

SYNTACTIC VS. LOGOPHORIC BINDING: EVIDENCE FROM NORWEGIAN CHILD LANGUAGE

ARILD HESTVIK*
WILLIAM PHILIP†

**Department of Linguistics and Comparative
Literature
University of Bergen, Norway*

*†Utrecht Institute of Linguistics OTS
Utrecht University, The Netherlands*

I. INTRODUCTION

Work on Binding Theory during the last decade has shifted from theories positing a single theoretical module, designed to capture all occurrences of reflexives, to theories that account for the distribution of reflexives in terms of the interaction of multiple modules and that hypothesize the existence of different types of reflexives. The single-module approach is represented by Chomsky (1981, 1986), whereas the multi-module approach has been advanced most prominently by Pollard and Sag (1992) and Reinhart and Reuland (1993) (although the need for a distinction between local vs. nonlocal binding was recognized already by Bouchard (1984) and Lebeaux (1985)). The two central questions running through these works are: (i) What is the core syntactic domain in which the binding principles determine the selection of a reflexive or a pronoun?—i.e., How is “core binding” defined?— and (ii) What are the properties of noncore anaphoric relations involving reflexives—i.e., What are the properties of “logophoric binding”?

In this chapter, we present experimental evidence from Norwegian child language that binding into locative PPs and of possessive reflexives constitute cases of core binding and not logophoric binding, whereas binding into picture NPs is indeed logophoric binding. The results match the predictions of a theory in which the relation between a reflexive and its antecedent may involve LF-movement, such that the range of possible LF-movements partially determines what counts as local binding. Any reflexive that cannot move into a local relation with its antecedent is ungrammatical unless it can be reinterpreted via logophoric binding.

The chapter is organized as follows: First, we review what are widely assumed to be the distinctive semantic and syntactic properties of logophoric reflexives. Then we consider how two alternative binding frameworks deal with such reflexives. After this theoretical discussion, we review a recent psycholinguistic study which has bearing on the central theoretical questions in that it sheds light on the logophoric status in child English of a reflexive in the object position of a locative PP. Finally, we present our own experimental evidence from Norwegian child language and discuss its implications.

2. LOCAL VS. NONLOCAL (LOGOPHORIC) BINDING

It is widely assumed that logophoric binding generally exhibits the following properties:

- Logophoric anaphors tend to have antecedents that occupy the “center of consciousness” of the discourse in the sense that the propositional content of the sentence containing the logophor is viewed from the perspective of the person denoted by the antecedent.
- Logophoric reflexives exhibit pronounlike properties: They may have non-c-commanding antecedents or split antecedents; they may allow discourse reference, and they may allow strict identity in VP-ellipsis.

The best theory should predict which occurrences of reflexives have logophoric properties and differentiate them from locally bound reflexive occurrences and ordinary pronouns. We will now consider the predictions of two such alternative theories.

2.1. The Non-Coargument Theory

The theory developed by Reinhart and Reuland (1993) proposes that only reflexives bound by coarguments are subject to core binding condi-

tions, whereas reflexives with non-coargument antecedents either are ungrammatical or are in principle acceptable as logophors. To illustrate with a clear-cut case, consider the following pair:

- (1) a. [[Oscar₁'s father]₂'s picture of himself₂] was on display.
- b. [Oscar₁'s father]₂ commented [that a picture of himself_{1/2} was on display].
- c. *Oscar felt a wave of panic. He had believed that his identity was unknown to the police. At breakfast he learned otherwise. His father commented that a picture of himself was on display at the post office on an FBI poster.*

In (1a), *himself* can only refer to Oscar's father, whereas in (1b), *himself* can refer to Oscar, even though it is not c-commanded by any nominal expression denoting Oscar. Embedding (1b) in an appropriate context improves the acceptability of a logophoric reading of the reflexive, as shown in (1c). In short, Reinhart and Reuland's theory—henceforth, the “non-coargument theory”—holds that if the antecedent and the reflexive are not coarguments, the possibility of logophoric interpretation is simply left open by the syntax. (In Reinhart and Reuland's theory, the distribution of reflexives is also constrained by the A-Chain Condition; however, since we will not be concerned with cases in which this constraint would apply—i.e., a reflexive c-commanding its own antecedent—we will ignore this aspect of the theory as well as the general question of how, within this theory, the A-Chain Condition interacts with logophoric binding.)

The non-coargument theory leads to the expectation that, nothing else being said, any occurrence of a reflexive which does not have a coargument antecedent (and which does not c-command its own antecedent) should, in principle, be acceptable under a logophoric reading and should display at least some properties of logophoricity. In particular, binding into locative PPs in English should exhibit logophoric properties, as should the binding of possessive reflexives in languages that have them. However, consider the contrast between (2a) and (2b).

- (2) a. Clinton₁'s car carried a picture of himself₁ on the roof.
- b. *Clinton₁'s car backfired/collapsed/explored behind himself₁.

According to the non-coargument theory, the reflexive in an English locative PP must be a logophor since it is not a coargument of its antecedent. However, this reflexive does not appear to have the expected logophoric property of always admitting a non-c-commanding antecedent, as seen by (2b). This raises the question of whether the non-coargument theory makes the right predictions for English. We return briefly to this issue in the discussion of Avrutin and Cunningham's experimental work.

