

The development of relative clauses in spontaneous child speech*

HOLGER DIESSEL and MICHAEL TOMASELLO

Abstract

This study examines the development of relative clauses in the speech of four English-speaking children between 1;9 and 5;2 years of age. It is shown that the earliest relative clauses occur in presentational constructions that express a single proposition in two finite clauses. Starting from such simple sentences, children gradually learn the use of more complex constructions in which the relative clause modifies the noun of a full-fledged main clause. Five factors are considered that might contribute to the development of relative clauses in spontaneous child speech: (1) the ambient language, (2) the formulaic character of the main clause, (3) the information structure of the whole utterance, (4) the communicative function of presentational relatives, and (5) the limited processing capacity of young children.

Keywords: *relative clause; syntactic development; construction grammar; presentational construction.*

Introduction

The acquisition of relative clauses has been studied extensively over the past 30 years. The bulk of this work is concerned with children's comprehension of relative clauses in experiments (cf. Brown 1971; Smith 1974; Sheldon 1974; Hakes et al. 1976; de Villiers et al. 1979; Tavakolian 1981; Hakuta 1982; Goodluck and Tavakolian 1982; Hamburger and Crain 1982; Clancy et al. 1986; Keenan and Hawkins 1987; MacWhinney and Pléh 1988; Correa 1982, 1995; McKee et al. 1998; Kidd and Bavin 2000). The current study investigates the use (i.e., production) of relative clauses in naturally occurring child speech, which has never been examined in detail. Menyuk (1969) and Limber (1973, 1976) discuss a few aspects of children's spontaneous use of relative clauses in English;

Slobin (1986) compares the development of relative clauses in the speech of English- and Turkish-speaking children; and Dasinger and Toupin (1994) and Jisa and Kern (1998) analyze the discourse-pragmatic functions of relative clauses that children used in a picture book task. However, none of these studies provides a systematic analysis of the development of relative clauses in natural child speech. The current study presents the first large-scale investigation of the acquisition of relative clauses based on observational data and thus fills an important gap in the literature.

A relative clause is a subordinate clause that modifies a noun or noun phrase in an associated main clause. Two features characterize the structure of a relative clause: (1) The syntactic role of the main-clause element functioning as the *head* of the relative clause (i.e., the element that is modified by a relative clause), and (2) the syntactic role of the element that is *gapped* or *relativized* inside of the relative clause (also called the *focus* of the relative clause). Based on these two features, four types of relative clauses are usually distinguished: (1) SS relatives, in which the main-clause subject is modified by a relative clause in which the subject is relativized; (2) SO relatives, in which the main-clause subject is modified by a relative clause in which the object is relativized; (3) OS relatives, in which the main-clause object is modified by a relative clause in which the subject is relativized; and (4) OO relatives, in which the main-clause object is modified by a relative clause in which the object is relativized. The following examples, adopted from Sheldon (1974: 275), exemplify these four types of relative clauses:

- (1) The dog [that ____ jumps over the pig] bumps into the lion. SS
- (2) The lion [that the horse bumps into ____] jumps over the giraffe. SO
- (3) The pig bumps into the horse [that ____ jumps over the giraffe]. OS
- (4) The dog stands on the horse [that the giraffe jumps over ____]. OO

In order to test children's comprehension of relative clauses, researchers have used either an imitation task in which children repeated sentences like the ones in examples (1) to (4) (e.g., Smith 1974) or a comprehension task in which children acted out the meaning of such sentences using toy animals (e.g., Sheldon 1974). The errors that children produced in these experiments (which were not always consistent across studies; cf. de Villiers et al. 1979) suggested that children use a specific processing strategy in their interpretation of relative clauses. The following hypotheses as to how children interpret relative clauses have been proposed:

1. The *non-interruption hypothesis*, which asserts that children have difficulties in interpreting center-embedded relative clauses (i.e., SS and SO relatives) while they might find it relatively easy

to comprehend relative clauses that follow the main clause (i.e., OS and OO relatives) (cf. Slobin 1973).¹

2. The *parallel function hypothesis*, which states that children tend to assign the same syntactic role to the relativized NP and the head noun, which makes it relatively easy to interpret SS and OO relative clauses while SO and OS relatives are rather difficult to process (cf. Sheldon 1974).
3. The *NVN schema hypothesis*, according to which children interpret relative constructions using a Noun-Verb-Noun schema, which they apply to complex sentences regardless of the boundary between main and relative clauses (cf. de Villiers et al. 1979).
4. The *conjoined clause hypothesis*, which posits that children interpret early relative clauses as conjoined sentences rather than as embedded clauses (cf. Tavakolian 1981).

