing it is innate.

What is masking children's knowledge of pronouns? A comparison to Danish with its different binding rules may be useful to see what may cause the delay and whether it is the same delay cross-linguistically.

The study of anaphors and pronouns and how children use and acquire them is essential to language acquisition studies, particularly in light of the inconsistent findings between them. They are a unitary cluster of syntactic properties and should be acquired at the same time (Foster-Cohen 1994, 240). Only Principle A (and C, which I will show in chapter 9) is acquired early and directly support the innateness hypothesis (chapter 7). What about Principle B?

4.2 Principle B

As implied in chapter 1, the early studies with English children all more or less agree that knowledge of pronouns do not occur until the age of 6;6 (Chien &Wexler 1987). Studies have since then debated the notion of "knowledge" of the principle, resulting in explanations based on whether children obey the principle or not. This question might seem redundant in the view of the just mentioned late acquisition for pronouns. It is however important, as I will show in chapter 5. The crucial age groups for English in the research below are 2;0 -6;6. Do children within these years obey the principle in some contexts before they reach adult performance and competence in all instances (age 10 according to Deutsch, Koster & Koster, 1986)? Children have been found to obey Principle B under certain circumstances and show a DPBE in others according to some theories. One context in which they have been found to obey it, is when the pronoun is a bound variable as in (33)

(33) Every camel_j hit $him_{i/*j}$

(Thornton & Wexler 1999,32)

Children do not accept the interpretation where *him* refers to *every camel*. When the quantifier is replaced with e.g. a name, the children misinterpret the pronoun as locally bound. When (and how) do they reset their grammar parameters to match that of adults? This, on the surface, seemingly simple questions has been the starting point of much research. (33) have led researchers to argue that children cope differently with quantified and referential antecedents for pronouns, which is why they obey (33) but not (16) as pragmatics control the latter and syntax the former, as shown in chapter 5.

5. Acquisition of Principle B: Challenges to Chomsky's Binding Theory

Since 1981 where Chomsky formulated the principles, several issues and rewritings have been suggested to account for the acquisition data, which I will present in this chapter along with their findings.

In the traditional BT, reflexives are given a bound variable interpretation whereas pronouns can have either a grammatical bound variable interpretation or a pragmatic intended coreference interpretation (Koster 1993,202). The fact that pragmatics is involved in one but not the other, may account for the inconsistent findings between Principle A and B. Within the generative tradition, the main interest has been on the syntactic aspects of pronoun interpretation, but with the inconsistent findings, researchers examined the possibility of a pragmatic aspect, as masking children's knowledge (Chien & Wexler 1990 and Reinhart 1983). Reinhart's reformulated BT (1983) is essential to the acquisition debate as it seeks to account for the acquisition data based on the idea that Chomsky's traditional (syntactic) formulation of BT cannot account for it.

Reinhart focused on the difference between (34) and (35) (similar to (33)):

- (34) *Thelma_i touched her_i
- (35) Every girl touched her

(Bloom et al. 1994,54)

Children's performance on (35) has been found to be adult-like in the same period where children accept incorrect coreference in (34). This has led several researchers to suggest alternative theories, specifically reformulations of Principle B, to account for the acquisition data. These alternatives suggest that pragmatics cause the DPBE rather than lack of syntactic knowledge. Levinson (1987,380) suggested that Chomsky over-grammaticalized something (the binding principles) that is pragmatic and can be accounted for by the Gricean Maxims.

Modifications and reformulations have been suggested to clarify the delay in terms compatible with UG, rather than assume children do not have knowledge of Principle B even at age 6. Recall that BT is part of the innate language faculty (UG), indicating that some knowledge ought to be there. An account was needed to support the notion of UG (see section 7.1) despite the delay. For those opposed to UG an obvious "attack", in my opinion, would be that if Principle B is innate, why can children not use it correctly at the same times as reflexives, as UG should make sure of this (broadly speaking)? The delay would then seem to support the functionalist notion of learning from the environment over innateness (see chapter 10). I will argue below that the DPBE is not necessarily incompatible with UG. First, I will introduce Reinhart's (1983) Rule I.

5.1 Rule I

Reinhart (1983) suggested that bound variable interpretations should be separate from intended coreference readings of pronouns, as shown in (20). The latter should be limited to pragmatic principles, the former to syntax. Syntax is part of UG but a pragmatic interpretation is based on world knowledge and may be acquired gradually via experience. This resulted in a reformulated BT for bound variable interpretations (see also Grodzinsky & Reinhart 1993), in which an anaphoric element is syntactically bound and c-commanded by its antecedent within its GovC (reflexives) or outside the GovC (pronouns). This is expressed in (36) along with the conditions for interpretation:

(36) Coindex a pronoun P with a c-commanding NP α .

Conditions:

A: if P is an R-pronoun, α must be in its minimal governing category

B: if P is a non-R-pronoun, α must be outside its minimal governing category.

(Reinhart 1983,158)

According to this, a pronominal cannot have a bound variable interpretation with a ccommanding NP in the same local domain (Koster 1995, 3). Reinhart(1983) only operates with Principle A and B in (36). Instead of Principle C, she introduced Rule I in (37) as a speaker/hearer strategy for coreference interpretation of pronouns (167):

(37) Rule I: Intrasentential Coreference

NP A cannot corefer with NP B if replacing A with C, C A-bound by B, yields an indistinguishable interpretation.

(Kaufman 1994,181)

Rule I suggests that it is not the grammatical principle B that children struggle with, but Rule I. When Rule I is not available, the child does not know, whether a non-coindexed pronominal and an NP should have coreference or a disjoint reference interpretation (i.e. elements not coindexed as in (33)) (Koster 1995). Hence, the starting point for Reinhart (1983) was to compare and differentiate between binding and coreference because "stating the Binding Theory principles in terms of definite NP coreference have complicated expressing anaphoric relations...the government and binding theory governs only bound variable anaphora" (Reinhart 1983,158). Coindexation is what allows coreference and BT governs both. In Reinhart's version referential antecedents are ambiguous between a referential and quantificational interpretation. BT operates only in the former case. Both binding and coreference is pragmatic and binding syntactic (Kaufmann 1994,181). Reinhart (1983) claims that Chomsky's version is incorrect as coreference can also occur in sentence where binding does not have a say:

(38) The bear near Lucie touched her

(Foster-Cohen 1994, 243)

In this case there is no binding relationship between the items interpreted to corefer due to lack of c-command between them. But they are still interpreted as coreferential. (38) is Rule I grammatical. Further there are examples within the classic BT where the pronoun can be interpreted as both bound and unbound:

(39) Al loves his sister and Bill does too

 a. Al_i loves his_i sister and Bill_j loves his_j sister too → sloppy reading
 b. Al_i loves his_i sister and Bill_j loves his_i sister too → strict reading
 (Conroy 2009,448)

There is an ambiguity in (39) between bound variable and coreference interpretation. The second conjunct can mean that *Bill loves Bill's sister* or that *Bill loves Al's sister*. There is more than one way for a pronoun to be connected to its antecedent. The pronoun may be treated as a bound variable, whose interpretation is determined by its antecedent. This gives rise to the 'sloppy' reading because the elided VP and the overt VP each contain a bound variable pronoun bound by the subject of the corresponding clause. Alternatively, the pronoun may be understood to have a fixed reference that match the reference of the subject of the first clause in the 'strict' reading. Based on this Reinhart (1983) suggests a pragmatic account of

coreference, which is independent of syntactic binding and differentiates between them. Rule I excludes coreference interpretation in structures that allow bound variable anaphors unless such an interpretation is motivated by pragmatics or discourse context.

Rule I states that if we in (34), repeated here as

(40) Thelma touched her

mean that *Thelma* and *her* refer to the same person (in a context where *Thelma* is touching *herself*), then *her* should be replaced with the bound variable *herself* as long as it does not change the intended meaning. A change in intended meaning would be possible in e.g.: *that must be John. At least he looks like him*, if the replacement occurred (Kaufman 1994). Application of Rule I need to be sensitive to context. This is what makes it a non-syntactic activity, according to Reinhart (1983). The child must decide if the pronoun can be replaced by a bound element. Next the child must decide whether the two versions are distinguishable interpretations based on the context (the context determines what it can mean). This is not the case with *Mama Bear is touching her*, where coreference should be blocked: * *Mama bear_i touches her_i* and replaced with *Mama bear_i touches herself_i*. The pragmatic aspect distinguishes between possible interpretations (see also Foster-Cohen 1994). Hence, there are sentences that are BT ungrammatical and Rule I ungrammatical:

BT ungrammatical:

- (41) *Oscar_i said that Bert touches himself_i
- (42) *Every boy_i touches him_i

Rule I ungrammatical:

- (43) Oscar touches him
- (44) He touches Oscar

(Foster-Cohen 1994, 243)

Children's incorrect interpretation of pronouns as having local antecedents is a Rule I rather than a BT violation according to Reinhart. This leads to the obvious question, whether there will be a significant acquisition difference between e.g. (41) and (43). Do sentences that test BT actually test Rule I instead, causing the difference in performance between the principles? (Grodzinsky & Reinhart 1993). As will be evident in section 5.3, some researchers believe that children know Principle B, but struggle with the pragmatics, such as Rule I, which decide when to assume coreference when BT is not decisive. Rule I argues that the DPBE should not be attributed to lack of syntactic knowledge of Principle B, but to lack of pragmatic/ world knowledge, which matures later.

5.2 Reformulation of Principle B

Chien &Wexler (1985,1987,1990) support the notion of a reformulated BT and suggest a pragmatic principle along the lines of Reinhart (1983), to account for the DPBE. Their studies have been the basis for much discussion, so I will spend some time on the studies leading to the reformulation.

Wexler & Chien (1985) compared English children's acquisition of Principles A and B. They found that children at the age of 4 correctly interpreted sentences governed by Principle A. At age 6;6 they scored 90% correct on reflexive constructions. The scores for Principle B remained remarkably flat over a 4 year period, only reaching 70% at age 6;6 (around 60% at age 3). They used an act out task, which is the most used methodology along with a TVJT (truth-value judgment task). In the act out task, the experimenter presents a sentence and instructs the child to act it out with toys. In the TVJT children are asked to evaluate the correctness of a sentence, based on pictures or on a story told by the experimenter. Afterwards, a puppet states what it thought happened. The child is then asked to judge the correctness of this and reward the puppet if it is correct, or explain to the puppet why it was wrong.

The 2;6 year olds have a score of 20% on reflexives as mentioned in section 4.1. This is not taken to show that they do not know principle A, but to be compatible with the Lexical Learning Hypothesis (Wexler & Chien 1985,32). The child needs to learn that e.g. *herself* is an anaphor and *her* is a pronoun, before being capable of using them. The BT principles operate much earlier, but need lexical learning to be triggered. This means that the children would show knowledge of the binding conditions for pronouns, but the data disprove this. Wexler and Chien suggest a reformulation of BT, in which the problem is pragmatic rather than syntactic (see next section).

The 1987 study consisted of two experiments testing children aged 2;6-6;6, using the "Simon-says" game (similar to the act-out task). Test sentences consisted of:

(45)
$$\left\{\frac{Kitty}{Snoopy}\right\}$$
 says that $\left\{\frac{Sarah}{Adam}\right\}$ should point to $\left\{\frac{herself}{himself}\right\}$

(46)
$$\{\frac{Kitty}{Snoopy}\}$$
 says that $\{\frac{Sarah}{Adam}\}$ should point to $\{\frac{her}{him}\}$

(Chien & Wexler 1987,34)

Sarah/Adam locally c-commands the reflexive/the pronoun *Snoopy/Kitty* does not. Again, they found early mastery of reflexives and no knowledge of Principle B until the age of 6.

They then created a "Party Game" in which the child should give a toy to himself or one of two puppets by putting the toy into his/her own bowl or one of the puppets' (1987, 36), depending on the correct interpretation of:

(47)
$$\left\{\frac{Kitty}{Snoopy}\right\}$$
 says that $\left\{\frac{Sarah}{Adam}\right\}$ should give $\left\{\frac{herself/her}{himself/him}\right\}$ a car

(Adapted from Chien & Wexler 1987,36)

Again, the results showed that children at an early age (4;6) show knowledge of Principle A. Between the ages 4;6 and 5;0, they scored 90% correct in the Party Game and scored 90% as 5;6-6;6 year olds in the 'Simon-says' game. With regards to Principle B, the same as earlier was found. Children aged 6;6 did not show adult-like knowledge of it. The correct scores only reached 60% in the oldest group, revealing a DPBE. Even at the age of 6 they still have not learned the non-local binding condition for pronouns. Only the findings from Principle A confirm the Lexical Learning Hypothesis but cannot explain the DPBE.

Chien & Wexler suggests a pragmatic reformulation of Principle B which children lack knowledge of rather than the "original" (syntactic) Principle B. They stated their reformulation in terms similar to Reinhart: "only pronouns as bound variables are subject to Principle B, and non-variable cases of Principle B are to be handled in different ways" (see also Chien & Wexler 1990). They exemplify with:

(48) Every bear_i says that John should point to him_i.

(49) Snoopy says that Goofy gave $\frac{a.himself}{b.him}$ a candy and John should too

(Chien & Wexler 1987,38)

In (48) *him* is a bound variable (co-indexed with *every bear*) whereas (49) involves more than one reading due to VP-deletion (a verb phrase is deleted when it can be filled through contextual clues). What Chien & Wexler refer to as "sloppy reading" in (49)a, is when the deleted VP is a bound variable (i.e. if John should give himself a candy). In (49)b, a co-indexation between *him* and *Goofy* is a violation of Principle B but it will not allow a sloppy reading in the deleted VP by the reformulated principle (1987,38).

The hypothesis of a reformulated BT was not just based on Reinhart's (1983) but also on Montalbetti & Wexler (1985 as cited in Kaufman 1994) ,who suggested that there is not coreference, but linking in BT. This means that pronouns link only to become bound variables and linking applies to c-commanded NP's (Kaufman 1994,184). The BT principles only handle elements that link (i.e. they do not account for referential antecedents to which

pronouns may not link, but accounts for quantificational antecedents to which pronouns must link (185)). Like Chien & Wexler, they too suggest a lack of pragmatic knowledge to account for the children's data. Anaphors must have the same index as their local c-commanding antecedent, but pronouns may not have the same index as the local antecedent. Both semantics and pragmatics must be used to interpret these indices, as noncoindexing does not necessarily imply disjoint reference, as I will show in section 5.2.1, where Chien & Wexler (1990) suggest Principle P.

Alternatively Chien & Wexler (1987) suggests a maturation theory (based on Borer & Wexler 1987 (section 7.4)), where the principles rather than being constantly available, mature with age (1987,38). They transfer this claim to the binding principles as these also involve the notion of linking /non-linking between two elements e.g. a reflexive and its antecedent. The major difference between Principle A and B is that one involves coindexing and the other disjointness between X and Y. The latter (Principle B) may mature later, which they argue can account for the DPBE and they predict that Principle C will also be acquired later because R-expressions/names must be free. If that is the case, then Principle B and C might be connected pragmatically, as suggested in the introduction (see chapter 9 for discussion).

They also reconsider the Lexical Learning Hypothesis, by adding that the principles are also learned (1987, 38). I find this unlikely, as this would still require an explanation as to how pronouns are learned and why B is harder to learn than Principle A. Correct coindexation between reflexives/pronouns and their antecedent is based on the same knowledge and requires that the child can use knowledge that is not in the input data. Lastly, children do use pronouns correctly as in (50), showing they know what pronouns are (Wexler & Manzini 1987).

(50) I saw him (accompanied by pointing gestures) (O'Grady 1997, 233)

I argue, that pronouns occur as frequently in the input as reflexives, so lexical classification cannot be the main cause for the delay. This should be confirmed by a corpus study. It seems unlikely that children put reflexives and pronouns "in the same box" and initially use them interchagedly based on examples like (50). Pronouns are not harder to learn than reflexives (Chien and Wexler 1990,253).

5.2.1 Pragmatic Principle

In 1990, Chien & Wexler formulated their hypothesis of lacking pragmatic knowledge rather than syntactic knowledge in Principle B violations in the form of Principle

P. This theory supports Rule I in section 5.1. Chien &Wexler state the reformulation in terms of locality: pronouns cannot have a bound variable reading with a c-commanding antecedent in the local domain. To them, the key to a reformulated BT is the role of coindexation and coreference. For Principle A, it is rather simple. An anaphor must have the same index as its local c-commanding antecedent as they refer to the same entity (1990,255). Pronouns are more complex, as they can have a different index than their local antecedent. If a pronoun has the same index as a local antecedent, it is violating Principle B. It seems that two NPs that are not coindexed are noncoreferential (disjoint) but Chien &Wexler argue that it is not the case (257):

(51) That_i must be $John_j$

a. *At least he_i looks like him_i.

b. At least he_i looks like him_{i.}

Coindexing in (51)a is ruled out because *him* is bound locally. In (51)b *he* and *him* can both refer to *John* but they are not coidexed. Hence, noncoindexing does not imply disjointness. Chien &Wexler suggest Principle P to handle pragmatic coreference like (51)b where *he* and *him* is interpreted coreferentially but may not be coindexed.

Principle P handles pragmatic coreference cases. Children "do know Principle B... they know the relevant syntactic principle... what the children don't know is the pragmatic principle P" (Chien & Wexler 1990, 258), given as (52) and exemplified in (51). Noncoindexation does not rule out coreferential interpretation. To figure this out, children need pragmatic knowledge.

(52) Principle P: Contraindexed NPs are noncoreferential unless the context explicitly forces coreference.

Chien and Wexler claim that Principle P handles pragmatic coreference. Principle B rules out (53)b because children do not allow the pronoun to be a bound variable (unlike the allowed coreference in (55)). (53)c is the only possible reading but the non-coindexed elements cannot corefer due to the different representations at LF in (54)a and b.

(53) a. Every woman looks like her

(54)

b. *Every woman_i looks like her_i.

c. Every woman_i looks like her_j.

a. *For every woman *x*, *x* looks like *x*.

b. There is a woman *x* such that for every woman *y*, *y* looks like *x*.

(Chien and Wexler 1990,259)

(53) is controlled by Principle B, and children are hypothesized to show knowledge of it, but not knowledge of Principle P in

(55) **Mary*_i likes her_i

Chien & Wexler (1990) tested this by comparing children's performance (aged 2;6-7;0) on principle B for pronouns as bound variables and for pronouns with referential antecedents in a TVJT:

(56) a. Is Mama Bear washing her?b. Is every bear washing her?

(Chien & Wexler 1990,274)

They found that 6-year-olds rejected principle B violations 86% of the time when the pronoun had a bound variable interpretation as in (56)b (1990,274).

The consistent rejection of principle B violations implies solid knowledge of Principle B. Chien & Wexler tested their hypothesis about Principle P to account for what has appeared as a DPBE.

One scenario involved *Mama Bear* and *Goldilocks*, where *Mama Bear* is not touching *Goldilocks*, but is touching *herself*. In the experiments, 5- to 6-year-olds incorrectly answered *yes* to (57) 50% of the time:

(57) Is Mama Bear touching her?

In the other scenario, the picture shows three bears and none of them are touching *Goldilocks*. They are touching themselves. 5- to 6-year-olds incorrectly answered *yes* to (58) only 16% of the time.

(58) Is every bear touching her?