Let us now consider which occurrences of reflexives in Norwegian should be logophoric according to the non-coargument theory. First, possessive reflexives should be logophors, since they are not bound by their coarguments. (The NP that contains the possessive reflexive is a coargument of its antecedent, but the possessive reflexive itself is not.) However, consider the Norwegian possessive reflexives in (3). Sentence (3a) illustrates a grammatical instance, but as (3b–3d) show, these reflexives do require c-commanding antecedents, do not allow discourse reference, and do not allow split antecedents.

- (3) a. John₁ holdt i [hatten sin₁].
 'John held onto his(self's) hat.'
 b. *John₁s mor₂ holdt i [hatten sin₁].
 'John's mother held his(self's) hat.'
 c. John₁ var forskrekket. *Marit₂ hadde lagt vekk [hatten sin₁].
 'John was terrified. Mary had put away his(self's) hat.'
 d. *John₁ ba Marit₂ ringe [slektningene sine₁₊₂].
 'John asked Mary to call their(selves') relatives.'

In general, when a non-c-commanding NP is a contextually plausible antecedent, it cannot be the grammatical antecedent of a possessive reflexive in this language. For example, the LF represented in (3c) remains unavailable when immediately preceded by a context such as "John was terrified." In sum, these possessives exhibit none of the expected properties of logophoric reflexives.

The same is true of Norwegian long-distance reflexives in locative PPs. They should be logophors according to the non-coargument theory, but exhibit none of the typical properties of logophors, as seen in (4b–4d).

- (4) a. John₁ kikket [bak seg₁].
 'John looked behind self.'
 b. *John₁s mor₂ satte stolen [bak seg₁].
 'John's mother put the chair behind self.'
 c. John₁ var forskrekket. *Marit₂ kikket [bak seg₁].
 'John was terrified. Mary looked behind self.'
 d. *John₁ ba Marit₂ sette stolen [bak seg₁₊₂].
 'John asked Mary to put the chair behind self.'

Finally, consider the case of Norwegian *seg* binding into a picture NP. As shown in (5), these occurrences of a reflexive also do not appear to behave like logophoric reflexives.

- (5) a. John₁ kjøpte [et bilde av seg₁].
 'John bought a picture of self.'
 b. *John₁s mor₂ kjøpte [et bilde av seg₁].
 'John's mother bought a picture of self.'
 c. John₁ var forskrekket. *Marit₂ kjøpte [et bilde av seg₁].
 'John was terrified. Mary bought a picture of self.'
 d. *John₁ ba Marit₂ kjøpe [et bilde av seg₁₊₂].
 'John asked Mary to buy a picture of selves.'

The facts presented in (2)–(5) might simply be taken as evidence that Reinhart and Reuland's non-coargument theory fails to provide an empirically adequate definition of core binding and miscategorizes a subclass of core binding as logophoric binding. On the other hand, it is also possible that the discourse-related rules of logophoric binding and the syntactic rules of core binding partially overlap in their effect on reflexive antecedent selection. Specifically, in the case of Norwegian, it may be that logophoric occurrences of *seg* conform to a language-specific discourse rule of subject-orientation that "mimics" the c-command restriction of core binding. This hypothesis would entail that absence of a c-commanding antecedent is a possible but not a necessary correlate of logophoric antecedent selection.

If it is possible for discourse constraints on logophoric binding to "mimic" syntactic constraints on core binding, what evidence could differentiate between core binding and logophoric binding in a language like Norwegian? As we will discuss, child language may be the only source of such evidence. But first let us consider how an alternative binding theory deals with logophoric reflexives.

2.2. The LF-Movement Theory

As an alternative to Reinhart and Reuland's approach, we might define core binding in the standard manner—i.e., with reference to nominal features [+/- anaphor, +/- pronominal] and with reference to governing category—but posit additionally that the binding requirement for a reflexive must be satisfied in the smallest domain in which it *could* be satisfied (e.g., Huang (1983), Chomsky (1986), and Hestvik (1991)). Under this approach, a possessive reflexive extends its domain to the containing matrix clause, as represented in (6a), since it already occupies the highest position in the nominal that a potential binder could occupy. Here, it finds a potential binder, namely the matrix subject. Similarly, a reflexive in a locative PP can, and therefore must, extend its binding domain to the containing clause, as represented in (6b).

- (6) a. [_{D(sin)} John₁ holdt i [hatten sin₁]].
 'John held onto his(self's) hat.'
 b. [_{D(seg)} John₁ satte bøtten [bak seg₁]].
 'John put the bucket behind self.'

In contrast, a reflexive that is the object of a picture NP does have a position for a potential binder, namely, the specifier position of that NP. This makes the picture NP the binding domain, as represented in (7) (specifier position indicated by underlining).

- (7) Jon kjøpte [_{D(seg)} bilder av seg].
 'John bought pictures of self.'

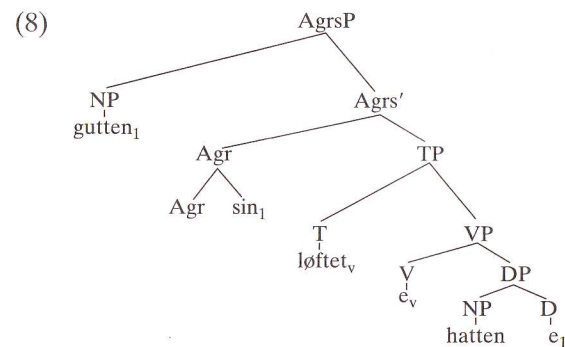
In the case of picture NPs, therefore, unless the NP has a subject that can bind it, the reflexive will not be bound in the smallest domain in which it *could* potentially be bound and will have to resort to logophoric binding to receive a semantic value, following whatever discourse-related rules of logophoricity exist in the language.