While the processing strategies suggested in the experimental literature might characterize children's comprehension of relative clauses, we did not find any evidence for such strategies in children's spontaneous production of relative clauses: there are no (systematic) errors in our data that would suggest the use of a specific processing strategy. That does not mean, however, that processing is irrelevant to children's early production of relative clauses. On the contrary, in the following we will argue that processing is one of the factors determining the development of children's spontaneous use of relative clauses. However, in our view children do not employ a specific processing strategy (in their spontaneous use of relative clauses); rather, processing plays a more general role in that it restricts children's early production of relative clauses to rather simple constructions. More complex relative constructions emerge only when children develop a more powerful processing capacity with increasing age. Moreover, processing is only one of the factors that is relevant to the development of relative clauses in spontaneous child speech: semantic and pragmatic factors are equally important. In fact, we claim that what children learn when they begin to use relative clauses are grammatical constructions (rather than abstract processing strategies) in which a specific form is paired with a specific meaning. More precisely, we argue that the earliest relative clauses used by English-speaking children are propositionally (i.e., semantically) simple. They consist of a presentational copular clause and a relative, which usually includes an intransitive verb. Though these sentences contain two finite clauses, they express only a single proposition. As children grow older, they begin to use relative clauses in sentences that are increasingly more complex and diverse. Unlike the early presentational relatives, the relative constructions

produced by older children often include two propositions expressed by main and relative clauses. Based on these findings we argue that one can characterize the acquisition of relative clauses in English as a process of clause expansion: starting from presentational relatives that are propositionally simple, children gradually learn the use of complex relative constructions that contain two propositions.

Methodology

Our study is based on naturalistic data from four English-speaking children between 1;9 and 5;2 years of age. All data are taken from the CHILDES database (cf. MacWhinney and Snow 1990). Table 1 shows the age range of the four children, the total number of utterances produced by each child, the number of relative clauses that occur in these data, and the number of transcripts available for each child.

As can be seen in Table 1, there is a total of 329 sentences including a relative clause in our corpus. We only considered finite relative clauses marked by a relative pronoun, a complementizer (i.e., *that*), the question word *where* (after locative head nouns; e.g., *the place where we used to live*), or just a gap in the argument structure. So we did not consider reduced relative clauses including a nonfinite verb and headless relative clauses lacking an overt head noun.

Note that our study is not confined to restrictive relative clauses, which function to identify a specific element in a set of potential referents. Following Lambrecht (1988), Fox (1987), Fox and Thompson (1990) and others, we assume that relative clauses may serve a variety of semantic and pragmatic functions apart from the identification function of restrictive relatives, which are often seen as the prototype of a relative clause (cf. Keenan and Comrie 1977).

All sentences included in our data have been coded for the two features that characterize the syntactic structure of a relative clause: (1) the syntactic role of the head noun, and (2) the syntactic role of the relativized NP. However, in contrast to previous works, we did not only distinguish

Table 1. *Age of children and number of relative clauses*

Children	Age range	Utterances	Relative clauses	Files
Peter	1;9–3;1	30,256	26	20
Sarah	2;3–5;1	37,066	41	139
Nina	1;11–3;3	32,212	69	56
Adam	2;3–5;2	46,480	193	55
Total	1;9–5;1	146,014	329	270

between SS, SO, OS, and OO relative clauses. Rather, in order to account for all relative constructions that occur in our data, we had to develop a more complex coding scheme: As can be seen in Table 2, we distinguish five head nouns and four relativized NPs, yielding a total of 20 types of relative clauses. An example of each type is given in (5) to (24).

- (5) Here's a tiger *that's gonna scare him*. (Nina 3;1) PN-A
 (6) Is this something *that turn around?* (Adam 3;5) PN-S
 (7) These are my duties *I have to do*. (Sarah 4;10) PN-O
 (8) It's the one *you went to last night*. (Peter 2;10) PN-OBL
 (9) The other thing *that holds it up*. (Peter 3;1) NP-A
 (10) The girl *that came with us*. (Nina 3;0) NP-S
 (11) Something *that cowboys use*. (Adam 4;10) NP-O
 (12) Those little things *that you play with*. (Adam 4;10) NP-OBL
 (13) The person *who puts dem on* (pause) has to. (Adam 3;11) SUBJ-A
 (14) The one *that not finished* is the café, I guess. (Adam 5;2) SUBJ-S
 (15) The first thing *we have to do* (is to) put dis in. (Adam 3;11) SUBJ-O
 (16) The apartment *he lives in* is very loud. (not attested) SUBJ-OBL
 (17) I want to see some ducks *that do that too*. (Nina 3;2) OBJ-A
 (18) She has a bathtub *that goes with it*. (Sarah 5;0) OBJ-S
 (19) I gon draw everything *I like*. (Adam 3;5) OBJ-O
 (20) You left this toy *I am playing with*. (Peter 3;1) OBJ-OBL
 (21) I wanna go to the zoo *that has those animals*. (Nina 3;2) OBL-A
 (22) I'm gonna go on the animal *that goes up and down*. (Nina 3;3) OBL-S
 (23) Change it to the very one *you love best*. (Adam 4;4) OBL-O
 (24) Sit on my place *where I used to sit*. (Sarah 4;6) OBL-OBL

For all values given in the results, mean proportions were used. That is, for each relative-clause type we computed the proportion of this type in the data of individual children, added the proportions from all four children, and divided the resulting figure by four.