The children gave more correct responses on sentences that violated Principle B when the pronoun was a bound variable. Children rejected examples like (58) as descriptions of reflexive activities more reliably than (57). (57) suggests that children do not know Principle B where: *Mama Bear is touching herself,* is an ungrammatical interpretation. Interestingly,

(58) points to a fairly robust knowledge of Principle B (1990,238). The contrast is argued to be between referential and quantificational antecedents for pronouns. Chien & Wexler (1990) noted that Principle B only rules out co-reference with bound variable pronouns as in (58), as quantifiers to not refer and cannot be corerential wth pronouns. Hence, the relationship is one of binding. In (55) the pronoun is not a bound variable and Principle B does not dictate whether the two expressions co-refer. Instead, co-reference is decided by applying Principle P (239). The same is the case for (57) and (58), according to them.

The scores obtained here is, according to Chien & Wexler, explicable by Reinhart's theory in which Principle B regulates pronouns acting as bound variables, but not as referential pronouns (257). Children correctly reject Principle B violations with bound variables because these are controlled by the BT. BT does not determine coindexing possibilities for referential pronouns. The argument is that children are better at bound variables than at referential pronouns, because they know the BT, which constrains bound variables, but not referential pronouns. The latter is controlled by Principle P (Chien &Wexler 1990, 243).

(57) and (58) supports the notion of a Principle B vs. a Principle P. However, children below the age of 5 still violated the syntactic Principle B (in the sense of Chien & Wexler 1990), by allowing a local antecedent for pronouns. In a control experiment, they found these children did not show clear knowledge of quantified NPs until the age of 5 (257). They may know Principle B, but perform poorly because they do not yet understand quantifiers. I return to this in chapter 6.

For reflexives, they found that children aged 5 knew Principle A, being 90% correct. Before the age of 5, the children were not certain in their knowledge, as they also allowed the reflexive to refer to an external referent from the introductory sentence. When shown a picture where the bear is touching *Goldilocks* and not vice versa, and asked if *Goldilocks* was touching *herself*, only 30% of the children under 4 years answered *no*. 67% of the children aged 4-5 answered *no* (1990, 258).

The children performed better with quantified NPs (Principle B) than with referential antecedents (Principle P). Hence, even though the child knows Principle B, it has been possible for the child to appear to violate it, when interpreting noncoindexed NPs as coreferential. This is taken to actually be a violation of Principle P, not B. Chien & Wexler (1990) conclude that children know Principle B. In the cases where they do not show knowledge of coreference, they are lacking Principle P (275). They analyse each group individually to underline this point. Even in the two youngest groups, they find different effects of Principle B and Principle P, as the children perform better with the quantifierpronoun condition than the referential condition (290).

Overall, Chien &Wexler argue that children know Principle B from the start and only have problems with the pragmatics such as Principle P/Rule I, that dictate when one should or should not assume co-reference in cases where BT is not decisive (258). They claim that knowledge of principle B (and lack thereof) has been confused with lack of pragmatic knowledge (259). They conclude that the results to a large degree confirm the Lexical Learning Hypothesis. By the time the child shows control of the concept of *every* and learns that *himself* is a reflexive and *him* is a pronoun, the child is able to link these lexical items to the corresponding Principle A and Principle B and to correctly identify their appropriate antecedents and rule out the inappropriate ones (276). On the contrary, they found that the youngest children (2;6) did not obey Principle B (only 13% correct compared to 50%), which their explanation does not account for and the main question about what age children learn to obey both principles was not entirely solved for the youngest group.

Reinhart (1983) and Chien & Wexler (1987,1990) present alternatives to the original BT, by arguing that studies that have found violations of Principle B had confounded syntactic vs. pragmatic knowledge since children's problems with pronouns is pragmatic. Chien & Wexler suggest a division of Principle B to show that children do have innate knowledge of syntax, but not pragmatics. Burzio (1998) also proposed a reformulation of the original BT in terms of morphological economy/hierarchi, to account for usage of reflexives and pronouns (see chapter 8).

5.2.2 Quantificational Assymmetry

The difference between quantificational antecedents and referential antecedents as introduced above, has been an important argument in favour of reformulated BTs, as children have been found to have knowledge of the reformulated Principle B. Recall, that in (57) and (58) the difference was that Principle B only controls (58) which has a quantificational antecedent resulting in a bound variable interpretation. This section will present studies in favour of a quantificational asymmetry (QA) and of Principle P/ Rule I.

Grodzinsky & Reinhart (1993) try to account for how QA develops and how to further account for Chien & Wexler's results in light of a reformulated BT. They claim that both Principle B and Rule I is innate. Because they have knowledge of Principle B they are prevented from interpreting (58) above as *every bear is touching herself*, but are not able to apply Rule I in (56): *Mama Bear is washing her*. Rule I prevents *her* from being referential in (56) but as children do not know Principle P/ Rule I they misinterpret it (Elbourne 2005,334). Grodzinsky & Reinhart (1993) argue that the problem is that children have to keep both the original representation and its reflexive alternative in mind, before comparing the two interpretations. This is too big a processing load for them at age 6. They do not have the cognitive abilities yet. Therefore, they are forced to guess (accounting for the 50% score on (57)). With a quantificational antecedent as in (58) there cannot be a coreferential reading, so they do not have to attempt to apply Rule I. This supports Reinhart's (1983) argumentation that the same module does not govern binding and coreference. I will return to Grodzinsky & Reinhart's view on innate syntactic constraints in section 7.2.

Thornton & Wexler (1999) also found support for QA in a TVJT with 4-5 year olds. They tested Principle B with referential and quantificational antecedents (143):

- (59) I think Bert brushed him
- (60) I think every reindeer brushed him

Unlike the others, they used an introductory story, in which *Bert* brushed *himself*, not any of the other possible referents for *him*. Children accepted (59) 58% of the time, in violation of Principle B (170). For (60), it is true in the story that every reindeer brushed himself but none of them brushed *Bert* (the potential antecedent for *him*). Children only accepted it as true 8% of the time (171). They conclude that children adhere to Principle B with quantificational antecedents in support of QA and Rule I (186). They found that children were weighing the possible antecedents before answering. The children quizzed the experimenter about the referent for *him* (172), which contradicts Grodzinsky & Reinhart's (1993) claim that children are forced to guess.

Children may be forced to choose between violating Principle B or not, by assigning an antecedent to the pronoun. Because of the structure of test sentences, only a proper antecedent for reflexives is present. I discuss this further in chapter 6 and section 7.1. These studies should support the notion of a reformulated pragmatic Principle B. Many researchers have found no QA.

5.2.3 No Quantificational Asymmetry

Many of the studies that have not found a QA, are based on revisions of the methodologies and stimuli used above (see also section 7.1).

Boster 1991 (as cited in Elbourne 2005,355) tested children aged 3;4-4;9 using a TVJT. As opposed to Chien & Wexler (1990), she tested both plural and singular pronouns:

- (61) Is every monkey patting him?
- (62) Is every bear touching them?
- (63) Is Chip brushing him?

A *yes* answer was possible only by violating Principle B. The children accepted (63) in violation of Principle B 37.5% of the time. They accepted (62) (in violation of Principle B) 41.67%; and accepted (61) in violation of Principle B 34.38% of the time. This shows that there is no significant difference in Principle B violations between referential and quantificational antecedents (Elbourne, 355). Lombardi and Sarma (1989) similarly found a 41.8% acceptance score for quantifiers and 48.3% for referential pronouns.

Conroy, Takahashi, Lidz and Phillips (2009) tested children aged 4;0-5;6 and found that they showed knowledge of Principle B, but not due to QA. They used TVJTs on both referential and quantificational conditions, testing QA and DPBE. Conroy et al. also used introductory stories⁴ to the sentences:

(64) a. Grumpy painted him (referential)

b. Every dwarf painted him (quantificational)

(64) was introduced by the experimenter, with a story about the smurf's painting themselves before going to a party (Conroy et al 2009,460) (see appendix). The child watched the experimenter act out the scenario. Afterwards, Kermit the Frog made a statement about it. The child should then reward or correct Kermit based on accuracy of his statement with respect to the scenario. The same stories were used to test both conditions and designed such that the same events were the determinants for the truth or falsity of the test sentence. They found that children and adults avoided an anaphoric interpretation of the pronoun. Children accepted this interpretation in 11% of the referential trials and in 14% of the quantificational trials (3% and 5% respectively for adults) (463). The results are based on the responses that reflected an anaphoric interpretation of the pronoun, which was always true in the story, and the trials where the response reflected a deitic interpretation of the pronoun that was false in the story. The results show that adults and children avoid the illicit anaphoric interpretation of the pronoun. Instead they choose a deitic interpretation of the pronoun, which made the sentence false. Conroy et al (2009) conclude that both adults and children avoid the anaphoric interpretation because they respect Principle B. They find no support for a DPBE and no significant difference between the quantificational and referential condition. There is no support for a QA in favour of a pragmatic rather than a syntactic error with pronouns. Conroy

⁴ See appendix and chapter 7 for discussion

et al (2009) argue that former findings of QA, has been due to methodological influence (see section 7.1). Their conclusion depends on the assumption that Principle B is the child's reason for avoiding the interpretation above. Therefore, they did another experiment with sentences that are not subject to Principle B to test availability of pronoun interpretation. (65) and (66) differ from (64) as the pronoun is embedded as a possessor inside the object NP. This makes the anaphoric readings acceptable unlike in (64) (464). The stories had the same truth conditions.

- (65) Grumpy painted his costume (referential)
- (66) Every dwarf painted his costume (quantificational)

They found that children accepted the bound interpretation of the pronoun in 80% of the referential trials and in 73% of the quantificational trials (83% and 67% respectively for adults). Therefore, Conroy et al (2009) conclude that Principle B was active in their first experiment and was responsible for avoiding the anaphoric interpretation (473).

Overall, they found that 4-year-olds rarely violate Principle B. Why are children then open to violate the principl if they know it? Conroy et al's (2009) study is based on a critique of the stories used in e.g. Thornton & Wexler (1999) as they argue that differences in acceptability of antecedents (e.g. a bias due to clear protagonist in the story) between referential and quantificational conditions may have caused the QA (see appendix). They show this by altering key features in their own stories to show the influence context has on the child's performance and that they can "reintroduce" the Principle B errors and the QA that Thornton & Wexler found. This argues against QA and pragmatics, but for knowledge of Principle B.

5.3 Discussion

The proposed reformulation of Principle B proved successful in many experimental contexts. Children perform well on Principle B, when it only "covers" bound variable interpretations. The DPBE could be caused by pragmatics. But later studies have not had the same success, as children do show incorrect bound variable interpretations for pronouns (section 5.2.2). Chien & Wexler (1990) argue that Principle P is missing, but do not explain how and when it is learned, if not simultaneously with the other binding principles.

It is clear, in my opinion, that when the first inconsistent results were found for pronouns, the most obvious place to find an explanation was in pragmatics, as an explanation was not apparent from syntax (the fast acquisition of reflexives). However, the acquisition data from studies testing the reformulation has not been consistent. I believe that other factors are involved as well. The reformulation has not quite solved the puzzle, so it may be a

combination of the BT and acquisition of other linguistic elements (see chapter 6). It is not pragmatics alone that is responsible for the DPBE.

Reinhart (1983) argues that the bound variable interpretation of a pronoun can also occur in VP-deletion (not just with quantifiers), as it can have both a bound variable interpretation and a pragmatic coreference interpretation, as the VP has been deleted in the second conjunct. Quantifiers only allow bound variable readings as shown above. Consider (67)

(67)	Charlie _i talks to his _i dog and Max _j does too	
	a. Max _j talks to his _i dog too	intended coreference
	b. Max _j talks to his _j dog too	bound variable

(Koster 1995,3)

The interpretation in (b) is considered to be part of the BT, but not (a). The interpretation is that x is talking to x's dog, satisfied by *Charlie* in the first conjunct and by *Max* in the second. Still, one needs to establish whether children understand VP-deletion at all in the agegroups used, or interpret them in the same way as adults? Koster (1995) argues that errors with VP-deletion would suggest that the reformulated BT is not sufficient. If children allowed an incorrect bound variable interpretation of (68), they would give the sentence an incorrect anaphoric interpretation, which should be impossible with the reformulated BT.

(68)

a. Bert_i points to him_j and Ernie_k points to him_j correct indexing and coreferencing
b. Bert_i points at him_i and Ernie_k points at him_k incorrect bound variable reading

(Koster 1995,6)

Boster (1991) found such violations (as cited in Koster 1995). She found that children interpreted pronouns reflexively 50 % of the time, but also accepted a pronominal VP-deletion sentence for a reflexive story 70% of the time. This error shows that the child misinterprets the pronoun as a reflexive, giving it an incorrect bound variable interpretation in the second conjuct. This is an interpretation of pronominals as bound variable reflexives, as in (68)b. From this (and section 5.2.3), the reformulation does not seem to be a better explanation for children's understanding of pronominals. The results are both for and against the reformulated BT, which to me suggests that something more is going on besides lack of pragmatic knowledge, which the studies in section 5.2.3 also indicated. Pragmatics should not be completely ruled out, but needs more support.

For the reformulated BT to be better than Chomsky's BT, it would have to be more robust and explain more of the acquisitional findings, but that seems not to be the case. It should be investigated when children acquire quantifiers, as this is essential to the bound variable interpretation, as it has been used in almost all studies accounting for the soundness of a reformulated BT (Reinhart 1983). Only a few commented on children's understanding of quantified NPs in the experiments, where they found no knowledge before the age of 4 (Chien & Wexler 1990). It seems that the claim of lacking pragmatic knowledge does not hold entirely. Nor does it hold as the sole explantion for the DPBE. A survey of studies done in other language than English, seem to discard the pragmatic explanation. Mckee (1992) reproduced Chien & Wexler's study (1990) for English and Italian children. She found that at the age where English children showed a DPBE, Italian children did not (90% with pronouns). She argues that pragmatics of pronouns is the same cross-linguistically, so the children should perform similarly. If it is a matter of pragmatics, then the input that is crucial to the learning of some pragmatic principle for pronouns is not available yet. This is the same question syntactic accounts encounter with insufficient syntactic evidence for binding properties in the input (46). Recall that Reinhart (1983) in section 5.1 said pragmatics is learned via experience. The reformulated BT goes some way to account for the delay, but in some aspects it still needs more support. In the following, I explore other explanations.

6. Theories about Principle B

Chomsky's BT has been questioned and debated in an effort to make the theory consistent with the acquisition data from Principle B and UG. Some found that it was the BT itself that should reformulated because pronoun errors are caused by lack of pragmatic knowledge. In this chapter I present alternative linguistic explanations to account for DPBE in comparison to the pragmatic account, which proved problematic in some aspects above.

Since grammar is modular (the levels presented in 2.1.1 to which different grammar theories apply), it is inevitable that the test sentences will not also tap into other aspects of language acquisition, which indirectly may show some form of a DPBE. Reconsider (18) and (19) above, repeated here as:

- (69) Luke Skywalker_i washed himself_i
- (70) *Luke Skywalker_i washed him_i

The reflexive has an available local antecedent in (69), but in (70) it is only the incorrect antecedent (in terms of binding) that is available to the child (Koster 1993,153). Children need to search the context for a proper antecedent, but if children have not yet

acquired the ability and knowledge of discourse/context that adults have, then the context of the sentence is not helpful. If children are not capable of processing the input and search the context for the pronouns' antecedent, which is absent in the test sentence, then a DPBE will be evident. I am not saying that there is no DPBE at all, but some factors may reinforce it in comparison to reflexives, e.g. if the pronouns' antecedent (as far as the child is concerned) is missing. Koster (1993) supports this, as she found that children prefer to "search" for a pronoun antecedent sentence-internally. In (70) the antecedent is at a different linguistic level (introductory story), meaning that it then also becomes a test of discourse knowledge (Koster 1993,153).

The modules mentioned in chapter 2 have alle been found to be violated at some stage during language development. Felix (1988) found that θ -theory (chapter 2) is violated in the early stages where children leave out verbs (which assigns the roles) and that x-bar theory is also violated (386). Koster (1993,143) also suggests that violations in assigning θ -roles may play a part in DPBE (in relation to antecedent errors). In (69) it is a self-oriented action, where agent and theme is the same person. (70) shows an other-oriented action with two different persons being assigned agent and theme, where the theme is not available in. The pronoun error is an incorrect theme choice, which becomes reflexively oriented. Clahsen (1992) also argue that θ -theory is not acquired until the age of 2-3, which may then also partly explain childrens performance in the youngest groups tested. Binding must respect theta theory, as the antecedent of the anaphor must be higher in the structure than the anaphor itself. On a modular view of cognitive and linguistic abilities, one module (grammar) might be fully present in the child, while another (e.g. processing) might not be fully present, resulting in a DPBE (Wexler 1990).

6.1 Influence of Children's Grammar

McDaniel, Cairns and Hsu (1990) tested children's grammar and how the binding principles operate. They too follow the assumption that the principles are part of UG and that children need to learn to categorize NPs into reflexives, pronouns and R-expressions. The principles will be operative when this is accomplished. Recall that Chien & Wexler (1990) had a similar suggestion in chapter 5. McDaniel et al's view is not that children do not know the principle for a period of time, but rather that they fail to obey/show knowledge of it because it is not operative in their grammar yet (125), which Grimshaw & Rosen (1990) support (see section 6.3). McDaniel et al (1990) tested at what age the children's grammar allow the correct interpretations by using an act-out task and a TVJT.

The 20 children were in the agegroup 3;9-5;4 and tested on sentences like

- (71) Grover is washing him
- (72) Grover thinks that Cookie Monster is touching him.

(McDaniel et al 1990,127)

They found that, for Principle B, nine children obeyed it and seven did not. Four showed partial knowledge only allowing *him* to refer to *Grover* in (71) (129). It was particularly the older children that did not obey Principle B, indicating that their grammar allowed the violations which McDaniel et al take to justify thatchildren go through stages where pronouns and reflexives do not have any restrictions about referring inside or outside of a domain (130). For reflexives, they found that four children under the age of 4 did not show knowledge of Principle A.The tendency was that the children who allowed the Principle B violation preferred reference outside the clause, as they allowed it in the TVJT, but did not act out the violation. They tended to prefer reference internally when possible as in (72), but rejected it for (71) (130). Based on this, they pursued Wexler's (1988) hypothesis (as cited in McDaniel et al 1990) that children perform differently with bound and unbound pronouns by studying 19 children aged 2;9-6;7 with a TVJT on:

- (73) Grover is washing him (unbound)
- (74) Everyone is patting him (bound variable)

Children obeyed Principle B more often in (74) (13/19 children) than in (73) (10/19 children) (132). Three children only obeyed Principle B when it was a bound variable. Several children still showed no knowledge of Principle B in either sentence but disobeyed it more in (73) (134). The finding that children obey Principle B with bound variables can be tied to my discussion in chapter 5 and to that of Wexler (1988) and in part McDaniel & Maxfield (1992). Initially children seem not to obey Principle B, or only partially as in (72). McDaniel et al observed a child, where they found that when pronouns are classified he could use the principle, but then seemed to "lose" it again in unbound sentenes as in (73) (137). It seems plausible, as the same can be seen with object nouns. Children acquire a word, use it for a while and then "forget it", i.e. do not use it for a period of time before it reenters the vocabulary (Hoff 2007). McDaniel et al (1990) partially find support for the QA and Rule I from chapter 5. Children have knowledge of Principle B initially. Those who misinterpret (73) but not (74) have temporarily "lost" knowledge of Principle B when it is not a bound variable in that period. In this stage, their grammar cannot interpret pronouns when unbound. (138) McDaniel et al agree with Reinhart 1983, that it may be due to lacking knowledge of
pragmatics but also that children lack knowledge of contrastive stress to figure out when pronouns can be coreferential, without being coindexed. McDaniel & Maxfield (1992) studied contrastive stress with regards to coindexing in

(75) I choose me

Unlike in (71) where *him* cannot be coindexed with *Grover*, *me* and *I* refer to each other without being co-indexed. Where the indication of coindexation are different, they can be the same despite the normal "rules", thus not violating Principle B. Children might base a temporary rule on (75); that pronouns can be used coreferentially without being coindexed. They do not know that this is restricted to certain pragmatic contexts and that *me* needs emphatic stress to be grammatical. Pronoun acquisition goes through three stages according to McDaniel et al (1990): acquisition, loss and re-acquisition of obedience (136). Hence, they twist the pragmatic accounts in chapter 5, by implying that pragmatics is involved, but it is not because Principle B only controls bound variable interpretations. Children have knowledge of Principle B but make temporary rules for coindexation, showing disobedience at an early stage, which they later reacquire (obedience) (138).