This approach fails, however, to predict the antisubject orientation of pronouns in languages such as Norwegian. Huang's theory, for example, would incorrectly predict that a pronoun in a locative PP or a possessive pronoun could satisfy its binding requirements internal to those phrases. In fact, in these constructions a pronoun must be non-coreferent with the higher subject.

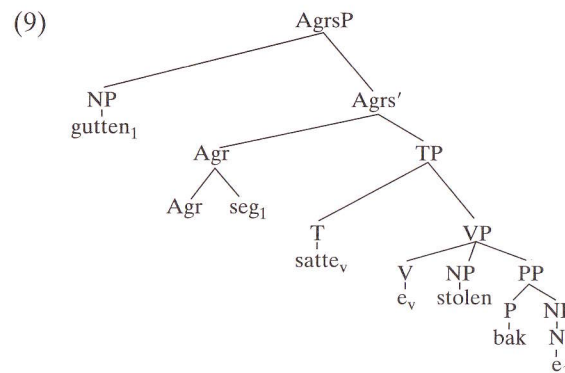
This problem is solved, however, in the LF-movement approach developed in Hestvik (1992). Under this approach, LF-movement applies both to pronouns and reflexives, yielding antisubject orientation in the case of pronouns and subject orientation in the case of long-distance reflexives. In other words, Norwegian simplex reflexives like *seg* or *sin* move at LF toward their antecedents in a way that mirrors reflexive clitic movement at surface structure in the Romance languages. For concreteness, let us assume that these reflexives must connect with their antecedents by adjoining at LF to the head of the Agr-projection of which the antecedent is a specifier. This explains the c-command requirement, since movement is only to positions that c-command the trace-position. The movement itself could follow from a general requirement that reflexives must get their features from a linguistic antecedent via a head-specifier relationship. Logophoric binding can then be viewed as a strategy available to a reflexive which has not been able to establish the requisite locality relation via movement.

On this account, after movement of the reflexive, the LF for a Norwegian sentence with a possessive reflexive such as *Gutten løftet hatten sin* 'The boy

lifted his(self's) hat' would be as shown in (8), abstracting away from irrelevant details.

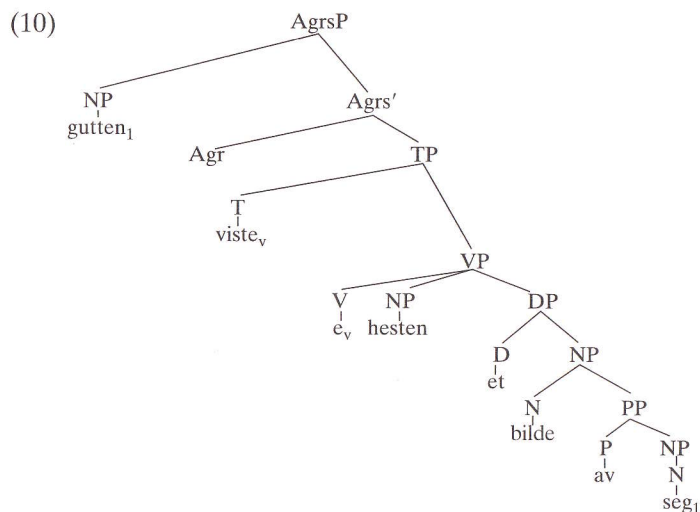


Likewise, the LF for a Norwegian sentence with a locative PP such as *Gutten satte stolen bak seg* 'The boy put the chair behind self' would be (9).



This analysis requires that the DP and PP boundaries do not block LF movement of the reflexive. (Specifically, the DP does not block movement of its head D.) On the other hand, DP must block movement of elements contained in a lower NP. This is in accord with general constraints on movement, where DP and CP most often act as the categories that block movement of elements they properly contain.

In the case of picture NPs, therefore, or reflexives internal to any NP, the hypothesized LF-movement of the reflexive is blocked; there is no escape hatch. Thus, the LF for a Norwegian sentence with a picture NP such as *Gutten viste hesten et bilde av seg* 'The boy showed the horse a picture of self' would be as shown in (10).



Since movement is blocked by the DP, the reflexive must stay *in situ* and can only resolve its referential requirements via logophoric binding.

In sum, the LF-movement theory makes the claim that in adult Norwegian, possessive reflexives and reflexives in locative PPs enter into core binding (at LF), but this is not possible for reflexives in picture NPs, which are true logophors. The same question arises, however, as with the non-coargument theory: If the difference between core binding and logophoric binding is not manifested in adult intuitions, how can we distinguish the two? Specifically, in the case of *seg* in a picture NP, what theory-independent evidence do we have that this reflexive is governed by logophoric binding rather than core binding? We now turn to the study of child language, where we believe such evidence can be found.

