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A NEW LOOK AT THE ACQUISITION OF RELATIVE CLAUSES

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This study reconsiders the acquisition of relative clauses based on data from two sentence-repetition tasks. Using materials modeled on the relative constructions of spontaneous child speech, we asked four-year-old English- and German-speaking children to repeat six different types of relative clauses. Although English and German relative clauses are structurally very different, the results were similar across studies: intransitive subject relatives caused fewer errors than transitive subject relatives and direct object relatives, which in turn caused fewer errors than indirect object relatives and oblique relatives; finally, genitive relatives caused by far the most problems. Challenging previous analyses in which the acquisition of relative clauses has been explained by the varying distance between filler and gap, we propose a multifactorial analysis in which the acquisition process is determined primarily by the similarity between the various types of relative clauses and their relationship to simple sentences.

1. INTRODUCTION. The acquisition of relative clauses has been subject to numerous investigations over the past thirty years. The majority of these investigations are concerned with children's comprehension of relative clauses in English (cf. Brown 1971, Sheldon 1974, Smith 1974, Tavakolian 1977, 1981, de Villiers et al. 1979, Goodluck & Tavakolian 1982, Hamburger & Crain 1982, Tager-Flusberg 1982, Keenan & Hawkins 1987, Schuele & Nicholls 2000, McKee & McDaniel 2001, Kidd & Bavin 2002).[1] English has a wide variety of relative clauses, which are commonly classified based on two structural features: (i) the syntactic role of the HEAD, that is, the main clause element that is modified by the relative clause; and (ii) the syntactic role of the GAP, that is, the element that is gapped or relativized inside the relative clause. Although head and gap may serve any syntactic role, the literature on the acquisition of relative clauses has concentrated on four particular types: (1) SS relatives (relative clauses that modify the main-clause subject and include a subject gap), (2) SO relatives (relative clauses that modify the main-clause subject and include an object gap), (3) OS relatives (relative clauses that modify the main-clause object and include a subject gap), and (4) OO relatives (relative clauses that modify the main-clause object and include an object gap). The sentences in 1 to 4, taken from Tavakolian 1977, exemplify these four types of relative clauses.

(1) The horse *that pushed the goat* stands on the lion.   (SS)
(2) The cow *that the sheep pushed* stands on the kangaroo.   (SO)
(3) The cow pushes the kangaroo *that jumped over the goat*.   (OS)
(4) The kangaroo stands on the pig *that the sheep pushed*.   (OO)

Although the relative constructions in 1–4 involve common syntactic relations (i.e. subject and direct object), they are very different from the ones that children produce in spontaneous speech. In particular, the matrix clauses have a different structure. As shown in Diessel 2004 and Diessel & Tomasello 2000, children's early relative clauses are attached either to an isolated head noun or, more frequently, to the predicate nominal of a copular clause. Some typical examples are given in 5–8.

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[1] Studies examining children's comprehension of relative clauses in other languages include Hakuta 1982 (Japanese), Clancy et al. 1986 (English, Korean), MacWhinney & Pléh 1988 (Hungarian), Crain et al. 1990 (Italian), Corrêa 1995a,b (Portuguese), Goodluck & Stojanović 1997 (Serbo-Croatian), and Ozeki & Shirai 2004 (Japanese).

(5) The girl *that came with us.*   (Nina 3;0)
(6) This is the sugar *that goes in there.*   (Nina 3;0)
(7) Here's a tiger *that's gonna scare him.*   (Nina 3;1)
(8) What's dat . . . *you have*?   (Adam 2;11)

More than 90% of the earliest relative clauses that were found in the speech of four English-speaking children occurred in copular constructions or in related constructions with an isolated head noun (Diessel 2004). The same constructions seem to be characteristic of children's early relative clauses in many other languages, including French (cf. Hudelot 1980, Jisa & Kern 1998), German (cf. Brandt et al. 2005), Hebrew (cf. Dasinger & Toupin 1994), and Indonesian (cf. Hermon 2005).

As children grow older, they begin to use relative clauses that are attached to an element in a full-fledged main clause. In particular, the main-clause object is often modified by a relative clause in the speech of older children (cf. Diessel & Tomasello 2000, Diessel 2004). In contrast to the main-clause object, however, the main-clause subject is only rarely modified by a relative clause: in Diessel's data there was only one child who produced a few SS and SO relatives before the age of 5;0.

Since children's early relative constructions are very different from the ones that have been used in most experiments, the results of these studies may not truly reflect what children know about relative clauses. In fact, Tavakolian (1977) maintained that children systematically misinterpret the relative constructions in 1–4 as conjoined clauses, that is, as two nonembedded sentences that are combined by a coordinate conjunction (see also Slobin & Welsh 1973). This might explain some of the surprising results of previous experimental studies.[2] For instance, although center-embedded relative clauses (i.e. SS and SO relatives) are assumed to be especially difficult to process (cf. Slobin 1973), most studies have found that SS-relatives cause the fewest problems for preschool children, which, according to Tavakolian, can be explained by the fact that SS-relatives involve the same sequence of NPs and Vs as two conjoined clauses in which the subject of the second clause has been omitted (see ex. 9). Since SO, OS, and OO relatives involve a different sequence of NPs and Vs, they tend to cause greater problems.