6.2 Knowledge vs. Obedience

In section 4.2.1, I asked whether children obey Principle B and so far the above studies have argued that children do not show knowledge of it until the age of 6, or only obey it in certain contexts (as bound variables). McDaniel et al (1990) above argue for partial obeyance of Principle B due to certain conditions not yet acquired for categorising all characteristics of pronouns. Contrastingly, Chien & Wexler 1987 claim there is no knowledge of Principle B because it develops later. This might not exactly be the case, as children may simply not obey the principle at all times (section 4.2.1), but still have knowledge of it. The studies above rely on the PPT and innateness. To maintain the UG claim, the fact that children should have equal knowledge of the principles but display uneven knowledge/obedience of them, needs to be explained. Children may not perform as perfectly as they do with Principle A, but the scores in Chien & Wexler (1990) is above chance level at age 6 for pronouns. My theory is that they must have some knowledge of the structural restrictions on Principle B, which is somehow masked (see my suggestion in section 8.8.3).

Grimshaw & Rosen 1990a argue that failure to obey Principle B mimics abscence of knowledge in some conditions. Experimental designs can undermine the child's actual knowledge of Principle B (and C) and overestimate it for Principle A(188). Hence it is not lack of knowledge but something in performance masking their pronoun competence

(343)

(Grimshaw & Rosen 1990b, 358)⁵. Children know the principle, but experimental designs can result in disobeyence of Principle B, as these only show performance. Low performance does not necessarily mirror competence (358). It is possible that they have knowledge of Principle B, but do not always obey it, due to some interfering factor in the experiment stimuli.

Children need not obey the principles to know them. They only need to treat reflexive and pronoun sentences in a systematically different way to show knowledge (Grimshaw & Rosen 1990a, 189). Grimshaw & Rosen (1990a) found that children perform well on (76)a (83% correct) but performed at chance level on (76)b. Hence, children did not reliably reject the ungrammatical sentences but treated violations differently from nonviolations, as they rejected (76)b 58% of the time:

(76) a. BT-Grammatical Big Bird pats Ernie.

I saw Big Bird doing something with Ernie. Big Bird, patted him,

b. BT-Ungrammatical Big Bird hits himself.

Big Bird was standing with Ernie. *Big Bird, hit him.

(Grimshaw & Rosen1990a,219)

42% of sentences violating Principle B were deemed correct. Besides lack of knowledge, the Charity Principle as mentioned in section 4.1 may account for the score. Children may not take the context into consideration, but simply accept the sentence they hear. The test sentences are ungrammatical in the given scenario, but all sentences can be grammatical under some reading if the context is not considered. The difference between the non-violations and the violations is that the former takes a nonlocal antecedent and the latter a local antecedent. If it is correct that children do not know Principle B, then the matter of a nonlocal and a local antecedent would be equivalent in the mind of the child when asked to judge grammaticality. This is clearly not the case, as they treated the two sentence types differently. Based on this, Grimshaw & Rosen (1990a) conclude that children know the principles, but do not always obey them, answering my question in 4.2. If children did not have knowledge of Principle B, they would not accept sentences that conform to Principle B 83% of the time. Rather, they would be expected to perform randomly with both grammatical and ungrammatical sentences, which was not the case in (76).

⁵ See Chomsky 1965 (10-15) for discussion of performance

This is supported by several studies that have found early knowledge of Principle B. One example is Kaufman (1987) as cited in Grimshaw & Rosen (1990a). Kaufman (1987) found that children as young as 2;6-3 only accept Principle B violations 10% of the time. Deutsch, Koster and Koster (1986) similarly found that children's performance on Principle B was above chance. They used a picture selection task with four pictures presented to each sentence (i.e. chance level is 25%) and found that 6-year-olds scored 53% correct, 8year-olds scored 85% and 10-year-olds 90% correct on Principle B sentences. Recall that the studies with English above only have examined children up to the age of 6. It is interesting that it is only at the age of 10 children reach 90% correct on pronouns, which I believe are very common in the linguistic input. If children knew all the BT principles, they should perform similarly when tested on them. Grimshaw & Rosen (1990a) argue it is not a fair comparison, as Principle A is logically independent of Principle B, involving different binding domains. Better performance on one over the other does not directly address the issue of knowledge, but rather an issue of obedience (197).

6.3 Production

The above studies have focused on a DPBE in comprehension of pronouns, but how do children perform in production?

De Villiers, Cahillane and Altreuter (2006) tested 68 English children aged 4;6-7;2. Their study was based on the Optimality Theory (OT) and they sought to account for the difference in production and comprehension of pronouns.

In short, OT integrates pragmatics and syntax into one system. A set of possible outputs is generated from the input. These are evaluated based on constraints ordered in a strength hierarchy. If two constraints are conflicting then it is most important to satisfy the stronger constraint. The candidate that performs best is the optimal output candidate for the given input. The theory is that children cannot take the speaker's perspective into consideration when matching a form to a meaning (comprehension) and a meaning to a form (production). Hence, children must learn to optimize bidirectionally (Hendriks and Spenader 2005, 327). They must learn to take into account not only their own alternative interpretations, but also those of their conversational partners in production. A child must learn that when hearing a pronoun, the other nonexpressed forms the speaker could have used should also be considered. These should be compared to the interpretation associated with the pronoun in the input. Then, the child may realize that e.g. coreferential meaning is better expressed with a reflexive over the pronoun they heard in the input (a violation of Principle B). Via optimizing bidirectionally, the child realizes that the pronoun should be interpreted as

disjoint to its antecedent in e.g. (77). Optimizing bidirectionally involves taking into account alternatives that are not present in the given situation, which is a skill they may acquire late and thus can explain the DPBE (full introduction to OT in Hendriks and Spenader 2005). This means that a set of possible outputs is generated from the input, which the child need to "optimize about". This is based on Burzio's (1991,1998) approach of referential/morphological economy, in which the constraint *Principle A* and *Referential Economy* express the distribution of pronouns and reflexives in a hierarchi. Buzio (1991) argues that referentially heavy items should be reduced when possible. This means that reflexives are preferred to pronouns as bound NPs and pronouns are preferred to R-expressions as bound NPs (Burzio 1998, 37). The hierarchy goes from least referential to most referential where the latter is preferred. I will return to this in chapter 8. Hendriks and Spenader (2005) argue that incabaility to optimize bidirectionally causes the comprehension delay but not a production delay, as it is a sort of pragmatic processing. Children may not acquire this properly until the age of 6.

(77) This theory was the basis for de Villiers et al's study of pronoun production of:Here is Baby Bear and Papa Bear. Baby Bear is washing him/himself.

(78) Big bird says every bear is washing him/himself.

(2006, 93)

They tested comprehension with a TVJT. For production the child was shown new pictures, and asked to narrate what was happening in the pictures. They found that production was significantly better than comprehension (although the comprehension scores were best with quantified NPs as in (78)). The children had minimal difficulty with producing reflexives and pronouns. They only produced a reflexive where a pronoun was intended 2.8% of the time (age 6;4). For (77) they found that children would ask: *who's 'him'*? indicating they could not access the proper antecedent in comprehension (95). Recall that Thornton & Wexler (1999) reported a similar situation (section 5.2.2). In production, children avoided pronouns by using proper names. For (78) (quantified), the children avoided using *himself* as bound to *Every* but used *theirselves, themselves* etc believing the reflexive needed a plural feature. To account for these findings they add two constraints to the OT: 1. referential salience: The antecedent of a pronouns must be salient in the discourse. De Villiers et al argue that in the absence of salience, Referential Economy is cancelled. 2. feature matching. The anaphor or pronoun must match its features (number, person) to the antecedent. They argue that these two constraints are necessary in the light of children's problems with (77) and (78).

The test sentences are short texts, which may account for the findings on (77) as children might need more cohesion to establish a discourse referent, as I also mentioned in the beginning of this chapter. It is usually assumed that comprehension is ahead of production (Hoff 2007), but it seems to be the other way around with pronouns. The good performance in production found by de Villiers et al may imply that the comprehension violations may not stem from a grammatical deficit, but may be from other linguistic aspects, which interact with syntactic principles, e.g. limited processing. See section 7.6 for discussion.

7. Discussion

The above chapters have shown diverse findings for the DPBE and suggested several explanations from reformulations to disobedience. I have already pointed out some strengths and weaknesses in the above sections. In this chapter, I will discuss the findings in light of syntactic theories proposed to explain the DPBE, such as maturation and a parameterized BT.

Principle A is in place from the beginning and innate (Grodzinksy and Kave 1994). I believe that Principle B is also innate and in place from the beginning, although it may not be clearly detectable from the experiments. There are many possible reasons for the asymmetry in acquisition between Principle A and B. One factor could be that the picture tasks allows the child to answer without using BT. The child could make a successful interpretation for reflexives by selecting the picture with a "reflexive action" and not use grammatical knowledge. Some verbs are more reflexive than others (e.g. *wash, shave*), and may indirectly guide the child's interpretation without having to use Principle A. Recall that Grodzinsky & Kave (1994) argued against this for Principle A. This is one possible methodological influence. I will discuss more in the next section and other theories that account for the delay in relation to innateness.

7.1 Methodology

Crain & Thornton (1998) argue that the act-out task can underestimate the child's linguistic knowledge, as it introduces sentences in a null context (no introductory story). The TVJT is better, as there is a larger degree of experimental control (70).

In the TVJT, children do not feel like they are being tested, the task is perhaps more enjoyable (judging whether the puppet is correct or not by rewarding it, if it is). It may be easier with puppets, as children may be reluctant to say that adults are wrong (the Charity Principle). The act-out task may only show one reading of an ambiguous sentence, even if more are possible, because the child has a preferred interpretation. TVJT can show all the possible interpretations (Crain & Thornton 1998, 211). Crain & Thornton (1998) support the view that pronoun errors are not due to lack of grammatical knowledge but are often induced by the task (122). Researchers assume that children interpret pictures like adults (e.g. the picture tasks in Chien & Wexler 1990), which Crain & Thornton tested. They found that when using a picture task and an alternative task, the children did considerably worse on the picture task. Nonlinguistic factors may cloud their performance, as children may not parse pictures like adults (122). Further, the request that children act out a sentence may exceed the child's cognitive ability, as this will also include nonlinguistic steps. Elbourne 2005 critiques the picture tasks, as he argues that in Chien & Wexler (1990) *Goldilocks* is more visually prominent than the bears in (79), which lack clear gender cues. This will bias the children (Elbourne 2005, 343). Hamann (2010) tested the interpretation of the same picture, which was a mismatch to (58) (repeated below as (79)) and found that the bears are hard to identify as females, even for adults (280). If the bears are not readily identifiable as females, then it would be easy for the child to answer *no* to (79), but not because they understand BT.



Figure 4: Chien & Wexler 1990 (263). Picture task in experiment 4. Adapted from Elbourne 2005.

(79) Is every bear touching her?

Elbourne (2005) claims that the introductory stories may also bias the children, if the character that is crucial to a right or wrong interpretation of the sentence is very clearly made the protagonist in the story⁶. Children will then not answer based on grammatical knowledge. I agree that the structure of the story may influence children, as they may reason about the world differently than adults. Elbourne (2005) refers to the aforesaid as a Salience Hypothesis. The more salient a character is, the more it will bias the children (2005,339). This was supported by Conroy et al. (2009) in section 5.2.3, where they reintroduced QA by altering the story (see appendix). These methodological concerns along with e.g lack of concentration ability (the youngest children are after all only around the age of 3), may explain the bad scores on pronouns. As mentioned in chapter 6, Koster (1993) critiques the structure of the testsentences. Pronouns require an antecedent, but unlike reflexives, it may

⁶ Crain &Thornton 1998 for details on story-structures.

not be local. (80) only has a proper antecedent for a reflexive interpretation not for a pronoun interpretation. Assuming that children have difficulty considering discourse, the introductory sentences may not be much help. In some contexts, children must choose between accepting a pronoun with no antecedent and violationg BT, which confuse the child if (s)he knows Principle B and the binding properties⁷:

(80) The Smurf is talking to him

(McDaniel et al 1990,200)

Here the child has two options. Either (s)he can think of *Smurf* and *him* as coindexed and violate Principle B or (s)he can accept that there is no antecedent for *him* (which there needs to be as a pronoun needs an antecedent). The child has to violate one or the other, as there is no other potential antecedent than the *Smurf*. This can account for chance findings, even if the child knows BT. This can also support Grodzinsky & Reinhart's (1993) idea of children guessing (section 5.2.3).

Verb choice may also have an influence on the apparent DPBE. Verbs such as *wash, brush* (as used by Chien & Wexler) can often be used intransitively in English with a reflexive interpretation, which may be confusing when followed by a pronoun. It is also this class of verbs that allow local SE-anaphors in Danish (see chapter 8).

Methodology may to a certain degree influence the results, but one cannot overlook the fact that despite attempts to prevent an experimental bias and different linguistic theories, most have found difficulties with pronouns in one context or another. There must be something to it. Whether it is lack of knowledge (syntactic or pragmatic), late maturation, processing difficulties or any number of other factors suggested in the literature, can still not be firmly concluded. Methodology will always be an issue. It is very hard to control that test sentences does not tap into acquisition of other modules of grammar (parameter values, knowledge of quantifiers, θ -roles etc). Further, children are difficult to test because they cannot explain their reasoning like adults.

7.2 Innateness Hypothesis

My framework is generative and based on language as being innate. Thus, the BT principles are in one way or another innate and available to the child. It is important to note that the claim of innateness within language acquisition is meant as UG being biologically inherited, as opposed to learned by experience. In this sense, innateness does not prevent maturation (see Wexler 1990 for discussion). Simultaneously it does not rule out learning altogether, but

⁷ See McDaniel et al 1990 for more examples.

rather states that language is biologically determined and guides the aspects that need learning (e.g. parameter values for binding). See also the Maturation Hypothesis in section 7.5. Learning seems necessary for some aspects of grammar (like binding) due to cross-linguistic variation, where some parameters might mature later than others. The results from Principle B studies seem to argue against UG. This I believe will (or have) caused e.g. cognitivists or other anti-generative linguists to argue that it is "evidence" for their notion of learning from communication and environment (see also chapter 10). However, I will maintain that language is innate and based on UG and that other factors cause later maturation or clouding of pronoun competence. Babies do not talk at birth, but go through the stages mentioned in chapter 2 (babbling etc). These stages cannot be attributed to instruction from the environment and must reflect an innate maturational process (Hoff 2007,235). I agree with Felix (1988) that e.g. c-command is not in the input of adults and hence the child will not be forced to hypothesize that it is relevant in binding relations of pronouns from input. The notion of c-command must be innately specified (373) like X-bar theory etc.

Grodzinsky & Reinhart (1993) support the notion that binding and coreference are innate, but are not governed by the same module, which as mentioned is the point Reinhart (1983) tried to make in proposing Rule I. They argue that principle A and B plus Rule I are innate and that the reason why children do not obey Principle B/Rule I, is due to them not having the computational capacity to interpret and process the structures. This module may develop later. It should be kept in mind that children of Romance languages do not show a DPBE, but this may be due to the fact that clitic pronouns cannot be used coreferentially. These children may struggle with other aspects of linguistics that English and Danish children do not, such as null subjects. For discussion see Meisel 1995, Atkinson 1992.

7.3 Lexical Parameterization Hypothesis

Explanations of the DPBE have been at least threefold: 1) lexical classification error. 2) A reformulation of the BT or 3) knowledge of the principle, but no consequent obedience. In 7.2, I pointed out that this is not incompatible with innateness. In support of the PPT, Wexler & Manzini (1987) put forth a parameterized definition of the GovC in (24), repeated here for convenience:

(81) γ is a governing category for α iff γ is the minimal category which contains α and has a subject. (Chomsky 1981)

They wanted to account for cross-linguistic differences in binding domains (e.g. Danish allows LD binding and English does not) and the discrepent acquisition data between English

Charlotte Bille Brahe Stud20072943

and Danish (and between Principle A and B) with a Lexical Parameterization Hypothesis (LPH).

The acquisition data may seem contradictory to UG. Children are born with UG, which handles interpretation of coreference, yet children have difficulties with co-reference relations (Hoff 2007,249). I find that the principles are still innate based on the LPH.

The LPH states that the BT principles are part of UG, but certain parameter values (here Principle B) mature later. I will not exclude that certain aspects of language are learned from the child's environment, but I believe that the basis for language is innate and guides language development, (Borer & Wexler 1987), as children seem to have a fundamental knowledge of their language and produce language they would not hear from adults. An example is overgeneral plurals where they form an overgeneral "rule" to add the morph1eme /s/ to all nouns because they have heard e.g. *cat-cats* and extend this to irregular nouns forming *foot-*foots*, rather than *feet* (introduction in Clark 2003). The same is seen in Danish with *æg-*ægger (æg* 'egg' has the same form in singular and plural). The value for plurals is not set correctly yet. They have learned the overall rule, but not the exceptions (Hoff 2007). The same may be the case for pronouns. They have learned the overall rule of binding, but not the domain exceptions. A parameter value may be connected to other values, causing an apparent delay and necessary resetting.

Wexler & Manzini (1987) studied acquisition of parameter values in terms of pronoun and anaphora binding. They argue that each linguistic choice is determined by either a principle of language, a principle of learning or by an interaction between the two. They propose a learning theory to accompany the GovC parameter in (81). The parametric values vary to allow for cross-linguistic variation (41). They suggest a Subset Principle where children initially select the smallest language available that is compatible with the input. If a child overgeneralizes, i.e. picks the value of a parameter that gives too large a language compared to the available input, then they cannot (with only positive data) correct the overgeneralization. All new data will be generated by the overgeneral grammar (43) and all the child's grammatical hypotheses will fit. With the smallest language and positive evidence they move toward a larger grammar based on a markedness theory with subsets and supersets accounting for the values.