3. USING CHILD LANGUAGE AS EVIDENCE: AVRUTIN AND CUNNINGHAM (1997)

One well-established and widely accepted generalization about first language acquisition and development is that children acquire mastery of the discourse-related constraints of their target grammar long after they have fully acquired its syntactic constraints. If syntactic principles alone constrain the interpretation of a sentence in adult grammar, the young child will show perfectly adultlike comprehension performance with this sentence. On the other hand, if discourse-related constraints also contribute to the meaning of

a sentence in the adult grammar, then the young child may well show significant levels of non-adultlike comprehension performance with this sentence. A well-known example of this is observed in the acquisition of the adult grammatical constraints on intersentential pronominal anaphora. When pronoun interpretation is only constrained by syntax, as in the case of a bound variable reading, children show virtually no divergence from adultlike performance. However, when a discourse-related rule also participates in determining the meaning of a pronoun, as in the case of a referential reading, children show the well-known (misleadingly labeled) “delay of Principle B” effect (e.g., Chien and Wexler (1990) and Grodzinsky and Reinhart (1993)). Another example of the delayed acquisition of discourse-related rules can be seen in children’s use of the grammatical features of pronouns. In the case of the intersentential phi feature agreement of a pronoun with its antecedent, which is purely a matter of syntax, children show virtually no errors (Chien and Wexler, 1990). However, in the case of the extrasentential phi feature agreement of a pronoun with its discourse antecedent, which is not a matter of syntax, on-line psycholinguistic studies have shown that young children differ significantly from adults, often failing to use features such as number or gender to disambiguate pronominal discourse anaphora (Tyler, 1983). Given the general developmental dissociation of syntactic and discourse-related rules, an observation of substantial child “errors” with a given sentence-type or construction becomes evidence that the “correct” adult performance with this sentence-type or construction is the effect of a discourse-related rule of grammar, not the effect of a syntactic rule.

Applying this reasoning, Avrutin and Cunningham (1997) provide an argument from English child language that binding into locative PPs is logophoric in adult English. Avrutin and Cunningham tested pre-school children’s interpretation of reflexives in locative PPs, a construction which clearly differentiates Reinhart and Reuland’s theory from other accounts. Building on work by Huang (1983), Hestvik (1991) showed that binding into locative PPs can be considered a case of core binding if the binding domain for reflexives is defined as requiring a subject. If so, children should not have problems with the type of construction. On the other hand, according to Reinhart and Reuland’s theory, reflexives in locative PPs are logophorically governed. If so, one might expect children to have problems with such reflexives insofar as the discourse-related rules of logophoricity had not been fully acquired.

Avrutin and Cunningham found that, indeed, young children acquiring English as a first language accepted non-adultlike (#) readings such as in (11) on average 53% of the time. In each sentence in (11), the antecedent of the reflexive is embedded in the subject and therefore is not a coargument of the reflexive (nor does it c-command it).

- (11) a. #[The man near the boy₁]₂ hid a book behind himself₁.
 b. #[The woman near the girl₁]₂ drew a circle around herself₁.
 c. #[The man near the boy₁]₂ put a hat on himself₁.

In stark contrast, the same children accepted the ungrammatical readings represented in (12) on average only 13% of the time. In each sentence in (12), the antecedent is a coargument of the reflexive (and c-commands it). (Presumably, the 13% non-adultlike responses observed here should not be attributed to the occasional assignment of an ungrammatical LF but rather to the occasional confounding effect of nonlinguistic factors.)

- (12) a. *[The man near the boy₁]₂ is washing himself₁.
 b. *[The woman near the girl₁]₂ is tickling herself₁.
 c. *[The woman near the girl₁]₂ covered herself₁.

Avrutin and Cunningham concluded that children have trouble finding the adult-grammatical antecedent of a reflexive in a locative PP because antecedent selection in this case is determined by logophoric binding. Since the rules of logophoric antecedent selection require access to discourse-related knowledge, and since this is missing, incomplete, or hard to access for preschool children, logophoric reflexives are effectively liberated from such constraints in the children's grammar, with the result that significant deviance from adultlike performance is observed. (Note that the incomplete acquisition of a discourse-related rule constraining logophoric binding does not necessarily result in 0% adultlike performance.)

4. EXPERIMENTAL EVIDENCE FROM NORWEGIAN CHILD LANGUAGE

We turn now to our own experimental work on child Norwegian, which applied the same research strategy as that of Avrutin and Cunningham. The three reflexive constructions we examined were possessive reflexives, simplex reflexives in locative PPs, and simplex reflexives in picture NPs. The prediction of the non-coargument theory was that the Norwegian children would treat all three reflexive constructions in the same way. Either they would show fully adultlike performance with each or they would make the same kind of coreference assignment "error" with each. In the latter case, this would be due to the circumstance that (i) in each construction the reflexive was a logophor and (ii) the children had not fully mastered the discourse-related rules of logophoric binding. In contrast, the LF-movement theory predicted that if the children showed any errors, it would only be

with reflexives in picture NPs, since, according to this theory, the possessive reflexive and the reflexive in a locative PP involve core binding, not logophoric binding.

We carried out two experiments with two overlapping groups of Norwegian preschool children of roughly the same age range. One group was tested on possessive reflexives and reflexives in locative PPs, and the other group was tested on reflexives in picture NPs. Eleven children participated in both experiments, i.e., were tested on all three reflexive constructions.