(9)   NP   V   NP   V   NP
    a. The horse [that pushed the goat]   stands on the lion. (relative)
    b. The horse   pushed the goat and Δ stands on the lion. (coordinate)

If the conjoined-clause hypothesis is correct, the results of previous experiments do not really reflect what children know about relative clauses; rather, they indicate the degree to which children's false interpretation of relative clauses as conjoined clauses happens to give rise to the same act-out responses as the correct interpretation of relative clauses. In other words, the results of previous experiments are potentially misleading.

The current study was designed to reexamine children's knowledge of relative clauses using materials that are more natural and realistic. Our test sentences were modeled on the relative constructions that children use in spontaneous speech. The relative clauses were attached either to the predicate nominal of a copular clause (10), like the great majority of children's early relative clauses, or to the direct object of a transitive clause (11), like some of children's later relative clauses (see Diessel & Tomasello

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[2] While the conjoined-clause hypothesis has been revised in part (cf. Goodluck & Tavakolian 1982), it still is one of the most frequently discussed hypotheses in the literature on the acquisition of relative clauses (cf. O'Grady 1997:Ch. 9, Diessel 2004:Ch. 6).

2000, Diessel 2004). Center-embedded relative clauses, that is, relative clauses that are attached to the main-clause subject, were not included in the materials because they are essentially absent from naturally occurring child speech.

(10) There's the boy *who Peter teased at school this morning*.
(11) Mary saw the boy *who Peter played with in the garden*.

In contrast to previous studies, we considered the full range of syntactic roles that can be gapped or relativized: SUBJ-relatives (relative clauses in which the subject is gapped or relativized, as in 12), DO-relatives (relative clauses in which the direct object is gapped or relativized, 13), IO-relatives (relative clauses in which the indirect object is gapped or relativized, 14), OBL-relatives (relative clauses in which an oblique element is gapped or relativized, 15), and GEN-relatives (relative clauses in which a genitive attribute is gapped or relativized, 15).

(12) . . . the man *who saw the farmer*.   (SUBJ-relative)
(13) . . . the cat *that the dog chased*.   (DO-relative)
(14) . . . the girl *who the boy gave his ball to*. (IO-relative)
(15) . . . the boy *who the girl played with*.   (OBL-relatives)
(16) . . . the man *whose cat caught a mouse*.   (GEN-relative)

We propose two major hypotheses. First, we expect that relative clauses attached to the predicate nominal of a copular clause will cause fewer problems than relative clauses attached to the direct object of a transitive main clause. Second, and more importantly, we hypothesize that children's performance on the various types of relative clauses will vary with the relativized syntactic role.

The first hypothesis is suggested by our earlier studies of relative clauses in spontaneous child language (Diessel & Tomasello 2000, Diessel 2004). We discussed several reasons why the earliest relative clauses are attached to the predicate nominal of a copular clause (or an isolated noun phrase). Among other things, we argued that these relative constructions are relatively simple. Although they consist of two clauses, the copular clause does not contain a separate proposition. Rather than denoting an independent situation, the copular clause functions to establish a referent in focus position, making it available for the predication expressed in the relative clause. If this is correct, one would expect these relative constructions to cause fewer problems in language acquisition than relative clauses embedded in sentences in which the main and subordinate clauses express a relationship between two propositions.

The second hypothesis is derived from the psycholinguistic literature on the processing of relative clauses in adult speakers. A number of experimental studies have shown that adult speakers of English, French, and Dutch have fewer difficulties in processing subject relative clauses than object relative clauses (e.g. Hakes et al. 1976, Wanner & Maratsos 1978, Frauenfelder et al. 1980, Holmes & O'Regan 1981, Ford 1983, Frazier 1985, King & Just 1991, Cohen & Mehler 1996). Wanner and Maratsos (1978) explain this finding in terms of the varying distance between filler and gap. In subject relatives the distance between filler and gap is minimal; the only element that occurs between them is the relativizer (see 17). In object relatives, by contrast, filler and gap are separated from each other by the subject and verb (18).

(17) The boy [who⎯kissed Mary].   (SUBJ-relative)
(18) The boy [(who) Mary kissed⎯].   (OBJ-relative)

Wanner and Maratsos argue that it is difficult for the human processor to keep the filler in working memory until it encounters the gap, which provides the information neces-

sary to integrate the filler into the relative clause. The longer the processor has to retain unintegrated information, the harder the relative clause is to parse. Thus, according to this proposal, object relatives are more difficult than subject relatives because in object relatives the filler must be retained longer in working memory. While Wanner and Maratsos consider only subject and object relatives, their analysis can easily be extended to other types of relative clauses (see O'Grady 1997:Ch. 9).[3]

If the varying distance between filler and gap determines the processing load of relative clauses, it is conceivable that it also affects the process of language acquisition. Specifically, one might hypothesize that relative clauses with a short distance between filler and gap cause fewer problems in language acquisition than relative clauses with a long distance between filler and gap. This hypothesis, which we call the filler-gap hypothesis, has been proposed in several studies (e.g. de Villiers et al. 1979, Clancy et al. 1986, Hawkins 1987, Keenan & Hawkins 1987), but it has never been systematically investigated with preschool children.[4] It is the purpose of the following experiments to examine children's command of the various types of relative clauses and to investigate the factors that affect the acquisition process.