To illustrate: One value of a parameter yields a language L(i) and another value yields a language L(j). L(i) is a smaller language than L(j). L(i) is contained within L(j), making it a subset of the latter:

(82)



Figure 5: Illustration of LPH. An initial parameter (A) is reset due to positive evidence (B), adding a new value to the language which expands the initial grammar (C).

The child selects the value that yield L(i) first. If correct, the child will stay with it. If L(i) is wrong, positive evidence will show this. The child will hear sentences from L(j) that are not in L(i) (illustrated in B with a blue arrow) and then switch parameter value (Wexler & Manzini 1987,44) to fit the L(j) value to his/her language (red arrow). This results in a language where L(i) includes L(j) values and the child has corrected his/her initial parameter value as in (82)c. If the child has chosen the wrong value initially, (s)he will switch parameters to one that yields the correct language, as shown in (82) where L(i) has expanded to cover the sentences from L(j), since the child has evidence that the value L(j) also exists in his/her language and the subset L(i) is not enough.

With regards to anaphors and pronouns, *i* could be the value for local binding and *j* the value for nonlocal binding, and the given language may choose one of them initially - presumably the value for local binding, as reflexives are acquired first. As in (82), if i is chosen but positive evidence shows this is wrong, the learner will reset to include the *j* value when given evidence of its correctness. The Subset Principle implies that two values of a parameter yield languages, which are in a subset relation to each other, which according to Wexler & Manzini is necessary along with UG for the Subset Principle to apply (1987, 45). The Subset Principle is evident with regards to Principle A and B. The generated language (L(i) above) will be smaller for Principle A as binding is local (e.g. within the minimal IP), as oppossed to Principle B stating that pronouns must not be bound locally, indicating no clear "boundaries"/domains for binding. This may be the problem for LD binding in Danish where the child may not know the "limit" or lack thereof for binding of LD sig, i.e. how far the domain may extend from the antecedent. For pronouns, the language chosen is a superset (L(j)) of the language, generated when pronouns must be nonlocally bound and added to the intial *i* value for local binding. In this way the Subset Principle interacts with BT and can account for learnability. There is more than one parameter in a language but an Independence

Principle (Wexler & Manzini 1987) allows the learner to set the parameters independently. A theory of parameter values is helpful in accounting for cross-linguistic acquisition, where children need to set values differently depending on the language. Based on the above reasonings, I find this theory describes the difficulties in pronoun acquisition well. As I will show in chapter 8, Danish children exhibit acquisition problems that English children do not, because the latter do not have SE-anaphors. The original BT cannot adequately describe LD binding and acquisition, but Wexler & Manzini's (1987) theory can.

Not all anaphors and pronouns behave in the same way across languages. Therefore, they can be associated with different values of a parameter as described above. The problem for the child is setting the parameter correctly for a particular lexical item. The orginial BT cannot account for the differences in binding domains (and acquisition data (chapter 8)) between Danish and English, as Danish allows LD binding and English does not. The notion of binding is correct but the definition of GovC is inadequate, as the BT principles do not address LD binding. Suppose Danish children start out with the values that fit the English binding rules, then they will need input and linguistic maturation to add the "Danish value" of LD binding to the GovC. The different rules and domains may mean that the parameter trigger for pronouns and reflexives differ in English and Danish. The value for LD sig may be dependent on other principles, which for some reason mature later (see section 7.5). Or, given that sig can also be bound locally with some verbs, the data may simply be conflicting to the child. (S)he may choose the wrong initial parameter value setting (local) and later reset it when positive evidence shows that LD sig is also grammatical. The same is evident for English children. They need to learn that pronouns are in syntactic opposition to reflexives with regards to binding domain. The parameter for reflexives may need to be firmly established before pronouns can be categorized and the value set, which can predict the DPBE.

By combining the orginal definition of GovC in (81) for English with the notion of differing binding domains, Wexler & Manzini arrive at a five-valued parameterized definition for GovC:

- a. has a subject, or
- b. has an INFL, or
- c. has a TNS, or
- d. has an indicative TNS, or
- e. has a root TNS

⁽⁸³⁾ γ is a governing category for α iff γ is the minimal category which contains α and

(1987,53)

The parameter values in (83) hold for different languages. Value (a) identifies with English, (b) with Italian, (c) with Danish and Norwegian, (d) with Icelandic and (e) with Japanese (Wexler & Manzini 1987,53). (A-e) shows that a GovC is potentially bigger than the previous, allowing the pronoun to be bound further away (cf. Danish (c) vs. English (a)). The notion of "values for a particular language" is misleading. The values must be associated with particular anaphors and pronouns (particular lexical items) and not the language as a whole (Wexler & Manzini 1987,54). For example, Icelandic *sig* can be accounted for by (d), as the GovC for *sig* needs to be in the matrix sentence and in indicative tense⁸, but (d) cannot account for Icelandic *hann* (54), which is more adequately accounted for by value (c) (Hyams & Sigurjónsdóttir 1990). Hence, some languages cannot be accounted for with one value of the GovC parameter according to LPH:

(84) Values of a parameter are associated not with particular languages, but with particular lexical items in a language

(Wexler & Manzini 1987, 55).⁹

In (84) they take the parameter theory one step further than Chomsky (1981). Chomsky (1981, 4-7) presented a theory of parameters, where successful acquisition depend on the childs ability to: "fix the value n of some formal grammatical parameter P so that Pn, once fixed, results in greater knowledge than might be expected from induction of whatever data triggers the parameter setting" (as cited in Safir 1987,77). Pn will interact with fixed parameter values and with grammatical principles invariant across languages (i.e. universal principles of grammar). The interaction between them results in a core grammar as "one of the particular grammars made possible by innate schema of parameters and the innate universal principles" (Chomsky 1981 as cited in Safir 1987,77). Chomsky's idea of a parameter was that they were few with an extensive effect to cover all aspects of language, where Wexler & Manzini (1987) suggest that there are many parameters, as the binding domains for anaphors cannot be accounted for by one language parameter as shown for Icelandic and for Danish (chapter 8).

⁸ Jón segir aδ [Maria elski sig]

John says that Maria loves REFL

GovC for Icelandic:

 $[\]gamma$ is a governing category for α if γ is the minimal category which contains α and has an indicative TNS (Wexler & Manzini 1987,50).

⁹ See Safir (1987) for critism.

Charlotte Bille Brahe Stud20072943

The LPH makes the GovC able to account for more languages (like Danish) and their acquisition (and possible problems). Wexler & Manzini seem to be on the right track with this hypothesis, as it opens up for describing more languages with regards to binding. Even though the Scandivanian languages all have traits of LD *sig*, some values are different, as e.g. Danish applies to value (c) and Icelandic to (d). The theory supports the notion of UG, but at the same time shows that parameters mature and that some things have to be learned based on evidence. The child may have to reset the initial parameter to his/her native language. An English child should realise/learn that reflexives are locally bound and pronouns are not. If the "default" value is "local binding", then the child needs to reset the value to include non-local binding for pronouns (see (82)).

Parameter resetting means eliminating alternative options. The Danish child must weigh the grammaticality of binding pronouns locally vs. binding the anaphor sig locally. To eliminate ungrammatical local binding of *sig*, the child must learn that Danish verbs either allow or disallow local binding of *sig*. If they set the default value to verbs only allowing local binding for sig, they may be led to assume that the same holds for pronouns. I will return to this in section 8.1.1. As long as the child has not set the parameter, (s)he will use a default parameter value where an ungrammatical option may be possible, such as local binding of pronouns. I believe the fact that children interpret pronouns as bound locally cannot stem from learning (in the sense of functionalists), as that interpretation would not be available to them from their linguistic environment. This I base on Felix (1988), who argues for unavailability of e.g. c-command in input as mentioned in section 7.2. The innate parameter may provide children with access to all options before fixing on a value (like the overgeneralization of plurals). The question is what triggers the parameter to be set to the correct value. Danish children acquire LD sig very late compared to reflexives and pronouns like ham/hende. However, Olsen (1992) argues that adults rarely use LD sig in production and thus this could be basis for a triggering problem (Borer & Wexler 1987,128). The value specific to LD binding of sig may be triggered later than the value for other reflexives and hence the LD value operates later. This may also be due to incomplete neurological maturation, which makes children incapable of processing the LD structure at an early age, causing them to apply value c incorrectly to cover the value for LD binding. I will return to Daish children's interpretation problems in chapter 8, where I will also introduce the issue of interpretation at LF.

Newson (1990) took the LPH a step further. Chien & Wexler (1987), among others, found that performance on Principle A quickly reaches adult-like knowledge. Principle

Charlotte Bille Brahe Stud20072943

B slowly develops in terms of performance rate and stays relatively flat from 2;6-6;6, where usage and interpretation of anaphors is near perfect. According to Newson (1990), this is not a coincidence. He claims that children develop knowledge of BT and that the DPBE is not caused by difficulty with the categorical state of pronouns or the binding principles/reformulations. He argues that children lack knowledge of what constitutes the GovC, where anaphors must be bound and pronuns free. Children have not set the parameter values correctly. Newson (1990) suggests that learning pronouns depend on the learning of anaphors where the parameter settings learned for anaphors transfers to pronouns, initially causing the DPBE.

The LPH can help explain children's incomplete knowledge of grammar in terms of parameterized principles that mature with age and linguistic experience. What is left unanswered is why a particular parameter (in this case pronoun binding) matures so much later than that for reflexives – if it is not due to a "transfer" (Newson 1990). Some of the principles and parameters of UG may be unspecified in order to accommodate crosslinguistic differences, hence children need to explore the possible variations allowed by this parameter because it is not set for only one lexical item in the language to begin with. Children explore and make their decisions based on information available from input. They need to learn what grammar properties the given parameter cover/disallow (see Meisel 1995 for similar views). For Danish, this means learning that some verbs disallow local binding and others do not. Further, they need to learn that because *sig* can be locally bound under certain coditions, it does not follow that *ham/hende* is locally bound too (section 8.1.1) etc. The English children need to add the value "non-local binding" to the existing value of local binding.

Elbourne (2005) agrees that children younger than 6;6 (for English) have not yet learned that nonlocal binding is a parameter their language selects and thus not "turned it on", which is in accordance with Chomsky's UG. This would also seem to account for why there is no DPBE in languages with clitic pronouns (section 7.2), as these languages do not require this parameter to be switched on (see Mckee 1992 for introduction).

7.4 Maturation Hypothesis

Wexler & Manzini (1987) argue for maturation of parameter values as explaining the pronoun delay. Borer & Wexler (1987) also argue for maturation of syntax. Maturation is closely tied to the innateness hypothesis. In UG the innate principles are crucial to the development of grammar, along with a learning procedure. These principles have been considered fixed an unchanging (124). Pinker (1984) expressed this in the Continuity Hypothesis, where the principles children use to fix his/her grammar, is constant throughout language development

(8). Borer & Wexler, however, argue that the innate principles mature with age. They do not claim that linguistic experience does not have an effect on maturation/development of the principles, but argue that the "biological program" (UG) guides the principle's development over time (as I also mentioned insection 7.2), as many aspects of the brain mature after birth, including the areas for language. It is highly plausible, in my opinion, that some linguistic properties mature from the innate linguistic module, as children do not have "perfect"/ fully developed language when they are born. They develop and practise their language as their brain matures. The linguistic principles mature alongside their cognitive abilities. This is also why they go through stages like cooing, babbling, telegraphic speech etc as described in section 2.2. They gradually build up sentence structure and add to their grammar from evidence. With maturation they become capable of contrasting speech (e.g. reflexives from pronouns in interpretation) and select the appropriate values to arrive at adult speech. Recall that Chien & Wexler (1985) also argue for maturation in section 5.2, where they say the disjoint reference for pronouns (rather than coindexation as for reflexives) matures later. It can hardly be debated that maturation plays a role in early language development. Otherwise children should in theory begin to speak instantly rather than at age 1 because of the innate language faculty (UG). This is not the case. With maturation cooing, babbling etc starts. The maturation of UG components is an inherent part of the "genetic program": "The mechanism that "pushes" the child through the sequence of developmental stages is therefore the maturational schedule that will successively make more and more UG principles constrain the kinds of hypotheses which the child considers vis-à-vis a given set of data"

(Felix 1988, 371).

7.5 Comprehension vs. Production

In chapter 6, I found that researchers have found production of pronouns to procede comprehension. If children are good at pronoun production (section 6.4), then they must have knowledge of Principle B, even though it is not apparent in comprehension. De Villiers et al (2006) found that production is much better and procedes comprehension. The common belief is that comprehension develops before production, but Owens (2008) argues it is only within development of the first 50 words (155). Maybe the roles are reversed once the child start to utter multi-word sentences. This possibility should be examined and compared to other syntactic categories, to see if it is the case.

Hendriks & Spenader (2005) claim that production results should be taken into account as they complicate the claim of a DPBE, if it is only evident in comprehension. Chien & Wexler (1990) and McDaniel & Maxfield (1992) find that children make errors in interpreting pronouns as late as age 6;6 but comprehend reflexives correctly at age 3, showing a lag of nearly 4 years between (85) and (86) in comprehension. This is interesting, as they can produce both correctly at age 6;4 (see de Villiers 2006 and section 8.6). (85) is correctly understood from a young age whereas the pronoun in (86) is misinterpreted as coreferring with the subject half the time even at the age of 6.

- (85) Bert washed himself
- (86) Bert washed him

(Hendriks and Spenader 2005, 319)

Hendriks and Spenader (2005) use the OT to account for the comprehension delay in terms of processing because children cannot optimize bidirectionally. I find that this may also depend on development of Theory of Mind (ToM) (see also Hamann 2010). ToM is the ability to attribute mental states to oneself and others and to understand that others have beliefs, intentions etc that are different from one's own. An inferential process that is part of comprehension. Owens (2008, 81) claims that ToM does not develop until the age of 4, which can explain the inconsistent results at that age and younger. In McDaniel et al (1990), children younger than 3 did not show knowledge of reflexives and pronouns at all. For children older than 4 (with ToM), a processing limitation theory is appealing for the DPBE, according to them.

Pronoun production precedes comprehension, possibly due to incomplete processing abilities and problems with keeping the alternatives in mind, whilst interpreting the sentence. Children may reason about a sentence differently, which affects comprehension but not production. See section 10.1 and (131). Goodluck (1991) argue that children may be poor in integrating discourse information in comprehension, as it takes place late in the sequence of processing operations (after lexical and syntactic analysis and integration of syntactic units) (370).

My claim based on the above, is that if children can produce pronouns, they must have knowledge of Principle B. However, Hamann (2010, 282) finds that production before comprehension is not found cross-linguistically. She refers to French studies where comprehension precedes production. This may however be due to clitic pronouns, which do not allow accidental coreference, which may make comprehension easier, but that is beyond the scope of this paper.

8. Delay of Principle A and B in Danish

In this chapter, I will present acquisition data for Danish. First, I will introduce the relevant Danish grammar and Danish binding rules in comparison to the English introduced in section 3.2. Then I move on to discuss the theories about acquisition of Danish reflexives and pronouns, before comparing to the English data above. The main focus in the literature has been on English. In English, the domain for Principle B is finite/nonfinite (tensed/untensed) clauses as in e.g. *John hit him/himself* and *John told Bill to hit him/himself* (McDaniel et al 1990,124). In Danish, LD binding of *sig* by a subject is also possibles besides local and nonlocal binding. What consequences do this have for BT and language acquisition? The studies on Danish acquisition of BT are few. Further research should be done to develop theories specific to Danish to enlighten more of the acquisition process.

8.1 Danish Binding

English and Danish share the main issue of BT, namely binding inside or outside a domain for reflexives and pronouns respectively. Danish is different in that it has more binding rules. There is no one-to-one relationship between the Danish and the English *-self* forms. Danish has the option of *sig* and *sig selv*, which does not exist in English. Where Danish has a reflexive pronoun, English often uses a personal pronoun or an intransitive verb (Allan et al. 1995,163). Thus Danish has a three-way distinction: reflexives and definite pronouns like those in English, and the reflexive pair *sig selv/sig*, where the latter can be LD bound but *sig selv* cannot (section 8.1.1). I use Reinhart & Reuland's (1993) terminology and refer to *sig* as a SE-anaphor and to *sig selv* as a SELF-anaphor. There is also a distinction between Danish and English possessive pronouns. Danish has both *sin* and *hans/hendes* where English only has one form: *his/hers*. This distinction will not be dealt with here, but it might be interesting to consider in future acquisition research on Danish binding.

English show differences in binding between *me, her/him* vs. *myself, him/herself*. In Danish is is between *mig/ham/hende/sig* vs. mig *selv/sig selv/hende selv* (in terms of the domains in (87)). In Danish there are different conditions with regards to domain and binder and hence more binding rules:

(87) Danish binding (Vikner 2010,4)

	Domain anaphors bound in the minimal IP (= Principle A)	Domain pronominals not bound in the minimal IP (= Principle B)	<u>Neutralised</u> (possessives)
<u>Binder anaphors</u> bound by a subject in the minimal finite IP	sig selv	Sig	Sin
Binder pronominals not bound by a subject in the minimal IP	ham selv, hende selv, den selv, det selv	ham, hende, den, det	hans, hendes, dens, dets
Neutralised (1st & 2nd person)	mig selv, dig selv, os selv, jer selv	mig, dig, os, jer	min, din, vores, jeres, deres

Sig, ham/hende conform to Principle B and *sig selv* to Principle A in terms of domain, but as (87) shows, they differ in binding (i.e. whether a subject can bind them or not, making *sig* a binder anaphor). The binder parameter is related to Manzini & Wexler's (1987) proper antecedent parameter. The interaction of the two parameters provides four distinct types of anaphors/pronouns in Danish (Vikner 1985,3).

First, I will describe binding for *sig/sig selv*. *Selv* is uninflected occurring with all forms of person, gender and number. *Sig* is not specified for gender, number or case. It requires a third person antecedent, but can be bound by an indefinite NP or to arbitrary PRO (non-overt subject)¹⁰ see (89). PRO is an empty pronominal NP, which occurs as subject for certain infinitivals. PRO is important for the θ -criterion in assigning θ -roles to arguments. This can be seen in (88), where there are two θ -roles: an agent and a theme (cutter and "cuttee"). The "cuttee" is *sig selv* and the cutter's argument needs to be PRO, as there are no more arguments. *Sig* does not assign θ -roles, as it cannot be replaced by something else in (90) as you cannot "sleep over" anything but oneself (Vikner 1985). *Sig* can be LD bound if it is in a nonfinite clause with a subject binder as in (89) (see section 8.1.1). This is also the case for *sig selv* and *sin* but *hende, hendes* and *hende selv* does not require the binder to be a subject.

(88) Det er svært [PRO_i at klippe sig selv_i]It is difficult [PRO to cut_]

(Vikner 1985,6)

Julie_j bad mig_i om [PRO_i at præsentere sig_j] Julie_j asked me_i about PRO_i to introduce REFL_j

¹⁰ Vikner (1985) describes Danish PRO in detail.