Table 2. *Classification of relative constructions*

Head of relative clause	Relativized NP
PN = predicate nominal	A = subject of transitive REL clause
NP = isolated noun phrase	S = subject of intransitive REL clause
SUBJ = subject	O = object
OBJ = object	OBL = oblique
OBL = oblique	

Results

The relative constructions that have been used in most experiments include two transitive clauses. The arguments of both clauses are usually expressed by common nouns as in the following example from Goodluck and Tavakolian (1982: 3):

(25) The lion kisses the duck *that hits the pig*.

The relative constructions in our data are very different. Only 27 percent contain two transitive clauses and the majority of arguments are expressed by pronouns keeping track of prior discourse topics. This suggests that the relative constructions in spontaneous child speech are less complex (and therefore easier to process) than those that have been used in most experiments. In fact, we maintain that the vast majority of relative constructions in our data express only a single proposition. They are either attached to an isolated head noun (phrase) (e.g., *Another picture I made*) or, more frequently, to the predicate nominal of a presentational copular clause (e.g., *That is the sugar that goes in there*). Figure 1 shows the mean proportions of these constructions in our data (the numbers/percentages for each child are given in Table 3 in the appendix).

An average of 47 percent of all the relatives children produced modify the predicate nominal of a presentational copular clause and an average of 22.5 percent are headed by an isolated NP. The latter obviously contain a single proposition, but since presentational relatives comprise two finite clauses, one might assume that they express two propositions. However, as Lambrecht (1988: 326) has argued in a study on presentational relatives in adult speech, the copular clause of these constructions is “propositionally empty”. It does not denote a situation; rather, it

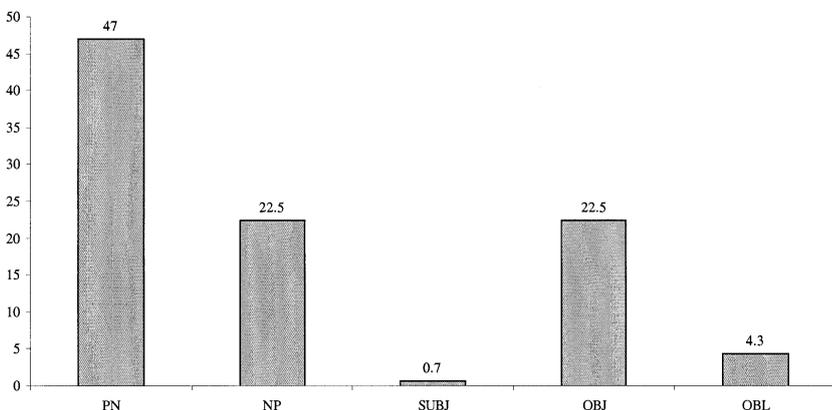


Figure 1. Mean proportions of PN-, NP-, SUBJ-, OBJ-, and OBL-relative clauses

functions to establish a referent in focus position making it available for the predication expressed in the relative clause. The whole sentence expresses thus a single proposition and can be paraphrased by a single clause (cf. Lambrecht 1988: 326):

- (26) Here's a tiger *that's gonna scare him*. (Nina 3;1)
 (27) The tiger is gonna scare him. (paraphrase)

Note that the propositional content of the relative is *not* pragmatically presupposed in these constructions; rather, it asserts new information concerning the referent established in the presentational clause (cf. Lambrecht 1988: 325; see also Fox and Thompson 1990: 306). The information structure of presentational relatives is thus very different from the information structure that one usually finds in sentences including (restrictive) relative clauses. This is a clear indication that presentational relatives form a specific grammatical construction (in the sense of construction grammar as developed in work by Fillmore and Kay [1993], Goldberg [1995], Kay and Fillmore [1999], and others). They can be seen as a grammatical template in which a specific form (i.e., [[PRO-COPULA-NP] [REL-clause]]) is paired with a specific meaning (i.e., a relative clause asserting new information). The whole structure has semantic and pragmatic properties that cannot be entirely explained in terms of the properties of their components.

If we add the mean proportions of presentational relative constructions to the mean proportions of sentences in which relative clauses are attached to an isolated head noun, we find that an average of approximately 70 percent of all sentences including a relative clause express a single proposition and could thus be paraphrased by a simple clause. Almost no S-relatives and very few OBL-relatives occurred. The only other relative construction that was relatively frequent includes an OBJ-relative clause, which accounts for an average of 22.5 percent of all relatives in our data.

The percentage of mono-propositional relative constructions is even higher among the earliest sentences in our corpus. Figure 2 shows the mean proportions of PN-, NP-, SUBJ-, OBJ- and OBL-relatives based on the first ten relative constructions produced by the four children that we examined (the numbers for each child are given in Table 4 in the appendix).