2. ENGLISH STUDY. In the first study we examined four-year-old English-speaking children using six different types of relative clauses: (i) S-relatives (relative clauses with an intransitive verb and a subject gap), (ii) A-relatives (relative clauses with a transitive verb and a subject gap), (iii) P-relatives (relative clauses with a direct object gap), (iv) IO-relatives (relative clauses with an indirect object gap), (v) OBL-relatives (relative clauses with an oblique gap), and (vi) GEN-relatives (relative clauses with a genitive relative pronoun).[5] We distinguished transitive from intransitive subject relatives (i.e. S-relatives vs. A-relatives) because Fox (1987) has argued that the two types of subject relatives behave differently in discourse and grammar (see also Fox & Thompson 1990). Moreover, previous studies have suggested that children find intransitive subject relatives easier to comprehend than transitive subject relatives (cf. Hamburger & Crain 1982, Goodluck & Tavakolian 1982).

2.1. METHODS: SUBJECTS. Twenty-one children, eight boys and thirteen girls, ages 4;3–4;9 (average age 4;7), participated in this experiment. All children were monolingual native English speakers who attended three different preschools in a suburb of Manchester, England. Two other children were excluded from the analysis because their correct responses did not reach 10%, which we determined prior to the experiment to be the minimal score necessary for a child to be included in the study.

MATERIALS. Twenty-four test sentences were constructed, four for each of the six experimental conditions, that is, $4 \times S$, $4 \times A$, $4 \times P$, $4 \times IO$, $4 \times OBL$, and $4 \times GEN$. In all twenty-four sentences the relative clause followed the main clause and was introduced by a relative marker, *who*, *whose*, or *that*.[6] The GEN-relatives comprised

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[3] Wanner and Maratsos's hypothesis has been implemented in more recent theories of sentence processing (cf. Frazier 1987, Clifton & Frazier 1989, Hawkins 1994, 2004, Gibson 1998, 2000). While some of these theories have revised aspects of Wanner and Maratsos's hypothesis, the central idea is the same in all of these studies.

[4] Keenan and Hawkins (1987) examined ten-to-eleven-year-old children who had to repeat various types of relative clauses in writing.

[5] The notions of S-relative, A-relative, and P-relative are adopted from the typological literature on grammatical relations (cf. Dixon 1979).

[6] We did not include *whom* as a relative marker because *whom* is largely restricted to written genres and does not occur in spontaneous child speech (Diessel 2004).

two different types of constructions: (i) relative clauses in which the NP containing the genitive functions as subject (e.g. *the woman whose cat caught a mouse*), and (ii) relative clauses in which the NP containing the genitive functions as direct object (e.g. *the woman whose horse Peter heard on the farm*). Table 1 gives an example test sentence for each of the six conditions. (For the full set of test sentences, see Appendix A.)

EXAMPLE	CONDITION
There's the boy who played in the garden yesterday.	S-relative
This's the man who saw Peter on the bus this morning.	A-relative
This's the girl who the boy teased at school this morning.	P-relative
There's the girl who Peter borrowed a football from.	IO-relative
This's the dog that the cat ran away from this morning.	OBL-relative
This's the woman whose cat caught a mouse yesterday.	GEN-relative

TABLE 1. Examples of English test sentences.

The main clauses were modeled on the relative constructions of spontaneous child speech (see 5–8 above). In each condition, three of the four sentences included a copular main clause, reflecting the high distributional frequency of this construction in early child speech. One of the three copular main clauses was a yes-no question (*Is that the X who . . . ?*); the two other copular clauses were declarative sentences (*This is the X who . . .*). The fourth sentence included a transitive main clause in which the direct object served as the head of the relative clause. Center-embedded relative clauses were not among the test items.

The test sentences were tightly controlled for length and various semantic factors (cf. Lust et al. 1996). They included the same number of sentence-level constituents and basically the same number of words and syllables (the number of words varied between eleven and twelve, and the number of syllables varied between thirteen and fourteen). In order to ensure that all test sentences were of the same length, we added adverbials to certain types of relative clauses (e.g. *this morning*) and varied the length of nominal constituents (e.g. by adding adjectives). The main clauses did not contain any adverbials or noun modifiers. All NPs in main and subordinate clauses denoted animate referents.

PROCEDURE. The experiment was conducted by an adult female experimenter. Children were shown a toy farm. They were told that we would like to play a game with them in which they had to repeat sentences like a parrot. Before the game started, the children were familiarized with the animals and people on the farm. Each type of referent was represented by three toy figures, that is, there were three horses, three dogs, three cats, three boys, three girls, three farmers, and so on. Having multiple toy figures for each type of referent ensured that the relative clauses occurred in a pragmatically appropriate context (cf. Hamburger & Crain 1982). During warm-up children had to repeat about eight sentences including simple transitive clauses, yes-no questions, and presentational constructions (e.g. *Mary is eating an apple*; *Is the dog sleeping? There's a black cat*). In the test condition, the children were given seventeen filler sentences in addition to the relative clauses. The filler sentences were simple sentences that were shorter and structurally less complex than the test items (e.g. *It's raining outside*; *The dog is barking*; *The house has a red roof*). Children had no difficulties in repeating the filler sentences, which encouraged them to continue the game even if they had difficulties in repeating the sentences containing relative clauses.

The test sentences were divided into four batteries. Each battery included six relative clauses, one from each condition (i.e. 1 × S, 1 × A, 1 × P, 1 × IO, 1 × OBL, 1 × GEN). The order of relative clauses was randomized across children within each battery. The filler sentences always occurred in the same order and same positions. The experimenter provided positive feedback after each response regardless of the child's performance. If a child did not respond to a test sentence, the experimenter repeated the sentence once, waited for a response, and then moved on to the next item (cf. Lust et al. 1996).