Julie asked me to introduce her

(Jakubowicz, 1994,120)

(90) Peter_i sov over sig_i

*Sig selv_i

Peter slept over____ Peter overslept

(Vikner 1985,12)

The exception to LD binding is if *sig* is in argument position. Then both local and LD interpretations are possible:

Julie_j bad Ida_i om [PRO_i at præsentere sig_{i/j}]
 Julie_jbad Ida_i about PRO_i introduce REFL_{i/j}
 Julie_j asked Ida_i to introduce herself_i/her_j

(Jakubowicz 1994,120) There is a difference as to whether the binder of the antecedent can be any c-commanding NP, which English allows, or (as in Danish) requires the binder to be a subject (Vikner 1985, 9). In Danish, a bound element must not only be free in a certain domain, but must also be bound by the subject. An example is *sig selv* (REFL self):

 (92) at [Peter_i altid har beundret *sig_i] sig selv_i
 that [Peter always has admired___]

(Vikner 1985,8).

Sig selv should be bound within the brackets and must also be bound by a subject

For local binding of *sig* to be possible, the verb is important. In Danish, nonaffectedness verbs ([-a] verbs) (e.g. betragte 'look at', kende 'know') prevent local-binding, where affectedness verbs ([+a]) (e.g. beskytte 'protect', børste 'brush') allow *sig* to be locally bound. For full list of verbs in either category see Jakubowicz 1994. There are also different binding rules, if *sig* occurs with a prepositional phrase. Lexical prepositions like *bag* and *under* ('behind' and 'under') allows local binding, where functional prepositions like *om* ('about') disallow it (Jakubowicz 1994, 121):

Ida _i lagde bøgerne bag sig _i	VS.	* Ida _i talte om sig _i
Ida put the books behind REFL		Ida talked about REFL

Ham/hende is bound like the English pronouns: outside the domain. They are binderpronominals and domain-pronominals. The exception is *ham selv/hende selv*. They are binder-pronominals but domain-anaphors (section 8.1.1). They are locally bound, but not by a subject (Vikner 1985,16).

8.1.1 Long Distance Binding

The ability for a reflexive to be LD bound is seen across several languages like Danish, Dutch, Norwegian and Icelandic, which all have SE-anaphors. Recall that English only has two forms to choose from (e.g. *he* and *himself*). The LD binding domains are different depending on the language where e.g. the requirements for LD binding in Danish differ from Icelandic¹¹ as shown in section 7.3.

(93) exemplify LD binding, where PRO comes between the bound element and its antecedent:

(93) ... at Peter_i bad Anne_K om [PRO_k at ringe til sig_i] (Vikner 1985,11)

In comparison to (29), which illustrated binding domains for English anaphors and pronouns, a Danish structure would look as follows for LD *sig* and *sig selv*:

(94)



(94) shows that *sig* can only refer to *Bo* as he is in the higher (non-local) IP, *Anne* is not. Likewise, *sig selv* can only be coindexed with *Anne* because she is in the lower IP, the local domain for *sig selv*. LD binding refers to binding relations that are nonlocal and can stretch across at least two clauses.

¹¹ Reuland (2005b) argues for three non-local binding domains across languages.

To further complicate matters, there is an overlap between *sig* and *ham/hende* in Danish. In some sentences *ham/hende* (*him/her*) are possible instead of *sig*:

(95) <u>Han</u> får Andersen til at give sig sit kørekort

He gets Andersen to to give REFL REFL's driving licence.

(Vikner 2010,2)

But in the following, *ham/hende* is consistently used over *sig* even though both could be used:

(96) Så bad <u>hun</u> mig i stedet for om at hjælpe <u>hende</u> med at arrangere blomsterne Then asked she me instead about to help her with to arrange flowers-the Then she asked me for help to arrange the flowers

(Vikner 2010,2)

Overall, a sentence with *sig* and a sentence with *ham* would mean the same. If you insert the word *kun* ('only') it is clear that they do not in (97). Context decides whether a reflexive or a pronoun should be used.

(97) a.Kun Bo bad lægen hjælpe <u>sig</u>

b. Kun Bo bad lægen hjælpe ham

Only Bo asked doctor-the help REFL/him

(adapted from Vikner 2010,3)

(97)a means that there was no other person who asked for help for himself, whereas (97)b means that "the only person who cared enough for Bo to ask the doctor to help him was Bo himself" (Vikner 2010,3).

The status of *sig* as a pronoun/anaphor has been discussed in the literature because it is anaphoric, but not necessarily locally bound. Reinhart & Reuland (1993) suggest parameterizing the domain of an anphor in terms of the elements' reflexivizing function and its referential independence, rather than the simple division into pronouns and anaphors (697) (see also Hamann 2010,257). Everaert (1992) argues that *sig* truly is an anaphor in spite of overlap with pronouns in distribution (non-local binding), and that Chomsky's distinctions cannot account for *sig* being both local and LD bound (1992,87). Both *sig* and *sig selv* are anaphors with respect to the binder-parameter (bound by specific binder), whereas only *sig selv* is an anaphor in terms of binding-domain (must be bound locally, where *sig* must not be bound locally (Vikner 1985,10). *Sig* is a binder-anaphor, but a domain-pronominal as shown in (87), where Vikner (1985) outline the Danish binding properties. Consider:

(98) At $[_{IP}Peter_i \text{ bad Anne}_j \text{ om } [_{IP}PRO_j \text{ at ringe til}]$

a. sig_i]]
b. *sig_j
c. *sig selv_i
d. sig selv_j

'that Peter asked Anne for PRO to ring to _____'

(Vikner 1985,11) In (98) the subjects *Peter* and *PRO* are inside the domain (the higher IP) so none of the possibilities are ruled out by the binder-parameter. The domain-parameter rules out (98)b and (98)c. *Sig selv* should be locally bound, but is not. *Sig* should not be locally bound, but it is. From this it is clear, that Chomsky's binding principles (and his distinction between pronominals and anaphors) cannot account for the Danish system and the distribution of the elements. Danish acquisition may be similar for the shared elements (reflexives and pronouns) but different for *sig/sig selv*.

8.2 Acquisition studies

Chomsky's (1981) binding principles cannot cover the differing domain and binding conditions Vikner suggest for Danish in (87).

Olsen (1992) examined acquisition of reflexives and pronouns in Danish. As shown, binding in Danish and English works differently, which evidently must lead to differences in acquisition and a different BT. In contrast to most of the English studies, Olsen (1992) tested both production and comprehension. She approached the subject by hypothesising that children's difficulties with pronouns are due to problems with morphology (and its maturation) rather than pragmatics or bound variable interpretations (chapter 5). The English studies have not used a morphological approach, except in section 6.3 with OT. Recall that the OT is partially based on Burzio's (1998) referential/morphological economy, where the least referential (underspecified) elements are preferred.

8.3 Morphological Approach

Olsen (1992) finds that the original BT cannot account for the Danish system. The delay of pronouns is caused by problems with their morphological properties: "…seule l'existence du Princip A est empiriquement justifée… les deux autres Principes de Liage pouvant être prises en compte par un seul Principe d'Economie Morphologique" (Olsen 1992, 278). This is based on Burzio's Morphological Economy Principle (MEP). Burzio (1991) defined Italian

Charlotte Bille Brahe Stud20072943

pronouns and reflexives on their morphological features (or lack thereof)¹² in a morphological hierarchi:

(99)

Binding theory= Morphological Economy: A bound NP must be maximally underspecified referentially.

(Burzio 1991, 95)

By morphological features, Burzio (1991) is referring to phi-features (gender, number, person). Recall the Referential Economy I referred to in section 6.3, where reflexives are preferred to pronouns because the former is least referential. (99) is based on this. Pronouns have phi-features, as does R-expressions (plus referential information), but anaphors like *sig* are underspecified.

Olsen (1992) suggests a modification of the BT based on the hypothesis that anaphors and pronouns have distinct morphological properties in Danish. In unmarked cases, anaphors are elements without features (number, gender, person), i.e. they are unspecified. An underspecified element is dependent on something else to receive these features to become interpretable. Thus, for interpretation, *sig* needs to move at LF (see section 8.4). Olsen (1992, 175) bases this on Burzio's (1991) claim, that an anaphor can be defined as an element that is morphologically underspecified and that the BT principles can be derived from the MEP in (99). Olsen (and Burzio) also argues that Chomsky did not provide sufficient definitions of the elements (section 3.2), but merely set forth 3 principles to account for their distribution. Olsen (1992) suggests a morphological classification of the Danish preform and reflexives based on Burzio's argument that anaphors are morphologically distinct from pronouns, as Danish *sig* lacks phi features like anaphors (recall the debate of reflexive *sig*'s pronominal properties, where it is both [+ pronominal] and [+ anaphor] in terms or binding and domain).

For Danish, this means that *sig* and *selv* can be morphologically defined as anaphors as they are not marked for number:

(100) a. Irma sammenligner sig med konkurrenterne

b. Irma og Kristine sammenligner sig med konkurrenterne

(Olsen 1992, 179)

¹² Italian reflexives lack the morphological features of person,number,gender (95).

The opposite is the case for the pronouns h*am/hende*, which are morphologically marked and therefore not underspecified. This also means that an expression like *ham selv* is problematic, as it is a combination of an anaphor and a pronoun.

BT principles can be expressed by the MEP, where a bound NP is maximally underspecified. This means that an anaphor is morphologically less specified than a pronoun, which again is less specified than an R-expression (184) (see also section 6.3). In the morphological approach, the child is better equipped to distinguish reflexives from pronouns and to determine when local binding is legitimate or not, according to Olsen (1992, 280). The morphological form is related to the interpretation. The morphological approach predicts that local binding of a pronoun is legitimate when the language in question does not have an anaphor that can be used instead. Olsen argues, that the child must then understand that the language in question is less rich on anaphoric expressions compared to pronominal expressions and deduct that in some cases the pronoun can be bound locally (Olsen 1992, 280). For Danish, this means that the Danish children should be able to classify pronouns and anaphors in a morphological hierarchi based on the binding rules for Danish. For instance that *ham* should be locally free means that the child should identify *ham* as morphologically specified (282). I will return to this in discussion of Olsen's (1992) findings. First, I will outline interpretation of SE-anaphors that are LD bound (*sig*).

8.4 LF-movement of SE-anaphors

As mentioned in chapter 3, BT deals with argument structures and their interpretation in terms of locality conditions and GovC. For an argument to be interpreted it must be fully specified for phi-features (gender, number, person) (which the morphological approach argues that anaphors are underspecified for). Recall that Danish has anaphors with no one to one correlation to English, namely *sig*, which lack phi-features (like Dutch *zich*, Icelandic *sig* and Norwegian *seg*). To receive an interpretation *sig* must first acquire full specification. Recall the x-bar structure in (13) and the structure in (94). *Sig* is a head and cannot be viewed as an argument, hence it needs to move to be visible and receive the missing features for interpretation (Reuland, 2005a, 95). *Sig* does not overtly incorporate into the verb, so its only option is to move at LF (covert movement) (Jakubowicz 1994). For comparison, consider clitic object pronouns, which move overtly at S-structure (for details see section 8.8.1). Olsen (1992) suggests that this is what causes children's interpretation problems with LD *sig*. For *sig* to obtain full specification of phi-features it requires an abstract movement to an element supplying it with phi-features. *Sig* is considered an X° constituent, which undergoes X°-

(head-) movement¹³ to a suitable target that meets the requirements for c-command. In this case the AGR node (which is inside INLF (IP)) (Reuland 2005b). Thus, SE-anaphors like sig move to I. As a head, it can only move to and from head positions (Reuland 2005a). In sum, LD binding of *sig* is licensed by abstract movement of *sig* from its base position to a source for phi-features (i.e. the nearest INFL that can give it phi-features) (see Lebeaux 1983 for full account). The fact that sig can be LD bound implies that it can move further than the first INFL node it meets, if it cannot give *sig* its features. AGR is always co-indexed with subjects and SE-anaphors always associate with AGR, so SE-anaphors are subject oriented. LD binding of X° results from successive cyclic movement of the expression from the lower INFL to the matrix INFL (Jakubowicz 1994,127 and Olsen 1992). Jakubowicz (1994) (among others) refer to this as a last resort device due to morhological necessity for *sig* to achieve interpretation. It is only the underspecified anaphors that can make this abstract movement at LF, as they can be interpreted as being heads $(X^{\circ})^{14}$ rather than XP's, which are not underspecifed for phi-features. Hence Danish *sig* (and the possessive *sin*) can make this move. Selv do not, as they are not analysed as X° categories (215). XPs ham/hende are not underspecified and can be interpreted in their base position.

The morphological approach and LF movement of SE anaphors can together help account for the problematic acquisition (section 8.5 and 8.6). See Hestvik (1999) for similar account of LF movement in Norwegian (183) and Hyams and Sigurjónsdóttir (1990) for Icelandic. The movement at LF separates the Scandinavian languages from English, where such a movement does not occur (Hestvik 1992).

8.5 Comprehension of *sig/sig selv* and *ham/hende*

Olsen (1992,287) examined comprehension of *sig/sig selv* and *ham/hende* in three different experiments. The first comprehension task was similar to that of Chien &Wexler (1985). She used an act-out task and a sentence-picture matching task, studying 80 children aged 3;0-9; 11. First, she tested *sig* and *sig selv* with the sentences:

(101) Minnie beder Eva/Jens om at pege på sig selv/sig sigte på lyse på sprøjte på

Minnie asks Eva/Jens to point at/aim at/ shine (the light) at/spray at herself/her (SELF/SE-anaphor).

¹³ Detailed introduction in Haegeman and Gueron 1999.

¹⁴ For full discussion of *sig* as a head see Olsen 1992,186

 Bamse beder Anders And om at tænke på sig selv/sig drømme om tegne på male på

Teddy asks Donald Duck to think about/dream about/draw/paint himself/him.

(Olsen 1992,287)

The verbs used were [-a] verbs, so if the sentence contained *sig* the expression must be LD bound. All the children correctly interpreted *sig selv* as locally bound. The results for *sig*, however, showed that at the age of 3;0-3;5 the children only interpreted it correctly 7% of the time, with only slight improvement until the age of 7;0, where they have not yet reached 70% correct (Olsen 1992, 293).

In the second comprehension experiment she did not change the test sentences but the comprehension and production study took place simultaneously. For comprehension she again found that children did well with interpreting *sig selv* with scores between 77-100% for all agegroups)(398) but with LD *sig* they only scored 20% correct at the age of 4 without much improvement (similar to Chien & Wexler's finding of no gradual improvement with English pronouns). The scores stayed relatively stable across the younger age groups until the age of 9 where they reached 80% correct (398). Thus, correct responses are more often found for *sig selv* than for *sig*.

Lastly, she tested influence of verb choice with (103) (287):

(103) Bamse beder Minnie om at drømme om sig

tænke på

tegne

male på

Teddy asks Minnie to dream about/think about/draw on/ paint on SE

The children interpreted LD *sig* correctly only about 50% of the time (age 3-5) but performed well with *sig selv* (84-94% correct). The last comprehension results differed from the previous ones, which imply an effect of verb choice (336). It was however only in the agegroup 3-4 that the results differed significantly from the 7% above.

For comprehension of *ham/hende*, the SELF- and SE-anaphors in (101) was replaced with *ham/hende* as in (104) and (105) but otherwise the sentences and procedures were the same:

(104) Minnie beder Eva om at pege på hende

Minnie asks Eva to point to her (i.e. point to Minnie or another person than Eva)

(105) Bamse beder Jens om at pege på ham Teddy asks Jens to point to him

(Olsen 1992,287)

In the comprehension experiments, she found that children had difficulty with *ham/hende*, as the 3-year-olds were 55-60% correct and the 5-year-olds 65% correct. Only between the ages of 7-9 did the children reach 98% correct. Hence, the youngest children violated Principle B 35-40% of the time. Overall, the children were approximately 7;5 years old before they reached a score as high for pronouns, as they had reached for reflexives at the age of 3;0. Hence, there is a lag of approximately 4 years to be equally as proficient with pronouns as with reflexives. This mirrors Chien & Wexler's (1987) finding for English children with a similar lag of 4 years before they had similar capabilities with reflexives and pronouns. The second comprehension study for *ham/hende* found the same percent correct scores (65% for the youngest group). She also tested for verb influence as in (103) and again found a 41% violation of Principle B for *ham/hende* for the younger children and a score of 98% correct for the 9 year olds.

To sum up, Olsen (1992) found that children already at the age of 3;0 correctly interprets phrases with a local *sig selv* but that they in the age groups 3-4;5 incorrectly interpret phrases with the pronoun *ham/hende* as locally bound. At the age of 7;5-9 children gradually reach correct interpretation of *ham/hende* (294). Finally, the results for LD *sig* showed that children only interpret it correctly 7% of the time at age 3 and only reach 70% correct at age 7(1992, 298). Since LD *sig* is not an option in English, there is no English data for comparison. In 8.8.3 I brifly turn to findings from other langauges with SE-anaphors for comparison. As I hypothesized in the introduction, there is also a delay in Danish, but the delay is more significant forDanish *sig* than for Danish pronouns.

8.6 Production of sig/sig selv and ham/hende

The purpose of the first production experiment was to elicit sentences with *sig selv* and LD *sig* and in the second experiment to elicit sentences with *sig selv* or locally bound *sig*. Olsen (1992,322) tested for influence of verb choice using (105) but found no differences from the first two experiments. To elicit *sig selv*, Olsen (1992,310) used questions like:

(106) Hvad laver X?

What is X doing?

(107) Hvem er det X peger på?Who is X pointing at?

To elicit LD sig (experiment 2), she used:

(108) Hvad er det X beder Y om at gøre?What is X asking Y to do?

To elicit pronouns she asked:

(109) Hvad gør X ved Y?

What is X doing to Y?

(Olsen 1992,322)

First, I will describe the results for *sig/sig selv* from (106) - (108). In the first production experiment, the verbs to describe the actions in the pictures were [-a] verbs, which disallow local binding of *sig*. Olsen (1992) found that the percentage of sentences with *sig selv* was high across all ages (40% for the youngest group and 80% for the oldest), but scores for *sig* was low (7% for the 3-year-olds). The 9-year-olds behaved like adults, producing LD *sig*-sentences 30% of the time (Olsen finds the score for adults on (108) to be 32% for LD *sig*, 40% for pronouns and 28% for R-expressions (314)). The scores for production of *sig selv* (40%) are not comparatively as good as those contained in comprehension (98% correct). Olsen finds that instead of producing *sig selv*, they incorrectly produced *ham selv* 30% of the time (295).

In the second production study, Olsen used questions like (108) to elicit LD *sig*. The children, rather surprisingly given their otherwise non-adultlike performance, answered with a pronoun, but it was still used incorrectly in terms of coreference:

(110) Hvad er det Bamse beder Anders And om at gøre?What is Teddy asking Donald Duck to do?

Expected answer: at pege på sig (point to self)

Child answer: at pege på ham/hende/Bamse (point to him/her/ Teddy) (1992,314)

The children were presented with 12 pictures with reflexive and non-reflexive actions. The verbs were all [+a], allowing locally bound *sig*. All children used locally bound *sig* productively:

Charlotte Bille Brahe Stud20072943

(111)

tørre: 98%barbere: 85% stikke: 74%gemme: 63% rede: 60%vaske: 50%'dry''shave''prick'' hide''comb''wash'

(Jakubowicz 1994,139)

There was variation in usage depending on the verb, but no child used *sig selv* instead of *sig*. Instead they used the possessive reflexive or no reflexive at all in the description of the scene. Children used *sig* productively, but not when presented with pictures of self-oriented actions depicting [-a] predicates, which indicates that the children know that [-a] verbs do not allow locally bound *sig* and may also know that *sig* is a clitic-like element¹⁵ (according to Jakubowicz' (1994) analyses of Olsens (1992) data) and cannot be used to answer questions like (107) (see discussion of this setion 8.8.1).