4.1. Experiment 1: Possessive Reflexives and Reflexives in Locative PPs

The stimuli sentences testing possessive reflexives were the three questions in (13). *Sin* is the third person singular form of the Norwegian possessive reflexive, unspecified for gender. The three sentences testing reflexives in locative PPs are shown in (14). *Seg* is the Norwegian third person simplex reflexive, unspecified for number or gender. (For brevity, we only give a morphological analysis of (13a) and (14a).)

- (13) a. *Knytt-er dame-n sko-en sin?*
 Knit-Pres lady-def shoe-def PosRefl
 'Is the lady tying her(self's) shoe?'
 b. *Løfter damen hatten sin?*
 'Is the lady lifting her(self's) hat?'
 c. *Holder gutten i buksen sin?*
 'Is the body holding his(self's) pants?'
- (14) a. *Ha-r dame-n lagt en hårbørste bak seg?*
 Aux-Pres lady-def put a hairbrush behind Refl
 'Has the lady put a hairbrush behind self?'
 b. *Har jenten satt en stol bak seg?*
 'Has the girl put a chair behind self?'
 c. *Tegner gutten en sirkel rundt seg?*
 'Is the boy drawing a circle around self?'

4.1.1. SUBJECTS

Thirty-two monolingual children acquiring Norwegian as a first language participated in Experiment 1. The age range was from 3:11 to 6:8. The mean age was 5:10. There were approximately as many boys as girls in this group of children. In addition, 23 adult Norwegian native speakers participated as a control group.

4.1.2. MATERIALS, DESIGN, AND PROCEDURE

The experiment was presented to the child as guessing game with pictures. For each trial of an experimental condition, one experimenter, who sat opposite the child, would make a guess about a picture that he could not see. The child, who could see the picture, determined whether or not the guess was correct. The guess, which was the target input sentence, was always presented in the form of a yes/no question. This allowed the child to respond by simply saying "Yes" or "No." A second experimenter sat with the child and manipulated the pictures.

There were three different trials of each test condition, varying as to the types of objects depicted in the picture and as to the predicate used in the target input sentence. The predicates were *knytte* 'tie,' *se på* 'look at,' and *løfte* 'lift.' Trials eliciting "Yes" responses from adults were perfectly counterbalanced by trials eliciting adult "No" responses because each sentence was tested once with a "correct guess" picture and once with a "wrong guess" picture, as exemplified in Fig. 1. (Figure 1 represents two separate experimental items presented at different points in the experiment.)

In each trial of each test conditions, both an inter- and an extrasentential potential antecedent for the reflexive was explicitly introduced into the discourse context in a thematically neutral fashion immediately prior to presentation of the guess. For example, for each of the trials shown in Fig. 1, just

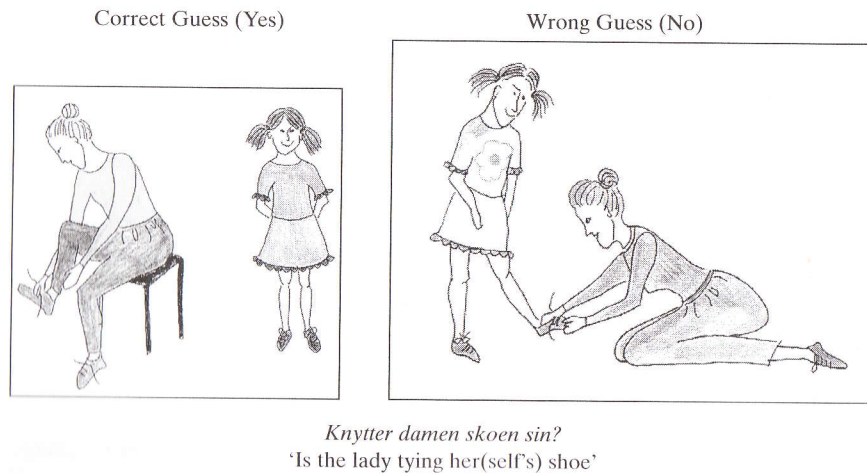


Figure 1. Possessive Reflexive *Sin* Conditions. The target input sentence presented with the correct guess picture was a trial of the test condition eliciting an adult affirmative response; the same sentence presented with the wrong guess picture was a trial of the test condition eliciting an adult negative response.

before delivering the guess, the guessing experimenter would say something like "Hmm. Let's see. A girl and a lady . . .," as if musing out loud about how to guess. The grammatical antecedent was always mentioned last in this explicit definition of the discourse context.

If the child's grammar treated *sin* as a logophor—i.e., as a reflexive not subject to a grammatical constraint but rather to a discourse-related constraint—and if the child had not fully acquired these discourse-related constraints, then we might expect the child to assign reference to the reflexive in a non-adultlike manner significantly often and to answer quite differently from adults much of the time. For example, such a child should significantly often take the girl to be the referent of *sin* in the trials of the two test conditions represented in Fig. 1, and therefore often respond "No" with the correct guess picture and "Yes" with the wrong guess picture. On the other hand, if the grammatical system of the child analyzes these cases as grammatically conditioned, we would expect adultlike performance virtually all of the time.

The two conditions testing reflexives in locative PPs are exemplified in Fig. 2. These conditions were presented in the same manner and with as many repeated measures as the conditions testing possessive reflexives. For the three different trials of each condition, the predicates *sette* 'place' and *legge* 'put' were used. For each trial, the experimenter manipulating the pictures always gave the guessing experimenter a "hint." For example, for each of the trials represented in Fig. 2, the hint was "The lady put the hairbrush somewhere." This was done to make the target input sentences maximally felicitous as guesses.