SCORING. The recordings were transcribed by the experimenter and double-checked by the first author. Children's responses were assigned a score of 1, 0.5, or 0. A higher score represents more accurate performance. A response was assigned the score of 1 if it was essentially correct. Changes that did not affect the structure and content of the test sentence were disregarded (e.g. changes in tense, number, or definiteness). A response was assigned the score of 0.5 if it included a lexical mistake or a minor grammatical error that did not affect the structure of the relative clause. Lexical mistakes involved the replacement of a lexical expression (e.g. *man* for *farmer*); minor grammatical mistakes included a variety of errors: the omission of adverbs, adjectives, or determiners, the replacement of the relativizer *that* or *who* with *what*, the replacement of a noun phrase by a pronoun, the substitution of a copular main clause for a transitive clause, and several others. Finally, a response was assigned a score of 0 if the structure or meaning of the test sentence was changed or if the whole sentence was ungrammatical. If a child did not respond or produced an incomplete utterance, the response was also assigned a score of 0.

2.2. RESULTS. In all six conditions, sentences containing a copular main clause caused fewer errors than sentences containing a transitive main clause. The difference between the two types of main clauses was highly significant (Wilcoxon $Z = 3.49$, $p = 0.001$). As a control, we compared children's responses to declarative copular clauses (e.g. *This is the woman who . . .*) to their responses to interrogative copular clauses (e.g. *Is this the man who . . . ?*); but in this case the difference did not reach significance (Wilcoxon $Z = 0.39$, $p = 0.694$). In other words, while there was a significant difference between copular and transitive main clauses, the different types of copular clauses basically caused the same number of errors.

Figure 1 shows the percentage of correct responses to the various types of relative clauses. A one-way repeated-measures ANOVA was performed on the number of correct responses (out of a possible four in each condition) to S-, A-, P-, IO-, and OBL-relatives. GEN-relatives were excluded from the statistical analysis because they were almost always incorrect. The ANOVA revealed a significant effect of the relativized syntactic role ($F(4,80) = 32.06$, $p < 0.001$). Pairwise comparisons showed that the differences between S- and A-relatives ($p < 0.001$) and A- and P-relatives ($p < 0.007$) were significant. However, the differences between P- and IO-relatives ($p > 0.173$) and IO- and OBL-relatives ($p > 0.903$) were not significant. In fact, Fig. 1 shows that the percentage of correct responses to IO- and OBL-relatives were basically the same.[7]

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[7] Interestingly, these results reflect the order of relative clauses on the accessibility hierarchy (cf. Keenan & Comrie 1977). The accessibility hierarchy is one of the best-known linguistic universals. It describes crosslinguistic constraints on the formation of relative clauses; see Hawkins 1994, 1999, 2004, Fox 1987, and Bock & Warren 1985 for different explanations of the accessibility hierarchy.
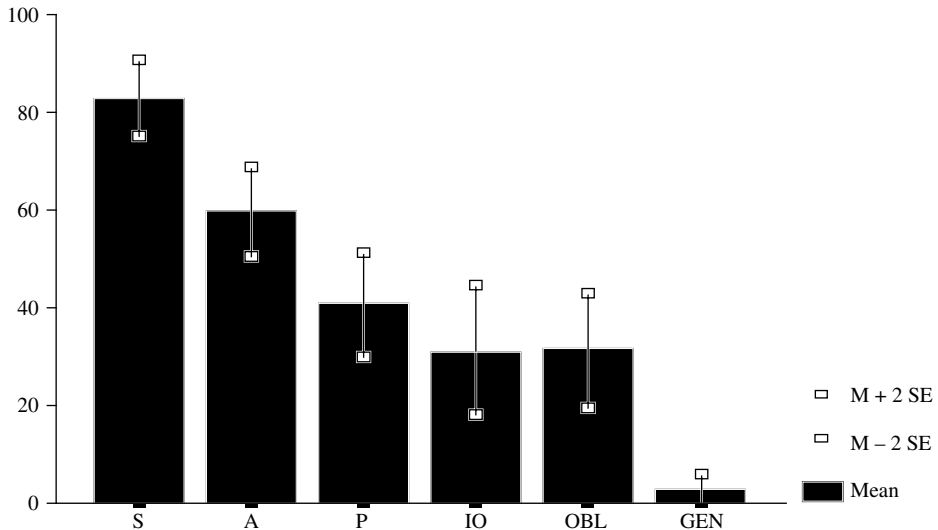
FIGURE 1. Percentage of correct responses to different types of relative clauses (English-speaking children).

2.3. ERROR ANALYSIS. If we look at children's errors we find one type of mistake that was particularly frequent: in thirty-eight sentences, children changed the word order such that they produced a relative clause different from the one in the test item. Conversion errors of this type occurred in two directions: A-relatives were converted to P-relatives (19), and P-, IO-, and OBL-relatives were converted to S/A-relatives (20–22). Presentation of S-relatives did not lead to any conversion errors. GEN-relatives were often repeated as S/A-relatives, and less frequently as P-relatives, but since children's responses to GEN-relatives almost always included some additional mistakes they were excluded from the error analysis.