As can be seen in Figure 2, an average of 75 percent of the earliest relative clauses modify the predicate nominal of a presentational copular clause and another 7.5 percent are attached to an isolated head noun. There are no SUBJ-relatives and no OBL-relatives among the earliest relative constructions in our data. The other 17.5 percent are headed by the object of a transitive clause. If we look at the OBJ-relatives more

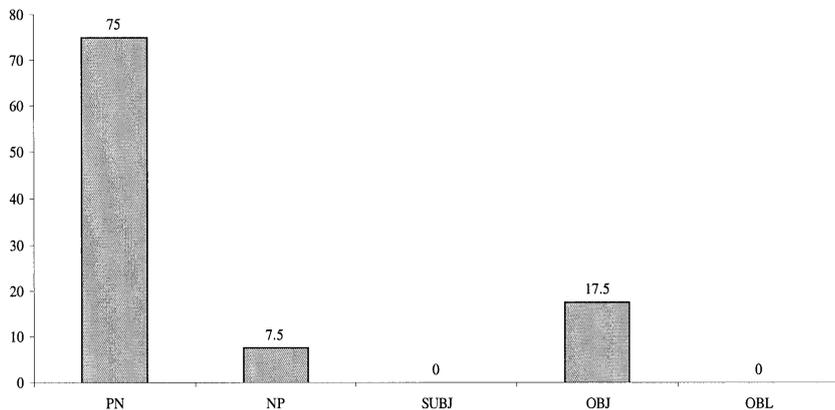


Figure 2. Mean proportions of the earliest PN-, NP-, SUBJ-, OBJ-, and OBL-relative clauses

closely we find that more than half of them follow an imperative main clause in which *look* functions as the main verb:

- (28) Look at all the chairs *a Peter's got*. (Peter 2;5)
 (29) Look at dat train (pause) *Ursula bought*. (Adam 2;10)
 (30) Look at dat big truck *going some place*. (Adam 3;0)
 (31) Look it (pause) a big boat *we gonna buy*. (Sarah 4;2)

The sentences in (28) to (31) are functionally very similar to presentational relative constructions: *look* does not serve as a perception verb in these examples; rather, it functions as an attention getter focusing the hearer on the entity expressed by the object. In other words, the imperative main clause does not contain a full proposition; rather, it serves, like a presentational copular clause, to focus the hearer's attention on a new referent that is characterized by the relative clause. If we include these sentences in the group of presentational relatives, an average of 92.5 percent of the earliest relative clauses occur in constructions that express a single proposition.

Furthermore, it is conspicuous that most of the earliest relative clauses include an intransitive verb in our data. Figure 3 shows the mean proportions of S-, A-, O- and OBL-relatives based on the first ten relative clauses that each child produced (cf. Table 6 in the appendix).

As can be seen in Figure 3, an average of 67.5 percent of the earliest relative clauses include an intransitive verb in our data (compared to an average of 38.7 percent in the entire corpus; see Table 5 in the appendix). Since almost all of them are attached to the predicate nominal of a copular clause, sentences containing an intransitive relative and a presentational

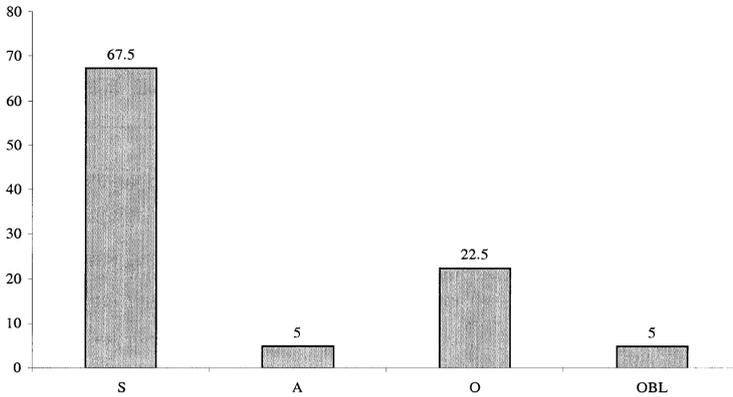


Figure 3. Mean proportions of the earliest S-, A-, O-, and OBL-relative clauses

copular clause can be seen as the prototype of a relative construction in early child speech. Twenty-four of the first forty relative constructions (i.e., the first ten relative constructions produced by each child) are of this type in our data.

Interestingly, in some of these sentences the relative clause follows the presentational copular clause without a relative pronoun or complementizer that is standard in adult speech (if the subject is relativized as in S-relatives and A-relatives). Consider the following examples, which are among the first ten relative constructions in the data of the four children that we examined.