Overall, the data from the second production study showed that *sig selv* and locally bound *sig* are understood and used correctly at the age of 3. However, the youngest children tended to use *ham/hende selv* instead of *sig selv*. Olsen (1992) argues that it can be due to the nature of the question, in terms of whether it can receive a syntagmatic or emphatic answer. She argues it is not a result of lacking a lexical distinction between *ham/hende* and *sig* (1992,315), as children use *sig* correctly to describe reflexive actions when the verb allows it [+a] in production. Thus, Olsen (1992) (and Jakubowicz 1994) conclude that children as young as 3 know the core properties of *sig* (that [-a] verbs disallow local binding and [+a] verbs allow it). If that is the case, the high number of errors in comprehension cannot be attributed to lack of grammatical knowledge. Clearly, the binding domain must make a difference at some level, as the correct responses are high for locally bound *sig*, but not for LD *sig*, perhaps due to abstract movement at LF (see section 8.7.1).

Like the findings for Principle A in English, the Danish children also perform well with the "obvious" reflexive *sig selv*. They struggle with LD *sig*, but do well with local *sig*. The results for *ham/hende* (Principle B) showed that the children (across all age groups) produced it 30-60% of the time and thus in general use it less than *sig selv*, and at a later age (reach 60% at age 5 for *ham/hende*).

For *ham/hende*, she argues that the low scores in production and comprehension should not be taken as an indication of children not obeying Principle B. Instead, they apply the MEP, which causes them to interpret pronouns as locally bound (Olsen 1992, 353). Once

65

¹⁵ Discussion section 8.8

Charlotte Bille Brahe Stud20072943

they have established the morphological differences between anaphors and pronouns, MEP will lead them to interpret pronouns correctly. The morphological approach predicts that until the child can identify the morphological structure, (s)he will not be able to correctly interpret a pronoun and will be hesitant to produce it. She looked at the children's individual performance and found that over half of the children, who could not interpret the pronoun correctly in comprehension, were able to use it in production. Children must have some notion of the morphology of pronouns. Overall, her results suggest that an element that is morphologically underspecified is harder to identify and remember than an element that has phi-features. Danish children obey the MEP from an early age, causing the problems with interpretation of pronouns. Olsen (1992, 346) argues that the hypothesis that a morphologically underspecified anaphor moves at LF from INFL to INFL to receive interpretation can account for the slow acquisition of LD sig. The errors children make in comprehension of LD sig suggest that children interpret the test sentences as having a verb that allows local sig even when it disallows it. They cannot interpret the abstract movement of sig at LF in spite of them knowing its status as an X°, according to Olsen (1992, 350). Children need negative evidence to deduce which verbs allow local *sig* and which do not; something they can only acquire from the utterances they have access to. Overall, children may not pay attention to what sort of verb is present in the sentence and what binding it (dis)allows and only apply local binding. These results support the notion of UG. The constraints guide the child to determine the morphological properties of reflexives/pronouns available in the given language. Once established, the binding properties are automatically derived from the syntactic principles that fit the expression. Otherwise it would be difficult to account for the 3-year-olds knowledge that sig cannot be used to answer a question like (106) (Olsen 1992).

8.7 Morphology and Logical Form revisited

Since children use *sig selv* correctly early on, Olsen (1992) concludes that they, at a precise stage in their linguistic development, have categorized *selv* as an anaphoric element. Even when they do not use *sig selv*, they still use the *selv*-element in *ham/hende selv* or following the characters name:

(112) Hvem peger Rødhætte på? Rødhætte selv (who is little Red Riding Hood pointing at? Little Red Riding Hood)(Olsen 1992, 341)

The morphological approach can explain why *LD sig* is acquired slower than the other elements, reaching only 75% correct at age 9 (compared to 65% correct on *sig selv* at age 3) as discussed in section 8.4. They interpret *sig* as locally bound rather than LD bound. This, plus the fact children used *sig* when the verb in question allows local binding of it, suggests that they do have some knowledge about the restrictions of locally bound *sig* (Olsen 1992,347). How come they also interpret LD *sig* as locally bound in verb contexts that do not allow local binding?

LD *sig* is acquired significantly later than local *sig* and *ham/hende*. Children still interpret it as locally bound even at the age of 9 (342). Olsen argues this is, as LD *sig* is rarely used even by adults (30% of the time). Adults show a tendency to use a pronoun in cases where LD *sig* could "legally" (in terms if binding) be used (344). Again there was a difference in comprehension vs. Production as shown in chapter 6 for English. With regards to *ham/hende*, Olsen (1992) says that the errors are not due to not knowing Principle B or maturation. When they learn the distinct morphological structures of pronouns, they will also use/interpret *ham/hende* correctly (1992,353).

8.7.1 LF movement for sig

I this section, I will discuss the abstract movement of *sig* at LF. Olsen (1992) argues that the results for comprehension of LD *sig* are best accounted for by the morphological approach where LD *sig* does not have the same internal structure as the locally bound *sig*, due to its movement at LF as an X° (351). When *sig* is locally bound, it has already received its features from the local INFL. Of primary concern here is the LD *sig*, which moves to I to receive interpretation.

0 shows an LF structure for LD sig:



The abstract movement at LF can explain the subject orientation of Danish *sig*, since movement to I results in it being c-commanded only by [spec I], not the object (Harbert 1995, 204). The LF structure above is based on Olsen's (1992) structure of a similar sentence (222). As can be seen, *sig* is suggested to move out of the VP, across the verb and then move from head to head until it reaches I° where *lod* is also moved to. Olsen (1992) does not account for movements in detail. It seems that it is based on clitic movement in Romance langauges, where the object pronoun moves (at s-structure) with the verb. I return to this in 8.8.1. If *sig* is an X°, it should move in accordance with head-movement, i.e. move through each head up to the INFL node where it receives its features for interpretation. At a first glance, it seems there would be barriers in the way of such a movement (e.g. the trace left behind by *lod*). Olsen (1992) argues that the head containing *fotografere* is not a barrier for *sig* because of the two instances of V° heads. She argues they are analysed as segments of one head and thus it does not constitute a head on its own and is not a barrier: "les deux occurences de la tête (V) sont analyses comme de segments d'une seule tête... la soeur V de sig ne constitue pas a elle seule une tête elle ne bloque pas le gourvernment proper de la trace de *sig*" (Olsen 1992,222).

Jakubowicz (1994, 125) explains the movement out of VP by saying that *sig* moves directly to CP and skips over the lower IP. In Olsen (1992) it skips over VP (where *fotografere* is based), but lands in the lower IP before moving to CP. Jakubowicz (1994, 126) illustrates her claim in (114)a and in a "flattened tree":

(114) a.at Ida_i bad mig om at invitere sig_i that Ida asked me to invite REFL

> b. [_{CP} at [_{IP} Ida_i [_{I'}sig_i bad_v[_{VP} t_v mig [_{pp}om_v[_{CP}[_{C'} t_i [_{IP} PRO[_{I'} at invitere_v [_{VP} t_v [_{CIP ti}]]...] (Jakubowicz 1994,125)

The movement of *sig* at LF has not received much attention in the literature. The problem with Jakubowicz' (1994) account is that it explains why the binding domain is so high in the tree, but not why it needs to be LD bound. Further, if *sig* can move directly to the CP, why can it not move to the first IP? Skipping the lower IP is unlikely in view of the head-movement. The head-movement constraint says that a head cannot bypass another head (Radford 2004). Baltin (1991) also argues that movement from V directly to CP should be ruled out based on the constraint (227) in his discussion of barriers. It is a stepwise movement of heads, which is where Jakubowicz' claim do not quite fit in, as *sig* would then jump over a head (I°) (Haegeman & Gueron 1999, 332). Reuland (2005a,98) suggests a way out of the dilemma by having *sig* adjoin to its governing verb, before moving out. Hence, the verb moves with *sig* to INFL. See Reuland (2005b) for full discussion and example structures (98). He does however not argue for why *sig* should adjoin to the verb. Further, Jakubowicz (1994) argues for her structure in terms of the +/- a verbs that allows or disallows local binding of *sig*, to explain why it must/must not be LD bound as in:

(115) Julie bad Ida_i om at forsvare sig_iJulie asked Ida to defend REFL

(Jakubowicz 1994,126)

According to Jakubowicz, LD *sig* is ruled out in (115) because the verb only allows local *sig*. However, *forsvare* is ambigious. To me as a native speaker, it can mean both that *Julie asked Ida to defend Ida* and that *Julie asked Ida to defend Julie*. This is problematic for her argument, and does not account for when and why there should/should not be LD *sig*. Further, Jakubowicz (1994) does not comment on the possibility of using *ham/hende* instead of *sig*.

The abstract movement of *sig* at LF can account for slower acquisition and LD binding in general. It is a morphological necessity that *sig* moves, so that it can be interpreted. The DP containing it needs to be visible for assignment of θ -roles (Olsen 1992, 215). If it did not, it would not recive its phi-features and would violate the principle of Full Interpretation, where each element must receive an appropriate interpretation and be properly licensed (Chomsky 1986,98). There are thus issues with the suggested structures and movements in relation to the general notions of head movement theory. A full investigation of the

problematic points and arguments briefly mentioned is beyond the scope of this paper. It would be interesting to investigate further to elaborate on Olsen's theory that *sig* does move for interpretation, creating an acquisition problem in Danish.

8.8 Discussion

The above hypotheses and arguments about acquisition of pronouns and reflexives are as evident for Danish as they were for English. Here I am referring to methodological biases, innateness and maturation theories in chapter 7. Recall that Danish children need to set an additional parameter value to account for LD binding of *sig*, and that this may mature later due to its possible rarity in the input (section 7.3 and 8.8.2). Here, I will focus on the additional choice of *sig/sig selv* and the resulting additional binding rules/properties. The acquisition findings supported my hypothesis of a different acquisition pattern for Danish, due to the extra option of a SE-anaphor, which support the hypothesis that Chomsky's binding principles cannot account fully for Danish, due to LD binding. In 8.7.,1 I discussed the movement of *sig* at LF. This covert abstract movement may require processing/working memory abilities the child does not yet have, causing the low scores. For pronouns and reflexives, their position in relation to the antecedent is visible in the S-structure. This is not the case for *sig*. It needs to move from its S-structure position to receive its interpretation from INFL at LF (see also chapter 2).

English and Danish share the lack of negative evidence when acquiring language. To assume that *sig* can be LD bound the child needs evidence that it is possible. Jakubowicz (1994) finds that adults rarely use LD *sig*, meaning that children presumably have little evidence to confirm that *sig* can be LD bound as well as locally bound (see also Olsen 1992,316). The fact that children is assumed not to have access to this evidence makes the functionalist claim of language acquisition as based on experience and communication even less likely. For the child, there are sentences predicted to be ungrammatical but turn out to be grammatical, and sentenses that are predicted to be grammatical but turn out not to be. Only the former is assumed to be present in first language acquisition. Even if a parent corrects the child, the child does not receive reliable and constant information to work with (Vikner 1985,45), which is why they may overgeneralize reflexive binding properties to pronouns (section 7.3).

8.8.1 Clitic Hypothesis

Jakubowicz (1994) suggested that the late acquisition of LD *sig* could be explained by *sig* being a clitic-like element.

The fact that binding domain and choice of antecedent varies within languages as seen with English and Danish, stems from the "feature composition of the reflexive morphemes and general principles from UG" (Jakubowicz 1994, 115). 1When the child is constrained by UG, (s)he will only acquire reflexives and pronouns when (s)he has fixed their morphological properties. Evidently, the morphological properties differ between Danish and English, and can account for the different acquisition data, as Olsen (1992) argues. As mentioned, *sig* can be local and LD bound in the right contexts. Despite this, I do not agree that *sig* should be taken to be a clitic element in the sense of Romance clitic pronouns. Jakubowicz' reasoning was as follows:

Pronominal clitics have syntactic properties that regular NPs do not. Clitics cannot be stressed, coordinated, clefted or topicalized. Jakubowicz (1994) finds that *sig selv* behaves like a regular NP but *sig* behaves as a clitic as in $(116)^{16}$:

(116) Stress:

a. Ida forsvarer SIG SELV/børnene'Ida defends REFL-self/the children'.b.*Ida forsvarer SIG'Ida defends SE

Coordination:

a. Julie præsenterede studenten og sig selvJulie introduced the student and REFL-selfb. *Julie præsenterede studenten og sigJulie introduced the student and SE

(Jakubowicz 1994,117)

I agree that *sig* can receive stress etc, but Jakubowicz bases this on a comparison to object pronouns in French. The difference between Romance clitic pronouns (like french *le* 'him') and Danish *sig* is movement. In French the clitic cannot be separated from its host, but in Danish it can be separated from the verb (118). Movement of object pronouns is referred to as cliticisation in French and as object shift in Danish. The difference is that in French the clitic pronoun *le* must be placed at the beginning of the sentence to be grammatical, but in Danish *sig* does not have to move as in (120) and (121). *Sig* behaves like all other Danish pronouns in

¹⁶ See Jakubowicz (1994) for more examples.

object shift. Object shift depends on movement of the main verb (to C°), which it does in main clauses, but not in embedded clauses. Vikner (2009,3) exemplifies as follows:

(117) Hvorfor læste Peter aldrig _____ bogen
Why read Peter never book-the
(118) Hvorfor læste Peter den aldrig ____?
Why read Peter it never
* Hvofor læste Peter aldrig _____ den?

(Vikner 2009,3)

Similar examples for sig:

- (119) Hvorfor skammede Peter sig aldrig ___?
 Why ashamed Peter SE never
 Why is Peter never ashamed?
- (120) Hun skammede sig ikke She ashamed SE not She is not ashamed
- (121) Hun fotograferede ikke sig selvShe photographed not SELFShe did not photograph

(122) shows the movement for object shift in (117) (adapted from Vikner 2009,4). In red, I have added (119) to Vikner's structure, to show that *sig* has the same structure/movement.


Sig is not clitic like French clitics, because they behave differently. It seems Jakubowicz (1994) takes pronominal object shift to be like X° movement for clitics. This is problematic as *sig* behaves differently from clitics. In 0 *sig* does not occur together with its finite verb. It does not follow the verb to C°, but Romance clitic pronouns do:

(123)	Où [$_{C}$ l' _i avait _v]-il [$_{I}$ t _v] [$_{VP}$ t _v [$_{V}$		
	Where it-had he	bought?	
	Where had he bought it?	-	(Vikner 2007, 415)

For further introduction to cliticization see Zagona (2002,184). A clitic obejct like the French *le* melts with the verb and becomes part of the new core. *Sig* is an inbetween element. It is inbetween incorporation with the verb and an independent phrase. I do not find that clitic properties of *sig* may accurately explain the acquisition data, as there are differences in the movements. *Sig* may have some clitic properties, but overall it is not clitic enough for comparison to Romance clitics. It still more closely resembles English anaphors and pronouns.

8.8.2 Parameter Hypothesis

Vikner (1985) addressed the issue of learnability of Danish based on Wexler & Manzini's LPH (section 7.3). Children need positive evidence to learn that *sig* can be LD bound otherwise (s)he will continue to believe that *sig* can be bound locally like *sig selv*, as LD *sig* is rarely used by adults (Olsen 1992,344). Without evidence, they cannot reset the parameter.

BT was made to account for aspects of language acquisition. Recall, that it is part of UG and the PPT, where the principles of language are innate. The parameters, however, are not "turned on" initially, but via linguistic experience. Vikner (1985) argues that the child needs to learn a) which lexical elements (or parts thereof) are associated with which parameters and b)how the parameters are set (46). This means that elements containing *selv* have to be learnt as domain-anaphors and elements without *selv* as domain-pronominals. Likewise, *sig* should be learned as a binder-anaphor and *ham/hende* as binder-pronominals. Once the child has learnt this, (s)he can choose parametrical settings from a small amount of evidence. This is possible because of the subset condition (Manzini & Wexler 1987). All grammatical sentences under one setting is either a proper subset of, or contains a proper subset of all grammatical sentences, accounted for under a different setting of the same parameter (Vikner 1985, 46). The child may use the setting for anaphors initially because for anaphors (unlike pronouns), the minimal setting is one where the coreference domain is as small as possible. Data with a larger coreference domain will provide positive evidence to

change the setting to include the value for pronoun binding and LD binding (47). For pronominals, the minimal setting makes the non-coreference domain as large as possible so that any data with a smaller non-coreference domain will be positive counter-evidence, and all the hypotheses the child has about the language will fit, but may not be grammatical (section 7.3). Hence children start out with the narrowest binding domain.

I asked in the introduction whether the original BT could account for all languages and it seems the answer is no. To account for Danish, there would need to be more principles, to account the differing domains and for *sig* when locally and LD bound. SE anaphors allow their antecedent in a position beyond the GovC in the BT (Reuland 2005a, 95). The LPH can explain how children learn aspects of grammar in terms of setting the parameter values correctly and how some values mature from evidence, initially showing as a delay.

8.8.3 Danish vs. English

Both English and Danish children have difficulty interpreting and producing pronouns (and with the reflexive *sig* in Danish). Many of the English studies, did not test beyond the age of 6;6, whereas Olsen (1992) tested children aged 7-9 as well. At this age the children were 98% correct on *ham/hende* and 70% correct on LD *sig*. It would be interesting to see the scores for English children at this age for comparison. Do they reach 98% at the same time or is adult-like language acquired sooner for English children? Because Danish has the additional SE-anaphor, they have a later "near perfect performance" (age 9 for *sig* vs. age 3 for English reflexives and *sig selv*). As Hamann (2010) says: "*sig* is clearly anaphoric but not necessarily locally bound" (257), which may confuse the child in terms of possible pronoun characteristics.

English and Danish children perform similarly with pronouns, but there is a difference in acquisition of reflexives in the two languages. The "obvious" anaphor *sig selv* is acquired as early as English reflexives but *sig* is acquired late. This is not to say that Danish is harder to learn, but rather that Danish has more alternatives and if it is indeed a matter of maturation. It seems reasonable that certain parameters will develop later, perhaps partially due to the fact that *ham* and *sig* can be used interchangeably as in (97), or because LD *sig* is rare in the input. The English and Danish children act similarly with pronouns, with scores around 50-60% at age 6.

Norwegian also has the additional forms of *sig/sig selv*, which makes a comparison to Danish interesting. The Scandinavian languages do not differ in many aspects of grammar (Olsen 1992). Hestvik et al (1999,199) found that Norwegian children only made

Charlotte Bille Brahe Stud20072943

principle B errors 9% of the time at age 5, where Danish children made pronoun errors 50% of the time. A closer look at exactly how the Scandinavian languages differ in domains for local/non-local binding may shed more light on acquisition and the stages children go through. Why should pronoun acquisition in languages so closely related show such differences? More research should be done with Danish in comparison to other Scandinavian languages. Grammatical factors are unlikely to explain the difference in DPBE between Danish and Norwegian, as the grammars and the restrictions in domains are very similar. The delay is not as evident in all languages, despite English and Danish children having similar scores on pronouns.