(19) A → P
     TEST ITEM: This is the man who saw Peter on the bus this morning.
     CHILD: This is the man who . . . Peter saw on the bus this morning.
(20) P → A
     TEST ITEM: This is the girl who the boy teased at school this morning.
     CHILD: This is the girl that teased . . . the boy . . . at school this
                    morning.
(21) IO → A
     TEST ITEM: Is that the boy who the woman sent a letter to?
     CHILD: Is that the boy who sent a letter to the woman?
(22) OBL → A
     TEST ITEM: There is the horse that the little cat jumped on yesterday.
     CHILD: There is the horse that jumped on the cat yesterday.

Conversions to S/A-relatives were much more frequent than conversions to P-relatives. Only six A-relatives were converted to P-relatives, but thirty-two P-, IO-, and OBL-relatives were converted to S/A-relatives. Especially frequent was the conversion of P- and OBL-relatives; the conversion of IO-relatives was less common. But in IO-relatives children often left out the subject of the relative clause, producing utterances with the same word order as in S/A-relatives (see 23).

  (23) IO → A (ungrammatical)
    TEST ITEM: This is the girl who Peter borrowed a football from.
    CHILD: This is the girl who borrowed a football from.

This type of mistake also occurred in P- and OBL-relatives, but it was especially frequent in IO-relatives. Table 2 shows the total number of errors that involved either the full conversion of the relative clause or the omission of the relative-clause subject.

	A → P	P → S/A	IO → S/A	OBL → S/A
Fully converted sentences with reversed word order	6	15	3	14
Partially converted sentences with an omitted subject	–	9	29	10
TOTAL	6	24	32	24

TABLE 2. Errors involving word order.

What Table 2 reveals is that there was a very strong tendency to convert a sequence of ⟨NP rel NP V⟩ to ⟨NP rel V (NP)⟩ (cf. Bever 1970). This type of word-order change occurred in twenty-four P-relatives, thirty-two IO-relatives, and twenty-four OBL-relatives. By contrast, conversions from ⟨NP rel V NP⟩ to ⟨NP rel NP V⟩ occurred in only six A-relatives. Three Wilcoxon tests were performed on the number of these two changes: test 1 compared the number of A-relatives converted to P-relatives to the number of P-relatives converted to S/A-relatives ($Z = 2.62$, $p < 0.009$); test 2 compared the number of A-relatives converted to P-relatives to the number of IO-relatives converted to S/A-relatives ($Z = 3.20$, $p < 0.001$); and test 3 compared the number of A-relatives converted to P-relatives to the number of OBL-relatives converted to S/A-relatives ($Z = 238$, $p < 0.017$). The tests revealed that children converted P-, IO-, and OBL-relatives significantly more often to S/A-relatives than A-relatives to P-relatives. In other words, word-order changes from ⟨NP rel NP V⟩ to ⟨NP rel V (NP)⟩ were significantly more frequent than word-order changes from ⟨NP rel V (NP)⟩ to ⟨NP rel NP V⟩.

 Apart from word-order changes, children's responses included a variety of other errors. Very often, the responses were simply ungrammatical or incomplete; but there were also some other nonrandom errors (apart from the conversion errors) that reflected children's particular difficulties with relative clauses.

 First, there were six sentences in which children used a resumptive NP or a resumptive pronoun in lieu of a gap (e.g. *This is the girl who*, *who the boy teased the girl this morning*; *Here is the girl who borrowed a football from her*). The use of resumptives has been noticed in previous work and has led to a debate over the structure of children's early relative clauses (cf. Labelle 1990, 1996, Pérez-Leroux 1995, Goodluck & Stojanović 1997, McKee et al. 1998, McKee & McDaniel 2001). Labelle (1990) argues, based on data from French-speaking children, that the use of resumptives is incompatible with WH-movement. In her analysis, children's early relative clauses are linked to the previous clause by a complementizer and do not involve movement or gapping.

 Second, there were nineteen sentences in which children replaced the relativizers *that* or *who* with *what*. Flynn and Lust (1980), who noticed the same kind of mistake in their data, argue that children tend to replace *that* with *what* because *what* is commonly used in headless relative clauses, which children seem to master before they master headed relative clauses (cf. Hamburger 1980).

 2.4. INTERIM SUMMARY. Consistent with children's preferences in spontaneous speech, our study shows that relative clauses attached to the predicate nominal of a

copular clause cause fewer problems than relative clauses attached to the direct object of a transitive main clause. It seems that children have much fewer problems with relative clauses in copular sentences than with relative clauses embedded in other sentence types. We come back to this point in the final discussion.

Turning to children's performance on the various types of relative clauses, we note that the filler-gap hypothesis is consistent with the fact that subject relatives (i.e. S- and A-relatives) caused fewer errors than other relative clauses; however, it does not explain the following data.

- Although S- and A-relatives involve the same distance between filler and gap, S-relatives caused significantly fewer problems than A-relatives.
- Although the distance between filler and gap varies in P-, IO-, and OBL-relatives, children basically produced the same number of errors in response to these three types of relative clauses; there were some differences between P-relatives and IO- and OBL-relatives, but the differences were not significant.
- Although GEN-relatives involve a relatively short distance between filler and gap (especially if the head of the genitive functions as subject), children were unable to repeat them correctly.

3. GERMAN STUDY. In the second study, we tested twenty-four German-speaking children using the same experimental task as in the first study. Relative clauses in German are structurally very different from relative clauses in English. They are introduced by a relative pronoun marked for gender, number, and case. The relative pronoun plays an important role in the interpretation of German relative clauses. Table 3 shows the morphological paradigm of the German relative pronoun.