- (32) That's doggy *turn around*. (Nina 1;11)
- (33) This is my doggy *cries*. (Nina 2;0)
- (34) That's a turtle *swim*. (Nina 2;2)
- (35) Who's that *fit on that train*. (Nina 2;3)
- (36) Here's a mouse *go sleep*. (Nina 2;3)
- (37) That is a train *go go ...* (Nina 2;3)
- (38) That's the roof *go on that home*. (Nina 2;4)
- (39) That's the rabbit *fall off*. (Nina 2;4)
- (40) What's this *go in there?* (Peter 2;0)
- (41) There's a tape *go around right there*. (Peter 2;0)
- (42) It's the wheels *go*. (Peter 2;3)
- (43) This is the fire engine *go "whoo whoo"*. (Peter 2;6)
- (44) There's somebody's *gonna crash on him*. (Peter 2;9)
- (45) What is dis *came out?* (Adam 3;1)
- (46) There's the green grass *grow all around (pause) around ...* (Sarah 3;6)
- (47) And that's the birdie *scream*. (Sarah 4;3)

The sentences in (32) to (47) contain a presentational copular clause and a verb phrase that one might analyze as a relative clause in which the relative pronoun or complementizer is absent. Though these sentences are ungrammatical from the viewpoint of standard English, they *do* occur in certain nonstandard varieties of adult speech. The following attested examples are reported by Lambrecht (1988: 319):

- (48) There was a ball of fire *shot up through the seats in front of me*.
 (49) There's something *keeps upsetting him*.
 (50) There's a lot of people *don't know that*.

The sentences in (48) to (50) were produced in natural conversations by adult native speakers of English. They have the same structure as some of the early relative constructions in our data (except that two of them include a transitive relative clause). Lambrecht, who analyzes these sentences from a construction grammar perspective, argues that they are not ungrammatical or pragmatically ill-formed; rather, they are instances of a specific grammatical construction, which he calls the “presentational amalgam construction” (Lambrecht 1988: 335; see also Lakoff 1974). Though the occurrence of this construction is restricted to certain nonstandard varieties of adult speech, it is so widely attested that its existence cannot be disputed. Lambrecht characterizes the presentational amalgam construction as a syntactic blend in which the predicate nominal of the copular clause also serves as the syntactic subject of the clause final VP, which he considers a truncated relative clause. Based on this analysis, he classifies the amalgam construction as a subtype of the presentational relative construction in which the relative clause is clearly separated from the rest of the sentence.

The same analysis applies to the sentences that we have cited in examples (32) to (47): they are syntactic amalgams that are related to the presentational relative construction. Since the occurrence of these sentences is especially frequent among the earliest relative clauses (only a few later examples occur), they can be seen as a precursor to the presentational relative construction, which children tend to learn later: Three of the four children that we examined (Peter, Nina, and Sarah) used the amalgam construction several months before the presentational relative construction emerged in their speech. The fourth child (Adam) began to use both constructions at around the same time.

As the children of our study grow older, they begin to use relative constructions that are increasingly more complex. While the earliest relative clauses tend to occur in presentational constructions that are propositionally simple, the relatives of older children are frequently attached to a noun (or noun phrase) in a common main clause. In order

to measure this development we divided the relative constructions in our corpus into three groups according to the age of the children that produced them: (1) relatives produced by children up to age three, (2) relatives produced by children between three and four, and (3) relatives produced by children between four and five. Figure 4 provides a graphic representation of the developments; the numbers on which this representation is based are given in Table 7 in the appendix.

There are two crucial developmental changes shown in Figure 4: While the average percentage of PN-relatives falls from 71 to 37 percent, the percentage of all other relative clauses (notably OBJ-relative clauses) shows a steady increase. What this means is that the relative frequency of mono-propositional relative constructions gradually decreases as the children of our study grow older. This development is accompanied by some crucial changes in the argument structure of the relative clause as shown in Figure 5 (the numbers are given in Table 8 in the appendix).

As can be seen in this figure, there are two significant developments in the argument structure of relative clauses: while the average percentage of S-relatives decreases from 63 percent at age three to 26 percent at age five, the average percentage of O-relatives increases from 24 to 42 percent during the same time, which means that the children of our study use proportionally more transitive relative clauses as they grow older. Since transitive clauses involve an additional argument (compared to intransitive clauses), the development depicted in Figure 5 contributes to the increasing complexity of relative constructions in our data.