Danish children also differ from Icelandic in that they are less successful in interpreting pronouns and interpreted *sig* as LD bound less than 25% of the time even though local binding of *sig* was not possible in the test sentences (recall -/+ a verbs from section 8.1). Hyams & Sigurjónsdottir (1990) find that Icelandic children perform well with LD *sig*, preferring a nonlocal antecedent for it at age 3 (approxiamtely 60%) (73). They argue that Icelandic children are better "equipped" than e.g. Danish and English children, as they also perform well with Principle B (90% correct at age 5 (1990,76)). This seems contradictory to UG, which all children have before even being exposed to language (see also Olsen 1992). All children should be equally equipped. Further, the Icelandic binding properties for LD *sig* differ from those of Danish, as mentioned in section 7.3, which may cause a difference in e.g. maturation or value setting.

Based on my literature research, I do not agree with Jakubowicz (1994) that LD *sig* is not acquired later because it is clitic-like. The difference between object shift and cliticisation shows that it is not "clitic enough" for comparison to French clitic pronouns in terms of movement etc. Rather, I agree with Olsen (1992) that the delay of *sig* is caused by morphology, as it needs to move at LF to receive its features and an interpretation (315). This abstract movement may require cognitive abilities the child has not yet developed or the parameter value (GovC (section 7.3)) for LD *sig* has not matured.

It is interesting that a Danish reflexive such as *sig* is acquired so much later than the English reflexives (a difference of approximately 5 years). But recall that *sig selv* was acquired as early as the English reflexives (age 3-4). The difficulty must lie in the fact that *sig* is an anaphor in terms of binding but a pronoun in terms of domain and can be LD bound. In a sense, it applies both to Principle A and B, which is why Chomsky's principle and his classification cannot cover the distribution of reflexives and pronouns in Danish. That Icelandic children perform well with LD *sig* is incompatible with the subset principle (section 7.3). Based on their performance, Icelandic children do not seem to choose the smallest value for the GovC and later reset it. Danish (and English) children choose the parameter value that yields the smallest language initially, which in this case is that of reflexive binding, before given evidence that pronouns should be non-locally bound.

Rare input may account for the late acquisition of LD *sig*, but it cannot account for the pronoun scores. Pronouns are just as frequent in input as reflexives in my opinion (a corpus study may support this claim). The DPBE can be accounted for by the LPH and maturation of parameter values. Principle B is innate like Principle A, but grammar is modular so several aspects of grammar/cognitive abilities may need to be matured before they fully master pronouns, as I also referred to in chapter 6. Several factors may cloud their knowledge of binding properties for pronouns, e.g. simultaneous acquisition of other aspects of grammar that intervene in interpretation of test sentences.

The acquisition of language does not require acquiring principles of UG, which is fixed and innate (BT). This is supported by fast acquisition of Principle A and C (see below). Language development consists of the parameters left open by UG (binding domains): "the principle of UG lay down the requirements that a language has to meet. The parameters account for syntactic variation" (Cook and Newson 1996,55).

9. Principle C

I have contrasted Principle A and B, where the former is acquired early and the latter significantly later for English but the reflexive *sig* is acquired even later than pronouns in Danish. In this chapter I will briefly outline the findings for Principle C, to see if there is any connection (possibly pragmatic) to Principle B. Although no studies have argued for pragmatics as influencing Principle A, I will briefly consider a pragmatic possibility for LD *sig* violations in section 9.1.

Chomsky (1969) found that children older than 6, knew that *he* could not refer to *Pluto* in

(124) He knew that Pluto was sad

77% of the 5-year-olds allowed coreference in violation of Principle C (see chapter 3). Crain & McKee (1986) tested children aged 4 on a TVJT:

- (125) $He_{i/i}$ washed Luke Skywalker_i
- (126) He_{*i/j} ate the hamburger [when Smurf_i was in the fence]
- (127) [When $he_{i/j}$ stole the chickens], the lion_i was in the fence

For (127), a coreferential interpretation was accepted 73% of the time overall. In (125) and

(126) Principle C blocks a coreferential interpretation and the children correctly rejected such an interpretation 88% of the time.

Lust et al (1980) and Grimshaw & Rosen (1990) also found that children use the principle correctly 80% of the time at the age of 4.

Reinhart (1983) discards the principle as syntactic, saying it is controlled by pragmatics and Evans (1980,356) claim it can be overridden by conversational principles.

9.1 Principle B and C

Children perform well with Principle C (age 4) compared to Principle B. The asymmetry casts doubt on the claim that Principle B and C are governed by the same pragmatic mechanisms. I hypothesised that there could be a connection between Principle B and C if the research showed that Principle B is more pragmatic (e.g. Rule I) than has generally been thought and if Principle C showed a similar delay, as it has also been considered pragmatic. I did however not find convincing evidence for this, as the pragmatic accounts also falls short in explaining the DPBE fully (as shown in section 5.2.3 and 5.3).

Conroy et al (2009) suggested a syntactic processing explanation based on initial vs late filtering. If binding of an element functions as an initial filter, the parser is blind to potential antecedents in illicit positions. If it is a late filter, the parser will briefly allow illicit antecedents before excluding them (Conroy et al 2009,479). A general assumption is that Principle C act as an initial filter, meaning that the parser do not attempt to link pronouns to R-expressions that they c-command. The results are more mixed for Principle B having been claimed to be both the initial and the late filter (see Conroy et al for full discussion). If adults do temporarily have access to illicit antecedents when it comes to Principle B, it may be linked to children's violation of Principle B and to the violations of LD *sig* in Danish where ilicit antecedents may be allowed due to processing. In terms of binding *sig* is a pronoun, so it may be a late filter. It has been found that children show difficulty in recovering from incorrect initial representations of sentences (Trueswell et al, 1999). The temporary effect the late filter has in adults might appear as ungrammatical interpretations that persist in children, according to Conroy et al (479).

I did not find convincing support of a pragmatic connection between Principle B and C that could explain the DPBE, but it could be investigated further. I conclude that processing of Principle C is easier than for Principle B and thus acquired earlier, and not at the same age as Principle B despite the findings of Chomsky (1969). The processing account for Principle B and C provides a problem for the pragmatic explanations put forth as explaining the discrepant acquisition data for Principle B. If it is, as Chien & Wexler (1990) claim, a matter of children not being able to apply the pragmatic rule, how can children know and obey Principle C when the pragmatics apply here and the same difficulty should be expected, contrary to fact. Thornton and Wexler (1999) also argue that Rule I/Principle P cannot directly explain the asymmetry between the principles.

Recall, that Chien &Wexler (1987) predict that Principle C will be acquired later because of non-linking between two elements/ disjoint reference in section 5.2. This prediction has not been supported in later literature, but the principle C results support the notion of innateness.

10. Constructivist view

Above I sought to give a broad picture of the acquisition debate and the explanations with their strenghts and weaknesses based on PPT and UG. In the following, I will present a constructivist view for comparison. BT acquisition has not yet been dealt with in detail from a functionalist view, according to Tomasello (2003). A superficial description is that functionalists see language acquisition as being shaped by the desire to communicate. Similarly, constructivists see acquisition as a general cognitive learning procedure the child applies to the input (for detailed introduction see Hoff 2007,26).

10.1 Replacement for the Innateness Hypothesis

If binding is not innate, what should replace the notion of innate syntactic constraints? Matthews et al (2009) challenge the generativist view by combining Cognitive Grammar (CG) with a constructivist approach. CG argues that acquiring language is a matter of conceptualizing (forming a concept) between a form and a meaning (phonological and semantic representations). This can account for grammatical structures according to them. They minimise the claim of innate syntactic constraints and see language development and linguistic structures as motivated by cognitive processes (Langacker 2008). Constructivists argue that humans generate knowledge and meaning via an interaction between experiences and ideas. Matthews et al suggest three abilities central to mastering pronouns, which can replace the generative view of innate syntactic constraints.

Matthews et al (2009, 606) suggest the following: 1. children need knowledge of the accessibility of pronouns. 2. children need knowledge of discourse of sentential context. They need to understand the pronoun's relation to the surrounding discourse and third, they need to master point of view and the pronoun/reflexive contrasts, to use pronouns correctly. These abilities develop gradually. Until they master the constructions and hierarchies, their abilities in pronoun/anaphora tasks may vary.

Matthews et al (2009) tested accounts of co-reference errors where children allow *Mama Bear* and *her* to co-refer in

(128) *Mama Bear_i is washing her_i

63 children aged 4;6, 5;6 and 6;6 participated in a TVJT and a production experiment. The major finding was that contrary to most generativist accounts, children accepted co-reference even in cases of bound anaphora:

(129) *Every girl_i is washing her_i

Children at the age of 6 were at chance level (50%) when required to reject sentences like (130).

(130)	Every boy is washing	him	
	tickling		
	hitting		(Matthews 2009,618)

Children might not notice that the sentence final pronoun is not a reflexive, due to phonological overlap. When seeing the picture, children might be expecting to hear *the boy hit himself* and do not notice that the *-self* element is missing. Or do notice the pronoun, but are unsure whether it should be judged as incorrect. Making such judgments requires meta-linguistic reasoning like

(131) 'if she meant this, she really ought to have said x but she said something that means y and therefore her guess is wrong'

(Matthews et al 2009,618).

The results suggest that children aged 4 to 6 are not confident in making such inferences about pronouns (50% correct in Chien & Wexler 1990) but do produce it correctly. The children performed better in production of (128) than in comprehension. The violation in comprehension was not acted out in production (614). This contrast between comprehension and production, was also pointed out by Hendriks & Spenader (2005) and de Villiers et al (2006) (section 8.5 and 8.6). Matthews et al (2009) suggest that children's knowledge of anaphora constraints depends on understanding of accessibility, context and contrastive values of pronouns and reflexives (the three abilities mentioned above). Contrary to generativists, they find the performance errors to be based on lack of ability to make inferences about the talker's intentions and linguistic processing due to phonological overlap. Based on this, they claim Principle B is not innate (2009,625).

Matthews et al (2009) conclude that this experiment did not confirm any of the hypotheses from the generativist accounts. Chien & Wexler (1990) found that 5-6-year-olds

rejected violations of (130) above (bound variable interpretation) 84-87% of the time. Matthews et al (2009) found only a score around 50%. They suggest a phonological overlap between reflexives and third person pronouns, where the pronoun mismatch might not be easily detected in the speech stream (similar conclusion in van Rij 2010).

I agree with the idea that using language involves some learning or maturation but the bases of language is innate and guides learning/maturation (Borer & Wexler 1987). Children make sentences that would not be available to them in the input, e.g. they overgeneralise plurals (section 7.3). They are setting the parameters to their native language via experimentation, to learn the exceptions to the general rules. As the principles are innate and universal, all options are open until they can rule the incorrect ones out (Cook & Newson 2003). Chomsky argues that infants know how to put language components together innately (UG) and do not rely solely on input to learn syntax (the poverty of stimulus) (1986,xxv). This is also referred to as Plato's problem, which argues that grammar is unlearnable given the relatively limited data available to children. The cognitivists disagree. They believe that knowledge of language comes from language use, e.g. listening to language and imitating. In other words, language gets learned just like anything else gets learned. Cognitivists do not believe in an independent language faculty like UG. I find that an anti-UG view cannot account for all aspects of language learning and how children learn the hierarchical structure of language and BT. If language learning is based on communication and linguistic experience, how does this account for the fact that children go through stages with incomplete grammar as shown in chapter 2, which gradually gets more complex. From experience they would know that sentences require a subject etc (except pro-drop languages). The same goes for pronouns. An innate basis with slow maturation from experience can explain the DPBE. Children would not hear positive evidence that an illicit coreference interpretation of pronouns (in violation of Principle B) is grammatical from adults, except only in exceptional cases where it has to do with contrastive stress, which children need to learn (section 6). Hence, *learning* should not be excluded. Based on the above and chapter 7, I agree that the basis for language is innate which guides learning from linguistic input (Borer & Wexler 1987). This provides evidence, causing children to reset their initial hypotheses about how their language works (e.g. correct the overgeneral plurals, binding etc). Experience matures the innate principles and parameters (Wexler & Manzini 1987). Matthews et al. (2009), argue for learning three abilities to become proficient with pronouns. They do not account for when and how these abilities are learned. I find that the abilities Matthew et al mention (e.g. contexts in which pronouns are not used), may still be compatible with innateness. The initial

parameter value may be that, like reflexives, pronouns can be bound locally. This value is reset later due to UG "guidance" as the child hears evidence (cf. learns) of the appropriate contexts pronouns are used in rather than reflexives. Acquisition of pronouns is not only about syntax, but also about processing the input (cognitive maturation) and cooperation between linguistic modules/levels (chapter 6).

11. Conclusion

After Chomsky (1981) presented the BT and its principles for distribution of reflexives, pronouns and R-expressions, research on how children acquire these elements intensified. The studies I have discussed generally found that acquisition of pronouns was delayed compared to reflexives for English children. They allowed pronouns to be locally bound, in violation of Principle B, until the age of 6. For reflexives, they reached an adult interpretation at age 3.

Danish children perform like the English children with pronouns (50-60% correct at age 6). They acquire the reflexive *sig selv* at age 4 (similar to English reflexives), but they do not show knowledge of the reflexive LD bound *sig* until the age of 9, disproving my hypothesis that it is acquired with a delay similar to pronouns. *Sig* is problematic, as it may both be local and LD bound. In a sense it applies to both Principle A and B as a domain-anaphor and a binder-pronominal. Chomsky's notion of dividing elements as +/- anaphor and +/- pronominal does not seem adequate, as *sig* has both properties. The distribution of *sig*, shows that Chomsky's BT cannot account for Danish binding, as I hypothesized. To properly do so, more binding principles should be added.

From my research on the DPBE in English, I found that the reformulated BT, which accounts for the delay in terms of lack of pragmatic knowledge resulting in a pragmatic and a syntactic principle B, cannot be the sole explanation. The results for referential vs. quantificational antecedents, is too mixed to definitively support a division of Principle B into a syntactic and a pragmatic principle. Hence I found no direct support for my hypothesis about a pragmatic relation between Principle B and C. This was also due to the findings that R-expressions are acquired as early as reflexives. They are, however, processed differently, which may explain the acquisition asymmetry despite the suggested pragmatic connection. Processing may also to a degree explain LD *sig* difficulties.

The innateness hypothesis is not wrong despite the delay. Children's early knowledge of Principle A and C preserve the UG assumption and Principle B must also be innate, as it is part of the same syntactic module as A and C.

I find the delay is not caused by misclassification of the lexical properties of pronouns as being reflexives. Children can and do use pronouns without a reflexive meaning

Charlotte Bille Brahe Stud20072943

(deictically) in production. I find no reason to assume that the DPBE is caused by children thinking of pronouns as anaphors, since they perform above chancelevel with pronouns, which would not be the case, if they misanalyse them as anaphors.

The delay of pronouns can be accounted for by the LPH. The LPH covers many of the problematic aspects of pronoun acquisition – also cross-linguistically. It explains how children acquire parameter values that are initially incorrectly set and then reset based on experience and maturation. Danish children need to choose a different GovC compared to English because the binding properties differ. The parameter for binding of LD *sig* matures later, possibly because adults rarely use it. This is also compatible with UG, where the principles are innate but also mature. The delay may arise because children choose a subset parameter (local binding), which is then reset from positive evidence to also cover non-local binding of *ham/hende* and LD binding of *sig*. Children do have some learning to do (the setting of parameter values and the lexicon). Until these are set properly, children might speak differently than adults, but the language principles guide this setting from the innate faculty of language.

Interestingly, Norwegian children acquire pronouns and LD *sig* much faster than Danish children (only 9% errors on pronouns at age 5), as does Icelandic children (90% correct on pronouns at age 5). It seems the question of why Danish children are so much slower than children from languages that a grammatically very similar, still needs solving.

The constructivist approach does not explain how the suggested pronoun abilities are learned, why they are not learned simultaneously with those for reflexives, or why children utter sentences they would not have heard in the input. But experience (cf learning) triggers maturation of innate principles.

I found that the clitic hypothesis could not sufficiently account for acquisition difficulties with LD *sig*. Object shift and cliticization in Romance languages are similar but Danish *sig* is not clitic in the same sense as e.g. French clitics, as its movement in object shift is different from that of cliticization. I find the suggestion of an abstract movement of *sig* at LF more plausible. It is complex and children possibly do not have the ability to interpret a sentence in this way at the age of 6. Hence, *sig* will not receive its proper LD interpretation because the abstract movement is not carried out. Children misinterpret LD *sig* as locally bound because they have evidence that it can be bound locally. The cognitive ability to move *sig* further up the tree to receive its features from IP may develop later.

Methodology may to a certain degree influence the results. But despite many attempts to control for such influences, most studies still find a problem with interpreting

pronouns, so there must be something to it. The exact cause remains an open question as acquisition of other linguistic modules may also interfere with the child's interpretation of pronouns (acquisition of quantifiers, θ -roles etc).

My hypothesis that comprehension would be ahead of production was not borne out. Research generally shows that production is ahead of comprehension. This may be due to processing difficulties, or factors resulting in disobedience of Principle B in the experiments, masking the child's knowledge.

The theories and approaches dealt with in this paper go a long way in trying to account for the problems with Principle B, and LD *sig*, but there is still some way to go in fully understanding children's knowledge and acquisition of pronouns and reflexives cross-linguistically. The errors offer intereting insights into language acquisition; parametric variation across languages and to the stages children go through, but more work still needs to be done.

12. References

- Allan, Robin, Philip Holmes & Tom Lundskær-Nielsen. 1995. Danish: A Comprehensive Grammar. Routledge.
- Asudeh, A. 2006. Binding Theory. Encyclopedia of Language & Linguistics: 23-31.
- Atkinson, Martin. 1992. Children's Syntax: An Introduction to Principles and Parameters Theory. Blackwell textbooks in linguistics: 5. Oxford: Blackwell.
- Baltin, Mark R. 1991. Head Movement in Logical Form. *Linguistic Inquiry* 22 (2): pp. 225-249.
- Bloom, Paul, Andrew Barss, Janet Nicol & Laura Conway. 1994. Children's knowledge of binding and coreference: Evidence from spontaneous speech. *Language* 70 (1) (Mar.): pp. 53-71.
- Borer, Hagit & Kenneth Wexler. 1987. The Maturation of Syntax, in *Parameter Setting*, eds. T. Roeper & E. Williams, pp. 123-172. Reidel Publishing Company.
- Boster, C.T. 1991. Children's Failure to Obey Principle B: Syntactic Problem Or Lexical Error? University of Connecticut.
- Burzio, Luigi. 1991. The morphological basis of anaphora. *Journal of Linguistics* 27 (1) (Mar.): pp. 81-105.

Burzio, Luigi. 1998. Anaphora and Soft Constraints, in *Is the Best Good Enough? Optimality and Competition in Syntax*, eds. Pilar Barbosa, Danny Fox, Paul Hagstrom, Martha McGinnis & David Pesetskyn, pp. 93-115. MIT Press: Cambridge, Massachusetts.

- Chien, Y-C. & Kenneth Wexler. 1987. Children's Acquisition of the Locality Conditions for Reflexives and Pronouns. *Papers and Reports on Child Language Development* 26: pp. 2-12.
 - ——. 1990. Children's Knowledge of Locality Conditions in Binding as Evidence for the Modularity of Syntax and Pragmatics. *Language Acquisition* 1: pp. 225-295.
- Chomsky, Carol. (1969). *The Acquisition of Syntax in Children from 5 to 10*. The MIT Press research monograph. Cambridge, Mass. and London.
- Chomsky, Noam. 1965. Aspects of the Theory of Syntax. MIT Press.
- ——. 1981. Lectures on Government and Binding. The Pisa Lectures. Foris Publications.
- ——.1982. Some Concepts and Consequences of the Theory of Government and Binding. MIT Press.