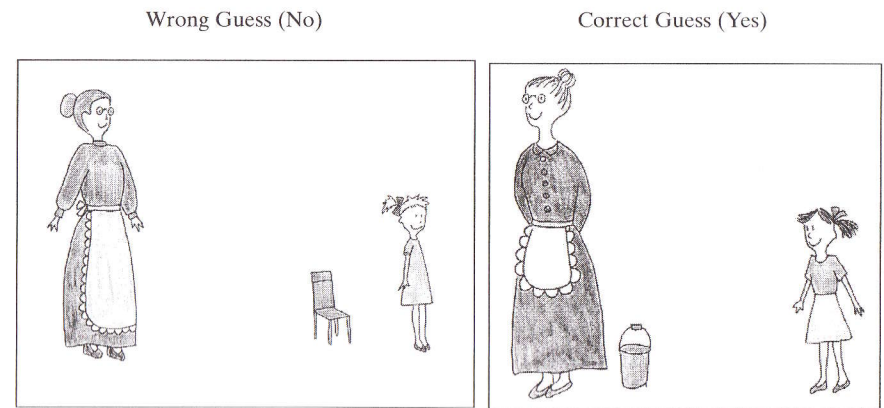


Figure 2. *Seg* in Locative PP Conditions.

The experiment also included filler items using the same picture types and sentence types as the test items, but with pronouns instead of reflexives in the target input sentences. This was part of another experiment (Hestvik and Philip, 1997, 2000), but may serve here as an independent measure of the children's linguistic development. The filler and experimental items were presented to all subjects in a single, pseudo-random order, in two 15-minute sessions spaced approximately one or two weeks apart.

Note that, in our experiment, it was not the child, but rather the experimenter making the guesses who appeared to be under examination. The experimenter's guesses were judged by the children for their truth value, and all the children immediately grasped that these guesses could just as often be wrong as right. (Thanks to the counterbalancing, they were wrong for an adult half the time.) For this and other related reasons, we believe that our adaptation of the Truth Value Judgment Task is formally and functionally equivalent to that used by Avrutin and Cunningham, and that their experimental results may be validly compared to ours despite superficial differences between the two experimental paradigms.

4.1.3. RESULTS OF EXPERIMENT 1

An ANOVA showed there to be no significant age effects when comparing 5-year-olds ($n = 16$) with 6-year-olds ($n = 16$). The average percentages of adultlike responses of the 32 children under each test condition are shown in Table 1 (standard error in parentheses). The average percentages of expected responses under these experimental conditions for the 23 adults in the control group are given in Table 2.

4.1.4. DISCUSSION OF EXPERIMENT 1

Even though it was possible to choose an antecedent other than the local subject, the 32 children of Experiment 1 performed virtually adultlike under all the test conditions. If antecedent selection for the reflexives were subject to discourse-related rules, and if children at this age do not master these

TABLE 1
PERCENT ADULTLIKE PERFORMANCE OF CHILDREN

Picture Type (Adult Response)	Possessive Reflexive <i>Sin</i>	<i>Seg</i> in Locative PP
Correct Guess (Yes)	99% (1)	98% (1)
Wrong Guess (No)	95% (2)	96% (2)

TABLE 2
PERCENT EXPECTED PERFORMANCE OF ADULTS

Picture Type (Adult Response)	Possessive Reflexive <i>Sin</i>	<i>Seg</i> in Locative PP
Correct Guess (Yes)	97% (2)	100%
Wrong Guess (No)	100%	99% (1)

rules, or due to general processing limitations cannot apply them easily, this highly adultlike performance is not expected. On the other hand, such performance is indeed expected if antecedent selection for possessive reflexive *sin* and *seg* in a locative PP is determined purely by syntactic rule.

Furthermore, if we consider how these children performed with non-reflexive pronouns in the same sentence types and with the same picture types, we find an interesting contrast with their performance on the test items. Consider Table 3, which shows the average percentages of adultlike responses of the children under the same experimental conditions but with pronouns substituted for reflexives. (*Hans* is the possessive form of the third person masculine singular pronoun; *ham* is the accusative form. In a sentence such as *John pekte på hatten hans*, "John pointed to his hat," coreference between *John* and *hans* is ungrammatical in adult Norwegian. Likewise, in a sentence such as *John satte stolen bak ham*, "John put the chair behind him," *John* is not a grammatical antecedent of *ham*.)

The children's comparatively poor performance with pronouns may be accounted for in the standard manner, i.e., by the hypothesis that they have not fully acquired some set of discourse-related rules or lack the computational power to apply these rules successfully most of the time. But why does this incomplete acquisition or general immaturity of computational resources not affect the same children's performance with reflexives? The simplest answer to this question is that discourse rules play no role whatsoever in the antecedent selection of Norwegian possessive reflexive *sin* and *seg* in a locative PP, neither in the child grammar nor in the adult grammar. We conclude, therefore, that reflexive antecedent selection in the case of

TABLE 3
PERCENT ADULTLIKE PERFORMANCE WITH PRONOUNS

Picture Type (Adult Response)	Possessive Pronoun <i>Hans</i>	<i>Ham</i> in Locative PP
Correct Guess (Yes)	78% (4)	60% (5)
Wrong Guess (No)	46% (6)	34% (6)

these two reflexive constructions is determined by purely by syntactic mechanisms, which children of the age tested have fully acquired.