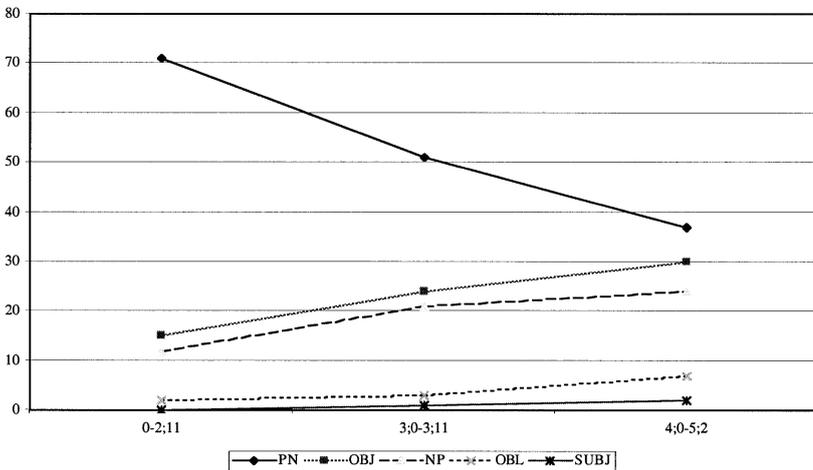


Figure 4. Development of PN-, NP-, SUBJ-, OBJ-, and OBL-relative clauses

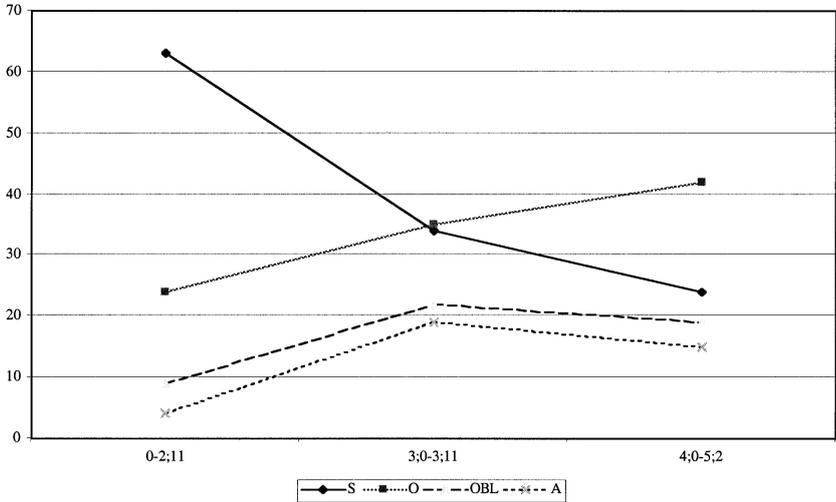


Figure 5. *Development of S-, O-, A-, and OBL-relative clauses*

Discussion

Figure 6 summarizes the major developmental changes of relative constructions described in the preceding section. The earliest relative clauses that English-speaking children learn occur in presentational constructions that are propositionally simple. They consist of a copular clause and a relative that usually includes an intransitive verb. Two types of this construction must be distinguished: (1) The regular presentational relative construction (PRC) in which the relative clause is syntactically separated from the rest of the sentence, and (2) the amalgam construction in which the relative clause is conflated with the copular clause. Since the amalgam construction is usually the first relative construction that children learn and since the occurrence of this construction becomes very infrequent once the regular presentational relative has emerged, it can be seen as a precursor to the latter. Both presentational relative constructions express a single proposition, but since the amalgam construction does not include two separate full clauses, it is syntactically denser than the regular construction. As the children of our study grow

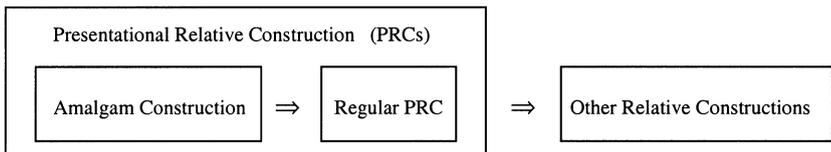


Figure 6. *The development of relative constructions in English*

older, they begin to use more complex relative constructions in which a relative clause, including an intransitive *or* transitive verb, is attached to a noun in a full-fledged main clause. Such relative constructions contain two propositions expressed in main and subordinate clauses. The whole development can therefore be seen as a process of clause expansion: starting from the presentational amalgam construction, which expresses a single proposition in a structure that is not truly biclausal, children gradually learn the use of complex relative constructions in which two propositions are expressed in two separate full clauses.

Having described the developmental changes of relative clauses in spontaneous child speech, let us now consider the factors that might motivate (or determine) the described development. In particular, let us ask why presentational relatives are the earliest and most frequent relative constructions in young children's speech. Is this a specific feature of English or is the frequent use of presentational relatives in early child speech also characteristic of other languages?

While we are not aware of any observational study that would bear on this issue, there has been one recent investigation by Jisa and Kern (1998) that analyzes the use of different relative constructions produced by French-speaking children in a picture-book task (cf. Berman and Slobin 1994). Though the children examined by Jisa and Kern are older than the children of our study (their youngest children are between 5;0 and 5;11), they also made extensive use of presentational relative constructions and compared to adult speakers they used fewer transitive verbs in the relative clause. It is thus conceivable that the development of relative clauses described in this article for English is also characteristic of the acquisition of relative clauses in other languages. However, this is probably dependent on certain language-specific features. As Dasinger and Toupin (1994) have shown in another picture-book study, the relative frequency of various relative constructions varies across languages. For instance, while presentational relatives are also frequently used by speakers of Spanish and Hebrew (both by children and by adults), they seem to be less frequent in Turkish and German, where major discourse participants are usually introduced by means of other constructions. In the remainder of this paper we will consider five factors that might explain the early and frequent use of presentational relatives in English (as well as other languages).

To begin with, like the four children of our study, their parents make frequent use of presentational relative constructions. For instance, 48.5 percent of the relative clauses produced by Nina's mother are either attached to an isolated head noun or to the predicate nominal of a presentational copular clause (see Table 9 in the appendix). That is, almost half of the relative constructions that Nina's mother

produced express a single proposition. Though the percentage of mono-propositional relative constructions is higher in Nina's data (68.1 percent; see Table 3 in the appendix), they are so frequently used by her mother that this is probably one of the reasons why presentational relatives are so early and frequent in Nina's speech.