	MASCULINE	FEMININE	NEUTER
NOMINATIVE	der	die	das
ACCUSATIVE	den	die	das
DATIVE	dem	der	dem
GENITIVE	dessen	deren	dessen
OBLIQUE	P* den/dem	P* die/der	P* das/dem

* (P = preposition)

TABLE 3. German relative pronouns (singular).

As can be seen from this table, in the masculine gender each syntactic role is expressed by a different case form. The masculine relative pronoun thus provides all of the information necessary to determine the relativized syntactic role. In the feminine and neuter genders, the relative pronouns are formally distinguished in dative, genitive, and oblique case, but in nominative and accusative case they have the same forms. In order to distinguish between subject and object relatives marked by feminine or neuter relative pronouns, the processor has to draw on other information. Very often, the interpretation is disambiguated by the case role of the NP that follows the relative pronoun (e.g. *die Katze*, *die den Hund jagt* 'the cat that chases the dog' (*die* = NOM) vs. *die Katze*, *die der Hund jagt* 'the cat that the dog chases' (*die* = ACC)); in addition, the meaning and context can provide important cues for the syntactic role of the relativized element.

Note that the relativized syntactic role can be identified without recognizing the position of the gap in German relative clauses. In fact, the position of the gap can be identified only if the relativized syntactic role is sufficiently determined by other linguistic means. Consider the following example.

(24) das Mädchen, das ___   Peter ___   kennt
     the girl   REL.NOM/ACC Peter.NOM/ACC knows
        'the girl who knows Peter' or 'the girl who Peter knows'

The relative clause in 24 includes two nominal constituents, the relative pronoun *das* and the proper name *Peter*. Since the syntactic roles of both constituents are ambiguous between an interpretation as subject (i.e. nominative case) and direct object (i.e. accusative case), the relative clause has two possible meanings: 'The girl who knows Peter' and 'The girl who Peter knows'. What this example demonstrates is that the position of the gap cannot be identified if the relativized syntactic role is not sufficiently determined by other linguistic means (or by the discourse context). This suggests that the position of the gap does not affect the interpretation of German relative clauses.

Thus, while it is commonly assumed that the relative pronoun has been 'moved' from its canonical position to the front of the relative clause, the gap, or the canonical position, does not determine the relativized syntactic role.[8] In most instances, the relative pronoun provides all of the information necessary to determine the relativized syntactic role. Since the relative pronoun occurs at the beginning of the relative clause, the processor does not have to keep unintegrated information in working memory while processing the relative clause. If processing German relative clauses does not involve the storage of unintegrated information, it is conceivable that German-speaking children will perform differently on the experimental task. Our second experiment was designed to examine this possibility.

3.1. METHODS: SUBJECTS. Twenty-four children, thirteen boys and eleven girls, ages 4;3–4;9 (average age 4;5), participated in this experiment. All children were monolingual native German speakers, who attended one of four kindergartens in Leipzig, Germany. Two other children were excluded from the analysis because their correct responses did not reach 10%.

3.2. MATERIALS, PROCEDURE, AND SCORING. The experiment was conducted by an adult female experimenter and the first author. Twenty-four test sentences were constructed, parallel to the test sentences in the English experiment. Table 4 gives an example of the test items in each experimental condition (for the full set of test sentences, see Appendix B). The procedure and scoring were the same as in the English study.

3.3. RESULTS. Like the English-speaking children, the German-speaking children had fewer difficulties in repeating sentences containing a copular main clause than sentences containing a transitive main clause. In all six conditions, copular main clauses caused fewer errors than transitive main clauses. The difference between the two types of main clauses is highly significant (Wilcoxon $Z = 3.93$, $p < 0.001$). By contrast, when we compared the interrogative copular clauses to the declarative copular clauses (as a control) we did not find a significant difference (Wilcoxon $Z = 1.33$, $p = 0.181$).

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[8] Note that the canonical position of the relativized syntactic role is not as obvious in German as it is in English. Compared to English, German has relatively flexible word order and uses different word-order patterns in different clause types; notably, the word order of subordinate clauses is different from the word order of main clauses. The more rigid and consistent the word order the more obvious the occurrence of a gap. Since English employs the same rigid word order across all sentence types, it is immediately obvious if an element does not occur in its canonical position. However, since word order in German is much more flexible than in English and inconsistent across clause types, the sense of a missing or displaced element is much weaker.

EXAMPLE	CONDITION
Da ist die Katze, die gerade auf den Baum geklettert ist.	S-relative
'There is the cat which [NOM/ACC] just climbed up the tree.'	
Da ist der Junge, der den Mann im Garten gesucht hat.	A-relative
'There is the boy who [NOM] looked for the man in the garden.'	
Da ist der Mann, den das Mädchen im Stall gesehen hat.	P-relative
'There is the man whom [ACC] the girl saw in the barn.'	
Da ist der Junge, dem Paul die Mütze weggenommen hat.	IO-relative
'There is the boy whom [DAT] Paul took away the cap.'	
Da ist das Pferd, auf dem Gabi vorhin geritten ist.	OBL-relative
'There is the horse on which Gabi was riding a while ago.'	
Da ist die Frau, deren Katze eine Maus gefangen hat.	GEN-relative
'There is the woman whose cat caught a mouse.'	

TABLE 4. Examples of German test sentences.