4.2. Experiment 2: Reflexives in Picture NPs

We now turn to a second experiment in which we examined children's comprehension of reflexive *seg* in picture NPs. The test sentences are shown in (15).

- (15) a. *Driv-er hund-en og vis-er gutt-en et bilde av seg?*
Do-Pres dog-def and show-Pres boy-def a picture of Refl
'Is the dog showing the boy a picture of self?'
b. *Driver gutten og viser hesten et bilde av seg?*
'Is the boy showing the horse a picture of self?'
c. *Driver politimannen og viser gutten et bilde av seg?*
'Is the policeman showing the boy a picture of self?'

4.2.1. SUBJECTS

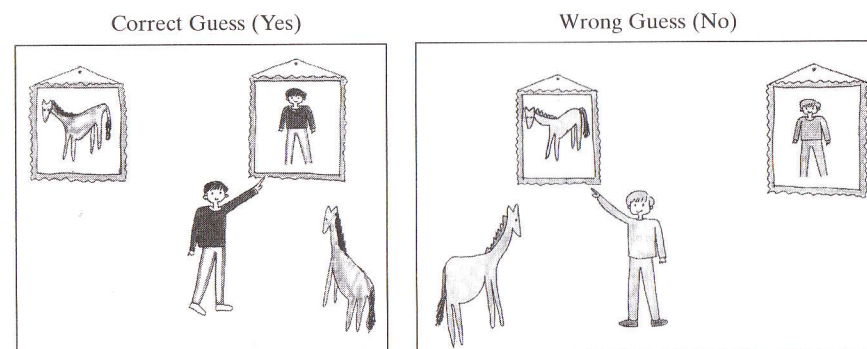
Forty-four children acquiring Norwegian as a first language participated in Experiment 2. The age range was from 4:5 to 7:4. The mean age was 6:3. The same 23 adults from Experiment 1 also participated as a control group for Experiment 2.

4.2.2. MATERIALS, DESIGN, AND PROCEDURE.

As in Experiment 1, tokens of the target input sentence type were matched with correct guess and wrong guess pictures, as exemplified in Fig. 3.

For the trials represented in Fig. 3, the context-setting linguistic input delivered by the guesser immediately prior to making his guess was a statement such as "Hmm. Let's see. A horse, a boy, and two pictures."

Experiment 2 used exactly the same experimental procedure as that in Experiment 1, and the design was the same as well. Aside from having different test conditions, the two experiments differed only in that they contained different filler items and in that for Experiment 2, a single predicate, *viser* 'show,' was used for the three different trials of each test condition. The filler items of Experiment 2 consisted of sentences like that shown in Fig. 3 but with the reflexive *seg* replaced by the pronoun *ham* 'him'—e.g., *Driver gutten og viser hesten et bilde av ham?* 'Is the boy showing the horse a picture of him?'—and also simple sentences containing a locally bound instance of the Norwegian complex reflexive *seg selv*—i.e., sentences such as *Driver gutten og tørker seg selv?* 'Is the boy drying himself off?' Again, these



Driver gutten og viser hesten et bilde av seg?
'Is the boy showing the horse a picture of self?'

Figure 3. *Seg* in Picture NP conditions.

may serve as independent measures of the linguistic development of the children who participated in Experiment 2.

4.2.3. RESULTS OF EXPERIMENT 2

Again, there were no age significant effects (ANOVA). The average percentages of adultlike responses of the 44 children under the test conditions exemplified in Fig. 3 and under the control condition with *seg selv* are given in Table 4 (standard error in parentheses). The adult control group performed 100% as expected for each of these experimental conditions, i.e., always selecting a subject antecedent.

4.2.4. DISCUSSION OF EXPERIMENT 2

As can be seen from Table 4, the children performed significantly worse with *seg* in picture noun phrases. Under the test condition for which the adult answer was "No," i.e., with the wrong guess picture, the children an-

TABLE 4
PERCENT ADULTLIKE PERFORMANCE

Picture Type (Adult Response)	<i>Seg</i> in Picture NP	<i>Seg selv</i> Locally Bound
Correct Guess (Yes)	84% (3)	98% (1)
Wrong Guess (No)	52% (6)	99% (1)

TABLE 5
PERCENT ADULTLIKE PERFORMANCE WITH PRONOUNS

Picture Type (Adult Response)	<i>Ham</i> in Picture NP
Correct Guess (Yes)	81% (4)
Wrong Guess (No)	39% (6)

swered "Yes" roughly half of the time, suggesting that they do not have the adult rules for selection of antecedent for *seg* when it occurs in picture NPs. (We attribute the fact that they performed slightly better under the correct guess condition to the general confounding effect of a yes-response bias.) This finding is expected if antecedent selection for the reflexive in this context requires mastery of a discourse-related rule and children at this age generally lack such mastery. It is highly unexpected, on the other hand, if syntax governs antecedent selection for the reflexive in this context, since children at this age generally show complete mastery of the syntactic rules of the adult grammar they are acquiring.

Interestingly, the results for *seg* in picture noun phrases closely parallel those for pronominals in picture noun phrases. Consider Table 5, which shows the average percentages of adultlike responses of these children for the filler conditions with pronouns.