Note that we did not find any examples of the amalgam construction in the speech of Nina's mother. It is therefore unlikely that Nina's frequent use of this construction is based on direct imitation of adult speech. Rather, it seems that children "create" the amalgam construction in an attempt to match the syntactic structure of presentational relatives with their meaning: since presentational relatives express a single proposition, children tend to merge the two clauses of this construction into a single syntactic unit. The emergence of the presentational amalgam construction is thus semantically motivated and it seems that children *and* adults "invent" this construction independently of each other but for the same semantic reasons.

Second, the earliest relative clauses are built on item-specific constructions that are deeply entrenched at the time when children begin to use relative clauses. As we have seen in the previous section, the main clause of presentational relatives consists of three components: (1) a deictic pronoun (i.e., *this, that, here, there, it*), (2) the copula *be* in the present tense form, and (3) a predicate nominal, which is basically a slot that can be filled by any (pro)noun (cf. Lieven et al. 1997). Since children use presentational clauses long before the first relative clauses emerge, it can be argued that the early use of relative constructions involves a very simple procedure by which the child combines a prefabricated (main) clause (i.e., a clause of the type *That's X, There's X, It's X*) with a second component—either a verb phrase, as in the amalgam construction, or a full relative clause, as in later examples.

Third, both parents and children use presentational relatives for specific communicative functions that are characteristic of parent-child speech: children tend to talk about elements in their environment and adult speakers usually do the same when they talk to young children. Since presentational relatives may serve to focus the hearer's attention on elements in the surrounding situation (which are then further characterized in the relative clause) they are pragmatically very useful in parent-child speech.

Fourth, as pointed out above, the propositional content of presentational relatives is asserted rather than pragmatically presupposed as in restrictive relative clauses. The information structure of the whole sentence is thus very similar to that of simple clauses, which should make it relatively easy for children to learn this type of relative clause. If the proposition of the relative clause was pragmatically presupposed, as

in other types of relative clauses, children probably would have more difficulties with these sentences because pragmatically presupposed information is usually not verbalized in young children's speech.

Finally, we suspect that processing plays an important role in the acquisition of relative clauses. Although we did not find any evidence for the use of a specific processing strategy in our data, processing seems to be an important factor in that it restricts children's early use of relative clauses to rather simple constructions. More precisely, we hypothesize that children under three years of age tend to avoid relative constructions including two propositions (one subordinated) because the processing load of these constructions would exceed their processing capacity at this early age. Our view is consistent with recent suggestions by Newport (1990) and Elman (1993) who argue that processing limitations give rise to an incremental development by which the child proceeds from rather simple to more complex structures. In their view, a limited processing window can be an advantage for the young language learner (compared to the adult second-language learner) in that it shields the child from constructions that are initially too complex to be processed successfully.

Additional support for the hypothesis that processing plays an important role in the acquisition of complex syntax comes from a recent study by Diessel and Tomasello (to appear) which examines the development of finite complement clauses (see also Diessel and Tomasello 1999). Based on observational data from seven children, this study shows that most child sentences that seem to include a sentential complement are monoclausal constructions in which the matrix clause functions either as a parenthetical evidential marker or as an attention getter that is only loosely adjoined to the complement clause, which is really an independent assertion. More precisely, children's early use of complement clauses is largely restricted to sentences in which the matrix clause is a formulaic expression such as *I think ...* or *I guess ...*, which basically serves the same function as a modal adverb such as *maybe* (Thompson and Mulac 1991). Thus, like relative clauses, complement clauses emerge in constructions that are propositionally simple and one might argue that the early use of subordinate clauses is in general confined to this kind of construction for processing reasons.

Moreover, processing limitations might also explain why children tend to avoid transitive verbs in early relative clauses (cf. Jisa and Kern 1998). As Hamburger and Crain (1982) have shown in an experiment, three- to five-year-old children have much more difficulties in interpreting transitive relative clauses than relatives that include an intransitive verb. In accordance with our line of reasoning, they argue that the outcome

of their experiment can be attributed to the additional processing load that arises from the extra argument in transitive clauses.

To summarize, we have shown that the earliest relative clauses occur in presentational constructions that express a single proposition, and we have considered five factors that might explain why relative clauses emerge in these constructions: (1) the ambient language, (2) the formulaic character of the main clause, (3) the information structure of the entire sentence, (4) the pragmatic function of presentational relatives, and (5) the limited processing capacity of young children. If and to what extent these factors contribute to the acquisition of relative clauses needs to be tested in experiments using sentences that are more realistic than those that have been used in previous works.