—. 1986. *Knowledge of Language: Its Nature, Origin, and Use*. Convergence. Westport, Conn.: Praeger.

- ——. 1995. Some Notes on Economy of Derivation and Representation, in *The Minimalist Program*, pp:129-166. The MIT Press. Cambridge, Massachusetts.
- Clahsen, Harald. 1992. Learnability Theory and the Problem of Development in Language Acquisition, in *Theoretical Issues in Language Acquisition*, eds. Jürgen Weissenborn, Helen Goodluck & Thomas Roeper, pp: 53-77. Lawrence Erlbaum Associates, Publishers.
- Clark, Eve. 2003. First Language Acquisition. Cambridge: Cambridge University Press.
- Conroy, Anastacia, Eri Takahashi, Jeffrey Lidz & Colin Phillips.2009. Equal Treatment for all Antecedents: How Children Succeed with Principle B. *Linguistic Inquiry* 40 (3): pp. 446-486.
- Cook, V. J & Mark Newson.1996. *Chomsky's Universal Grammar: An introduction*. 2nd ed. Blackwell Publishers.
- Crain, Stephen & Cecile McKee. 1986. Acquisition of structural restrictions on anaphora. *North Eastern Linguistic Society* 16: 91-100.
- Crain, Stephen, and Rosalind Thornton. 1998. *Investigations in Universal Grammar: A Guide to Experiments on the Acquisition of Syntax and Semantics*. Language, speech, and communication. Cambridge, Mass.: MIT Press.
- de Villiers, Jill, Jacqueline Cahillane & Emily Altreuter. 2006. What can Production Reveal about Principle B? Conference on Generative Approaches to Language Acquisition, North America. Pp. 89-100.
- Elbourne, Paul. 2005. On the Acquisition of Principle B. *Linguistic Inquiry* 36 (3): pp. 333-365.
- Evans, Gareth. 1980. Pronouns. Linguistic Inquiry 11: pp. 337-62.
- Everaert, Martin. 1991. Contextual determination of the anaphor/pronominal distinction, in *Long-distance anaphora*, eds. Jan Koster & Eric Reuland, pp. 77-119. Cambridge University Press.
- Felix, Sascha. 1988. Universal Grammar in language acquisition. *Canadian Journal of Linguistics* 33: pp. 367-93.
- Fischer, Silke. 2010. Pronominal Anaphors in *Syntax,* in *An International Handbook,* eds. Kiss, Tibor & Artemis Alexiadou. 2nd Edition. Berlin: Mouton de Gruyter. Available online: <u>http://ifla.uni-stuttgart.de/files/fis-pronanaphora.pdf</u>.
- Foster-Cohen, Susan. 1994. Exploring the boundary between syntax and pragmatics: Relevance and the binding of pronouns. *Journal of Child Language* 21: pp. 237-255.

- Frazier, Lyn & Jill de Villiers. 1990. *Language processing and language acquisition*. Netherlands: Kluwer Academic Publishers
- Goodluck, Helen. 1990. Knowledge integration in processing and acquisition: Comments on Grimshaw and Rosen, in *Language processing and language acquisition*, eds. Lyn Frazier & Jill de Villiers, pp. 369-81. Netherlands: Kluwer Academic Publishers.
- Grimshaw, Jane & Sara Rosen. 1990a. Knowledge and Obedience: The Developmental Status of the Binding Theory. *Linguistic Inquiry* 21: pp. 187-222.

—. 1990b. Obeying the Binding Theory, in *Language processing and language acquisition*, eds. Lyn Frazier & Jill de Villiers. Netherlands: Kluwer Academic Publishers, pp. 357-367.

- Grodzinsky, Y. & G. Kave. 1994. Do Children Really Know Condition A? *Language Acquisition* 3 (1): pp. 41-54.
- Grodzinsky, Yosef & Tanya Reinhart. 1993. The Innateness of Binding and Coreference. *Linguistic Inquiry* 24 (1): pp. 69-101.
- Haegeman, Liliane. 1993. *Introduction to Government and Binding Theory*. Blackwell textbooks in linguistics. Blackwell, Oxford.
- Haegeman, Liliane & Jacqueline Guéron. 1999. *English Grammar: A Generative Perspective*. Blackwell, Oxford.
- Hamann, Celia. 2010. Binding and Coreference: Views from Child Language, in *Handbook* of *Generative Approaches to Language Acquisition*, eds. J. de Villiers and T. Roeper, pp 247-290.Springer.
- Harbert, Wayne. 1995. Binding Theory, Control and pro, in *Government and Binding Theory* and the Minimalist Program, ed. Gert Webelhuth, pp. 177-212. Blackwell.
- Hendriks, Petra & Jennifer Spenader. 2005. When Production Precedes Comprehension: An Optimization Approach to the Acquisition of Pronouns. *Language Acquisition* 13 (4): pp. 319-348.
- Hestvik, Arild. 1992. LF Movement of Pronouns and Antisubject Orientation. *Linguistic Inquiry* 23(4): pp. 557-594.
- Hestvik, Arild & William Philip. 1999. Binding and Coreference in Norwegian Child Language. *Language Acquisition* 8 (3): pp. 171-235.
- Hoff, Erika. 2007. Language Development. 4th edition. Wadsworth.
- Hyams, Nina & Sigridur Sigurjónsdóttir. 1990. The Development of Long-Distance Anaphora: A Cross-Linguistic Comparison With Special Reference to Icelandic. *Language Acquisition* 1 (1): pp. 57-93.
- Jakubowicz, Celia. 1984. On Markedness and Binding Principles, in *Proceedings of NELS* 14, GLSA, eds C. Jones & P.Sells, pp. 154-82. University of Massachusetts, Amherst.

Jakubowicz, Celia. 1994. Reflexives in French and Danish: Morphology, syntax and acquisition. In Syntactic theory and first language acquisition: Cross linguistic perspectives: Binding, dependencies, and learnability, eds. B. Lust, G. Hermon and J. Kornfilt. Vol. 2, pp. 115-145. Lawrence Erlbaum Associates.

Kaufman, Diana. 1987. 'Who's Him?': Evidence for Principle B in Children's Grammar. Paper presented at the 12th Boston University Conference on Language Development. Temple University, Philadelphia, Pennsylvania.

- Kaufman, Diana.1994. Grammatical or Pragmatic: Will the Real Principle B Please Stand? In Syntactic theory and first language acquisition: Cross linguistic perspectives: Binding, dependencies, and learnability, eds. B. Lust, G. Hermon and J. Kornfilt, vol 2, pp. 177-200. Lawrence Erlbaum Associates
- Koster, Charlotte. 1993. *Errors in anaphora acquisition*. OTS dissertation series. The Netherlands: LEd.
- Koster, Charlotte. 1995. *The Fate of the Reformulated Binding Theory*. Originally published as: Le destin de la Théorie du Liage reformulée. *Grammaire universelle et acquisition du langage* 24. Available online: <u>http://scholar.googleusercontent.com/scholar?q=cache:bJ_hFndlQNEJ:scholar.google.co</u> <u>m/&hl=da&as_sdt=0,5</u>
- Koster, Jan & Eric Reuland. 1991. *Long-distance anaphora*. Cambridge: Cambridge University Press.
- Langacker, Ronald W. 2008. *Cognitive grammar: A basic introduction*. Oxford: Oxford University Press.
- Lebeaux, David.1983. A Distributional Difference between Reciprocals and Reflexives. *Linguistic Inquiry* 14: pp.723-730.
- Levinson, Stephen C. 1987. Pragmatics and the grammar of anaphora: A partial pragmatic reduction of binding and control phenomena. *Journal of Linguistics* 23 (2) (Sep.): pp. 379-434.
- Lombardi, Linda & Sarma, Jaya. 1989. Against the bound variable hypothesis of the acquisition of condition B. Paper Presented at the Annual Meeting of the Linguistic Society of America.

Lust, Barbara, Kate Loveland & Renee Kornet. 1980. The development of anaphora in first language: Syntactic and pragmatic constraints. *Linguistic Analysis* 6, pp: 359-91.

- Lust, Barbara, Julie Eisele and Reiko Mazuka. 1992. The Binding Theory Module. Evidence from First Language Acquisition for Principle C. *Language* 68 (2): pp. 333-258.
- Matthews, Danielle, Elena Lieven, Anna Theakston & Michael Tomasello. 2009. Pronoun coreferencing errors: Challenges for the generativist and usage-based accounts. *Cognitive Linguistics* 20 (3): pp. 599-626.

- McDaniel, Dana, H. S. Cairns, and J. R. Hsu. 1990. Binding Principles in the Grammars of Young Children. *Language Acquisition* 1 (1): pp. 121-138.
- McDaniel, Dana & Thomas L. Maxfield. 1992. Principle B and Contrastive Stress. *Language Acquisition* 2 (4): pp. 337-358.
- McKee, Cecile. 1992. A Comparison of Pronouns and Anaphors in Italian and English Acquisition. *Language Acquisition* 2 (1), pp. 21-54.
- Meisel, J.1995. Parameters in acquisition, in *The Handbook of Child Language*, eds P. Fletcher and B MacWhinney. Oxford: Basil Blackwell. Pp: 10-35.
- Montalbetti, M. & Kenneth Wexler. 1985. Binding is linking. Paper presented at Proceedings of West Coast Conference on Formal Linguistics, 4.
- Newson, M. 1990. Dependencies in the lexical setting of parameters: A solution to the undergeneralisation problem. In *Logical issues in language acquisition*, ed. I. Roca.pp. 177-197. Dordrecht: Foris.
- Olsen, Lis. 1992. *Théorie linguistique et acquisition du langage. Etude contrastive des relations anaphoriques, syntaxe danoise et syntaxe compare.* Universitée de Paris 8: Thèse.

O'Grady, William. 1997. Syntactic development. Chicago: University of Chicago.

Otsu, Y.1981. Universal Grammar and Syntactic Development in Children: Toward a Theory of Syntactic Development, Doctoral dissertation, MIT, Cambridge, Massachusetts.

- Owens, Robert E. 2008. Language Development: An Introduction. 7th edition. Pearson.
- Pinker, Steven. 1984. *Language Learnability and Language Development*. Cambridge, MA: Harvard University Press.
- Radford, Andrew.1990. Syntactic Theory and the Acquisition of English Syntax: The Nature of Early Child Grammars of English. Oxford: Blackwell.
- Radford, Andrew.2004. *Minimalist Syntax: Exploring the Structure of English.* Cambridge University Press.
- Reinhart, Tanya. 1983. Anaphora and Semantic Interpretation. London: Croom Helm.

Reinhart, Tanya & Eric Reuland. 1993. Reflexivity. Linguistic Inquiry 24: pp. 657-720.

- Reuland, Eric.2005a. Binding Theory: Terms and Concepts, in *The Blackwell Companion to Syntax*, eds. Henk van Riemsdijk & Martin Everaert, pp: 260-283. Oxford: Blackwell, vol 1.
 - ———. 2005b. Long-Distance Binding in Germanic Languages, in *The Blackwell Companion to Syntax*, eds. Henk van Riemsdijk & Martin Everaert. Oxford: Blackwell, vol 3, pp. 85-108.

- Roeper, Thomas, and Edwin Williams.1987. *Parameter Setting*. Studies in the theoretical psycholinguistics. Dordrecht: D. Reidel Pub. Co.
- Safir, Ken. 1987. Comments on Wexler and Manzini. In *Parameter Setting*, ed. Roeper, Thomas and Edwin Williams, pp. 77-89. D. Reidel Publishing Company.
- Thornton, Rosalind and Kenneth Wexler. 1999. Principle B, VP Ellipsis, and Interpretation in Child Grammar. MIT Press.
- Tomasello, Michael. 2003. *Constructing a language: A usage-based theory of language acquisition*. Cambridge, Mass.: Harvard University Press.
- Trueswell, J. C., I. A. Sekerina, N.M. Hill & M.L. Logri. 1999. The kindergarten path effect: Studying on-line processing in young children. *Cognition* 73 (2): pp. 89-134.
- Van Rij, Jacolien Hedderik van Rijn, & Petra Hendriks.2010. Cognitive architectures and language acquisition: A case study in pronoun comprehension. *Journal of Child Language* 37(3), pp: 731-766.
- Vikner, Sten. 1985. Parameters of Binder and of Binding Category in Danish. *Working Papers in Scandinavian Syntax* (23): pp. 1-61.
- Vikner, Sten. 2007. Object Shift, in *The Blackwell Companion to Syntax*, eds. Martin Everaert and Henk van Riemsdijk, pp: 392-436. Oxford Blackwell, vol 3.
- Vikner, Sten. 2009. Object shift and scrambling an introduction. The Germanic languages and the SOV/SVO difference. Lecture handout. Postgraduate Seminar, Department of Linguistics, University of Cambridge.
- Vikner, Sten. 2012. Comparative Syntax. Lecture Handout 1-12. Aarhus University.
- Wexler, Kenneth & Y-C.Chien. 1985. The Development of Lexical Anaphors and Pronouns. *Papers and Reports on Child Language Development* 24: 138.
- Wexler, Kenneth and M. Rita Manzini. 1987. Parameters and Learnability in Binding Theory. In *Parameter Setting*, ed. Roeper, Thomas and Edwin Williams: pp. 41-77. D. Reidel Publishing Company.
- Wexler, Kenneth. 1988. *Maturation and ungrammaticality in child language*. Paper presented at the Workshop for Language Processing and Acquisition, University of Massachusetts at Amherst.
 - ——. 1990. Innateness and Maturation in Linguistic Development. *Developmental Psychobiology* 23 (7): pp. 645-60.

Zagona, Karen T. 2002. The Syntax of Spanish. Cambridge University Press.

Appendix I: Abbreviations

AGR	Agreement	SE-anaphor/REFL sig	
СР	Complementizer Phrase	SELF-anaph	nor/REFL self: sig selv
CG	Cognitive Grammar	t	trace
DP	Determiner phrase	ТоМ	Theory of Mind
DPBE	Delay of Principle B Effect	TNS	Tense
BT	Binding Theory	TVJT	Truth Value Judgment Task
GovC	Governing category	UG	Universal Grammar
INFL	Inflection	VP	Verb Phrase
IP	Inflectional Phrase	X°	Head of an XP
LD	Long distance	ХР	Maximal Projection
LF	Logical Form		2
LPH	Lexical Parameterization		
Hypothesis			
MEP	Morphological Economy		
	Principle		
NP	Noun Phrase		
ОТ	Optimality Theory		
PF	Phonological Form		
РР	Prepositional Phrase		
PPT	Principles and Parameters		
	Theory		
QA	Quantificational Asymmetry		

Appendix II: Experiment stories

Thornton & Wexler (1999, 143):

Bert and three reindeer friends have a snowball fight, and they all get covered in snow. When they go inside, Bert is shivering, so he asks the reindeer to brush the snow off him. Two of the reindeer (separately) refuse, saying they have too much snow to deal with, and they brush themselves. The third reindeer helps Bert a little bit, but then brushes the snow off of himself. Bert thanks the helpful reindeer for starting to brush him. He say's he's sorry he can't reciprocate by helping brush the helpful reindeer; he needs to finish brushing all the snow off of himself because he's still very cold.

I think Bert brushed him. Referential condition

I think every reindeer brushed him. Quantificational condition

Possible bias:

Bert is clearly the main protagonist, and he is the anaphoric antecedent in the referential condition and the deictic antecedent in the quantificational condition. The QA can be derived by assuming that children associate the pronoun *him* with the most prominent referent in the story, with no need for Principle B (Conroy et al 2009,462).

Introductory stories by Conroy et al. 2009:

The first story is the one they made to avoid biases like that of Thornton and Wexler (1999) above (i.e. no clear protagonist). In (2) they alter the plot, to show that they can "reintroduce" the quantificational asymmetry, underlining the influence of methodology rather than of Rule I.

(1) The Painting Story:

Characters: Hiking Smurf, Tennis Smurf, Papa Smurf, Grumpy, Dopey, Happy

Papa Smurf announces that Snow White is going to have a party, and that she is going to have a painting contest. Papa Smurf declares that he is going to be the judge. Each of the dwarves shows and discusses the color of paint that he is going to use to get painted, as does Tennis Smurf.

However, Hiking Smurf does not have any paint, and he wonders whether one of the other characters will be willing to share. He first approaches Happy, who says that he would be glad to help out if any paint remains after he is painted. Fortunately, when Happy is finished some paint remains, and so he paints Hiking Smurf. Hiking Smurf, however, is not yet satisfied, so he approaches Dopey with a similar request, which is similarly successful. Then, Grumpy, who is in such a bad mood that he does not even want to go to the party, declares that he doesn't need to get painted. The other dwarves really want him to go, and Grumpy agrees to get painted, using all of his paint in the process. After Grumpy is painted, Hiking Smurf approaches him and asks for some paint. Grumpy politely apologizes that he would like to help but cannot, because he has used up all of his paint. Hiking Smurf realizes that his best remaining chance is to ask Tennis Smurf for some extra paint, and Tennis Smurf obliges when he is asked. Finally, everybody is ready for Snow White's party.

Referential Lead-in: OK, this was a story about painting. Hiking Smurf didn't have any paint, and Grumpy almost didn't go to the party. Let me see ... I think ...

Quantificational Lead-in: OK, this was a story about painting. Hiking Smurf didn't have any paint, and all the dwarves looked great. Let me see ... I think ...

Grumpy painted him. Referential condition

Every dwarf painted him. Quantificational condition

(Conroy et al 2009,465)

Reintroducing QA:

(2) This is a story about three dwarves and Hiking Smurf. Hiking Smurf announces a party at Snow White's house, and declares that everybody needs to get painted for the party. He then realizes that he is out of paint, and proceeds to solicit help from the dwarves. Hiking Smurf asks the first dwarf to paint him, but he refuses because he is too busy painting himself. Hiking Smurf then approaches the second dwarf, but he also refuses and paints himself. Hiking Smurf finally asks the third dwarf, who is more forthcoming. He says, "I can give you a little of my paint, but not too much, I need to get painted". Hiking Smurf thanks the dwarf and remarks that he wishes he could return the favor by helping to paint the dwarf, but cannot because he is too busy getting

painted himself.

Referential Lead-in: This was a story about dwarves and Hiking Smurf.

Quantificational Lead-in: This was a story about dwarves and Hiking Smurf.

Hiking Smurf painted him. Referential condition

Every dwarf painted him. Quantificational condition

(Conroy et al 2009,475)

Possible influences:

In terms of the accessibility of antecedents for the pronoun *him*, the referential and quantificational conditions differ. The central figure in the narrative is Hiking Smurf, who fulfills different roles in the two test sentences: he is the intended anaphoric antecedent in the referential condition and is the intended deictic antecedent in the quantificational condition. If children simply interpret *him* as referring to Hiking Smurf they should judge the test sentence true in the referential condition (ungrammatical) and false in the quantificational condition (grammatical), leading to the appearance of a QA (Conroy et al 2009,476).