This suggests that relative clauses are significantly easier for preschool children if they are attached to the predicate nominal of a copular clause than to the direct object of a transitive main clause.

Figure 2 shows the percentage of correct responses to the various types of relative clauses. Since children's responses to GEN-relatives were almost always incorrect, GEN-relatives were excluded from the statistical analysis. A one-way repeated-measures ANOVA performed on the correct responses to S-, A-, P-, IO-, and OBL-relatives revealed a significant effect of the relativized syntactic role ($F(4,92) = 47.44$, $p < 0.001$). Planned comparisons showed that the differences between S- and A-relatives ($p < 0.001$) and A- and P-relatives ($p < 0.006$) were significant; the difference between P- and IO-relatives approached significance ($p = 0.061$), the one between P- and OBL-relatives was highly significant ($p < 0.001$), and the one between IO- and OBL-relatives was not significant ($p > 0.101$).
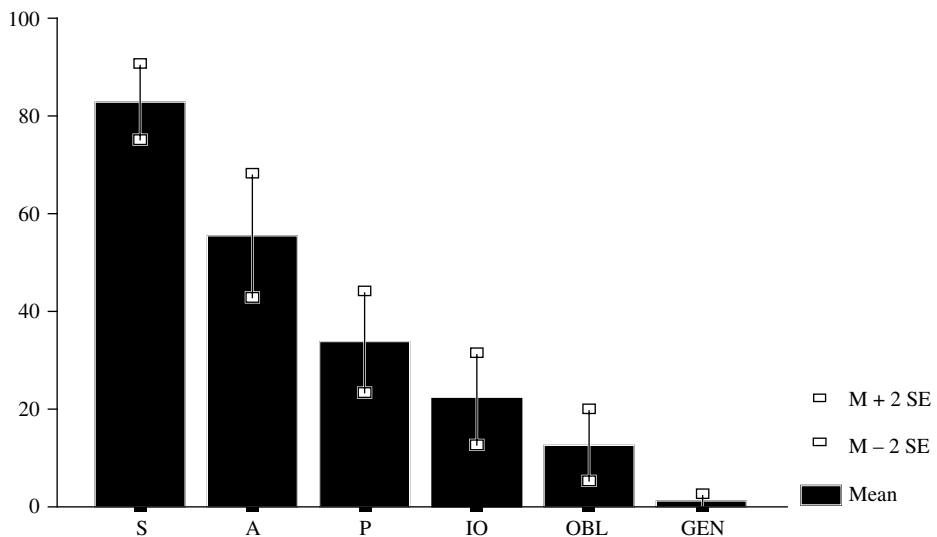

FIGURE 2. Percentage of correct responses to different types of relative clauses (German-speaking children).

The results of the German study were compared to the results of the English study, using a mixed ANOVA in which language was treated as the between-subjects variable

and the relativized syntactic role as the within-subjects variable. The test revealed that the percentages of correct responses were basically the same in English and German; there was no interaction between language and relativized syntactic role ($F(4,172) = 1.55$, $p > 0.197$) nor was there a significant main effect of language ($F(1,43) = 2.54$, $p > 0.118$). In terms of the specific types of relative clauses, children's performance on OBL-relatives was very different in the two studies. An independent t-test showed that the German-speaking children had significantly more difficulties with OBL-relatives than the English-speaking children ($t(43) = 2.57$, $p < 0.013$). In all other conditions (i.e. S-, A-, P-, IO-, and GEN-relatives), the differences in children's performance between the two studies were not significant.

3.4. ERROR ANALYSIS. The single most frequent type of mistake involved a change of the relative pronoun and other case-marked elements (i.e. the articles of other arguments). This type of mistake had basically the same effect as the word-order changes in the English study. In both cases, children converted the relative clause in the test item to a different type of relative clause. Overall, there were seventy-nine sentences in the German study in which the change of the relative pronoun led to the conversion of the relative clause. Thirteen A-relatives were converted to P-relatives (see 25), and sixty-six P-, IO-, and OBL-relatives were converted to S/A-relatives (26–28).

(25) A → P
    TEST ITEM: Ist das der Mann, der Peter heute Morgen geholfen hat?
                Is that the man who [NOM] helped Peter this morning?
    CHILD: Ist das der Mann, dem Peter . . . heute geholfen hat?
                Is that the man whom [DAT] Peter helped?

(26) P → A
    TEST ITEM: Da ist der Mann, den das Mädchen im Stall gesehen hat.
                There is the man whom [ACC] the girl saw in the barn.
    CHILD: Da ist der Mann, der das Mädchen im Stall gesehen hat.
                There is the man who [NOM] saw the girl in the barn.

(27) IO → A
    TEST ITEM: Hier ist der Junge, dem die Frau ein Buch vorgelesen hat.
                Here is the boy whom [DAT] the woman read a book to.
    CHILD: Hier ist der Junge, der der Frau ein Buch vorgelesen hat.
                Here is the boy who [NOM] read a book to the woman.

(28) OBL → A
    TEST ITEM: Hier ist das Schwein, vor dem die Katze weggelaufen ist.
                Here is the pig from which the cat ran away.
    CHILD: Hier ist das Schwein, das vor der . . . Katze weggelaufen ist.
                Here is the pig which ran away from the cat.

In addition, there were a number of sentences in which children changed the case of the relative pronoun without changing the case role of other nominal constituents.