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*Max Planck Institute for
 Evolutionary Anthropology
 Leipzig, Germany*

Appendix

Table 3. *Total number of PN-, NP-, SUBJ-, OBJ-, and OBL-relative clauses*

	PN	NP	SUBJ	OBJ	OBL
Peter	14 (53.9%)	8 (30.7%)	–	4 (15.4%)	–
Nina	31 (44.9%)	16 (23.2%)	–	16 (23.2%)	6 (8.7%)
Sarah	16 (39.0%)	14 (34.1%)	–	9 (21.9%)	2 (4.9%)
Adam	97 (50.3%)	27 (14.0%)	5 (2.6%)	57 (29.5%)	7 (3.6%)
Total	158 (48.0%)	65 (19.8%)	5 (1.5%)	86 (26.1%)	15 (4.6%)
Mean proportions	47.0	25.5	0.7	22.5	4.3

Table 4. *First ten PN-, NP-, SUBJ-, OBJ-, and OBL-relative clauses*

	PN	NP	SUBJ	OBJ	OBL
Peter	8 (80%)	–	–	2 (20%)	–
Nina	10 (100%)	–	–	–	–
Sarah	7 (70%)	2 (20%)	–	1 (10%)	–
Adam	5 (50%)	1 (10%)	–	4 (40%)	–
Total	30 (75%)	3 (7.5%)	–	7 (17.5%)	–
Mean proportions	75.0	7.5	–	17.5	–

Table 5. Total number of S-, A-, O-, OBL-relative clauses

	S	A	O	OBL
Peter	14 (53.9%)	4 (15.4%)	5 (19.2%)	3 (11.5%)
Nina	26 (37.7%)	9 (13.0%)	21 (30.4%)	13 (18.8%)
Sarah	15 (36.6%)	8 (19.5%)	11 (26.8%)	7 (17.0%)
Adam	51 (26.4%)	18 (9.3%)	104 (53.9%)	20 (10.4%)
Total	106 (32.2%)	39 (11.9%)	141 (42.9%)	43 (13.1%)
Mean proportions	38.7	14.3	32.6	14.4

Table 6. First ten S-, A-, O-, OBL-relative clauses

	S	A	O	OBL
Peter	8 (80%)	1 (10%)	1 (10%)	–
Nina	9 (90%)	–	1 (10%)	–
Sarah	5 (50%)	1 (10%)	3 (30%)	1 (10%)
Adam	5 (50%)	–	4 (40%)	1 (1%)
Total	27 (67.5%)	2 (5.0%)	9 (22.5%)	2 (5.0%)
Mean proportions	67.5	5.0	22.5	5.0

Table 7. Development of PN-, NP-, SUBJ-, OBJ-, and OBL-relative clauses

		Age		
		0–2;11	3;0–3;11	4;0–5;2
PN	Peter	59%	33%	–
	Sarah	–	71%	32%
	Nina	86%	35%	–
	Adam	67%	65%	43%
	Mean proportions	71	51	37
NP	Peter	29%	33%	–
	Sarah	–	14%	32%
	Nina	7%	27%	–
	Adam	0%	8%	16%
	Mean proportions	12	21	24
SUBJ	Peter	0%	0%	–
	Sarah	–	0%	3%
	Nina	0%	0%	–
	Adam	0%	5%	1%
	Mean proportions	0	1	2

Table 7. Continued

		Age		
		0–2;11	3;0–3;11	4;0–5;2
OBJ	Peter	12%	33%	–
	Sarah	–	14%	26%
	Nina	0%	29%	–
	Adam	33%	21%	33%
	Mean proportions	15	24	30
OBL	Peter	0%	0%	–
	Sarah	–	0%	6%
	Nina	7%	9%	–
	Adam	0%	2%	8%
	Mean proportions	2	3	7

Table 8. *Development of S-, A-, O-, and OBL-relative clauses*

		Age		
		0–2;11	3;0–3;11	4;0–5;2
S	Peter	59%	17%	–
	Sarah	–	57%	26%
	Nina	64%	31%	–
	Adam	67%	34%	23%
	Mean proportions	63	34	25
A	Peter	12%	33%	–
	Sarah	–	14%	21%
	Nina	0%	16%	–
	Adam	0%	13%	8%
	Mean proportions	4	19	15
O	Peter	18%	33%	–
	Sarah	–	29%	26%
	Nina	21%	33%	–
	Adam	33%	45%	57%
	Mean proportions	24	35	42
OBL	Peter	12%	17%	–
	Sarah	–	0%	26%
	Nina	14%	20%	–
	Adam	0%	11%	12%
	Mean proportions	9	22	19

Table 9. *Nina's mother—relative clauses*

	S	A	O	OBL	Total
PN	17	11	47	13	88 (43.1%)
NP	5	1	3	2	11 (5.4%)
SUBJ	13	4	63	5	85 (41.7%)
OBJ	3	—	3	—	6 (2.9%)
OBL	5	3	5	1	14 (6.9%)
Total	43 (21.1%)	19 (9.3%)	121 (59.3%)	21 (10.3%)	204 (100%)

Notes

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1. Note that there are a number of experimental studies that did not find any evidence for the assumption that center-embedded relative clauses carry a larger processing load than right-branching relatives (cf. Brown 1971; Hakes et al. 1976; de Villiers et al. 1979; Clancy et al. 1986).

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