This suggests that in practice, the children did not distinguish between pronouns and reflexives in this particular construction, supporting the hypothesis that they treat the picture NP as a context for logophoric binding. In other words, they recognize this sentence type as a logophoric context, but not knowing the rules for logophoric antecedent selection, they fail to differentiate between pronouns and reflexives in this context.

4.3. Within-Subjects Comparison

The results of Experiments 1 and 2 suggest that, in child Norwegian, possessive reflexives and reflexives in locative PPs are governed by the syntactic principles of core binding, while reflexive *seg* in picture NPs are governed by the discourse-related principles of logophoric binding. It might be objected, however, that the contrasts in performance observed between the test conditions of Experiment 1 and those of Experiment 2 may simply indicate a developmental difference between the two groups of children that participated in each experiment. In other words, perhaps the children of Experiment 1 simply happened to have been further along in their acquisition of the target grammar than those of Experiment 2—despite the fact

TABLE 6
PERCENT ADULTLIKE PERFORMANCE OF 11 CHILDREN IN BOTH EXPERIMENTS

Picture Type	Possessive Reflexive <i>Sin</i>	<i>Seg</i> in Locative PP	<i>Seg</i> in Picture NP
Correct Guess	100%	98% (1)	79% (7)
Wrong Guess	94% (6)	97% (3)	61% (12)

that they were slightly younger—and that is why they showed more adultlike performance with possessive reflexives and reflexives in locative PPs than the children of Experiment 2 showed with reflexives in picture NPs. This objection can be directly addressed by considering the performance of the 11 children who participated in both experiments. Consider, then, Table 6, which shows the percentages of adultlike responses under the three test conditions for the 11 children who participated in both experiments, and Table 7, where the performance of these 11 children under the wrong-guess conditions is compared with that of each larger group they were part of.

As can be seen at a glance, the response pattern for the 11 children who participated in both experiments is statistically nondistinct from that of each larger group they were part of. The ability of these 11 children to detect grammatically determined falsity with sentences containing a possessive reflexive—i.e., to recognize that such sentences falsely described wrong-guess pictures—differed significantly (*t*-test, $p < 0.0189$) from their ability to detect grammatically determined falsity with sentences containing a reflexive in a picture NP. (By transitivity, the contrast is even greater between false sentences with *seg* in a locative PP and false sentences with *seg* in a picture NP.) This within-subjects comparison provides strong evidence that the contrast in performance observed between reflexives in picture NPs, on the one hand, and possessive reflexives and reflexives in locative PPs, on the other, is due to linguistic factors, not to developmental differences between the two groups of children.

TABLE 7
PERCENT ADULTLIKE PERFORMANCE UNDER WRONG GUESS CONDITIONS

Group (n)	Possessive Reflexive <i>Sin</i>	<i>Seg</i> in Locative PP	<i>Seg</i> in Picture
Experiment 1 (32)	95% (1)	98% (1)	—
Experiment 2 (44)	—	—	52% (6)
Experiment 1+2 (11)	94% (6)	97% (3)	61% (12)

One caveat should be mentioned, however. Although we find it implausible, there is a possible nonlinguistic explanation of the asymmetry observed in the children's performance under the test conditions. Recall that under the conditions testing possessive reflexives and reflexives in locative PPs, one potential antecedent for the reflexive was extrasentential and the other was sentence-internal, while under the experimental conditions testing reflexives in picture NPs, both potential antecedents were sentence-internal. It might be speculated, then, that the children's highly adultlike performance with the former two reflexive constructions was confounded by the "Clever Hans effect," a nongrammatical strategy of picking the linearly closest NP as the antecedent for the reflexive. For the sentences testing picture NPs, this strategy would yield non-adultlike responses, since the linearly closest NP was the indirect object. On the other hand, for the sentences testing the possessive and locative constructions, this strategy would yield pseudo-adultlike performance, since the linearly closest NP, i.e., the subject, happened to be the grammatical antecedent. To conclusively rule out this alternative, strategy-based account of our findings, one would have to test sentences with possessive and locative constructions that also had an additional, sentence-internal NP linearly closer to the reflexive than the subject NP. We leave this for future research, and simply note in the meantime that the null hypothesis in assessing experimental data with children is that grammatical linguistic performance is determined by grammar.

5. CONCLUSION

Our findings take quite a different direction from those of Avrutin and Cunningham. Although our results have no bearing on the grammar of anaphors in child English, they do suggest the following general observations about child Norwegian:

- Possessive reflexive *sin* heading a DP and reflexive *seg* in a locative PP are not logophors in child Norwegian and, for this reason, Norwegian preschool children show fully adultlike performance with such reflexives.
- Reflexive *seg* in a picture NP is a logophor in child Norwegian and, for this reason—given a general (and presumably universal) delay in the acquisition of logophoric binding—Norwegian preschoolers show significant levels of non-adultlike performance with such reflexives.

Given the Strong Continuity Hypothesis of first language acquisition theory, these observations about child Norwegian constrain theories of adult

Norwegian linguistic competence as well. They suggest that in adult Norwegian, possessive reflexives and reflexives in locative PPs are governed by core binding, not by logophoric binding, and that only reflexives in picture NPs are true logophors. If this is the correct descriptive generalization, then the coargument theory of Reinhart and Reuland (1993) is in need of revision. The LF-movement theory, on the other hand, predicts precisely this state of affairs.

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