(29) IO → A (ungrammatical)
    TEST ITEM: Hier ist der Junge, dem die Frau ein Buch vorgelesen hat.
                Here is the boy whom [DAT] the woman read a book to.
    CHILD: Hier ist der Junge, der, . . . der die Frau ein Buch vorgelesen hat.
                Here is the boy who [NOM] . . . who the woman read a book to.

Table 5 shows the total number of errors that involved a change of the relative pronoun in A-, P-, IO-, and OBL-relatives.

	A → P	P → S/A	IO → S/A	OBL → S/A
Fully converted sentences	13	26	15	25
Partially converted sentences	3	5	16	10
TOTAL	16	31	31	35

TABLE 5. Errors involving a change of the relative pronoun.

As can be seen from this table, there was a strong tendency to replace a relative pronoun in accusative, dative, or oblique case with a relative pronoun in nominative case. Changes in the opposite direction also occurred but were less common. Three Wilcoxon tests were used to compare the number of relative pronouns that were changed in the various relative clauses. Test 1 compared the number of nominative relative pronouns replaced by an accusative relative pronoun to the number of accusative relative pronouns replaced by a nominative relative pronoun ($Z = 1.88$, $p < 0.060$); test 2 compared the number of nominative relative pronouns replaced by an accusative relative pronoun to the number of dative relative pronouns replaced by a nominative relative pronoun ($Z = 199$, $p < 0.046$); and test 3 compared the number of nominative relative pronouns replaced by an accusative relative pronoun to the number of oblique relative pronouns replaced by a nominative relative pronoun ($Z = 2.26$, $p < 0.024$). The three tests revealed that children were much more likely to change P-, IO-, and OBL-relatives to S/A-relatives than A-relatives to P-relatives.

Note that the German-speaking children never left out the subject in P-, IO-, and OBL-relatives as did the English-speaking children. This supports our hypothesis that the omission of the relative-clause subject in the English study represents a word-order error. If the English-speaking children had simply omitted the subject because the relative clauses were too complex, one would expect the same type of mistake in the German data, but the German-speaking children did not produce this kind of error.[9] Note also that the German-speaking children, unlike the English-speaking children, did not use any resumptive pronouns or resumptive NPs in lieu of the gap, which might be taken as evidence for our hypothesis that the interpretation of German relative clauses does not involve the gap (i.e. the canonical position of the relativized element).

Apart from changing the relative pronoun, there was only one other type of non-random error that occurred in the German data. In twenty-eight sentences children replaced a case-marked relative pronoun with the locative question word *wo*. *Wo* can occur in lieu of a preposition and a case-marked relative pronoun in OBL-relatives if the relative clause is attached to a locative head noun (e.g. *die Stadt, wo sie wohnt* 'the city where she lives').[10] In our experiment all relative clauses were headed by animate

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[9] One might object that this argument is convincing only if there are independent reasons for the frequent omission of the subject in English IO-relatives. We suspect that IO-relatives occurred with an especially high number of subject omissions because IO-relatives are not as easily converted to subject relatives as P- and OBL-relatives. The latter two can easily be converted to subject relatives by changing the order of subject and verb (e.g. *the girl who the boy teased at school → the girl who teased the boy at school*), while the full conversion of IO-relatives requires that the subject be 'moved' from the position before the verb to the end of the sentence after the preposition (e.g. *the girl who the boy borrowed a football from → the girl who borrowed a football from the boy*). Since children are especially sensitive to the end of sentences (cf. Slobin 1973), it is conceivable that they did not 'move' the omitted subject to the end of the relative clause because they realized that the final constituent of the sentence was a dangling preposition rather than a noun phrase.

[10] Interestingly, in some German dialects *wo* is a general relative marker introducing all kinds of relative clauses. In the dialect that the children of our study acquire, however, *wo* occurs only in OBL-relatives attached to a locative head noun.

nouns; that is, there were no sentences containing a locative head noun among the test items. However, three of the OBL-relatives had a locational meaning and these three sentences accounted for twenty of the twenty-eight *wo*-relatives.[11] Although the *wo*-relatives were ungrammatical in these constructions, their use was semantically motivated by the locational meaning of the relative clause, suggesting that the children understood the meaning of OBL-relatives but had difficulties with their structure. If we look at the OBL-relatives that children tried to repeat with a preposition and relative pronoun, we find that most of them were ungrammatical: very often, the children omitted the relative pronoun after the preposition (e.g. *Das ist das Pferd*, *auf Gabi geritten ist* 'That is the horse on Gabi rode') or replaced it with a wh-pronoun (e.g. *Hier ist das Schwein*, *vor wem die Katze weggelaufen ist* 'Here is the pig from whom the cat ran away'). We suspect that the *wo*-relatives were basically used as a strategy to simplify the grammatical structure of OBL-relatives without changing their meaning.

3.5. Interim summary. Although the structure of German relative clauses is very different from that of English relative clauses, the results of the German study are similar to the results of the English study. In both languages, S-relatives caused by far the fewest errors, followed by A-relatives, which in turn caused fewer errors than P-relatives. Moreover, GEN-relatives were almost always incorrect in both English and German. Where the two studies yielded somewhat different results was in the domain of P-, IO-, and OBL-relatives. In the German study, the differences between P-, IO-, and OBL-relatives were larger than in the English study. The English-speaking children basically produced the same percentage of correct responses to IO- and OBL-relatives and performed only slightly better on P-relatives. The German-speaking children, by contrast, performed much better on P-relatives than on IO- and OBL-relatives, and although the difference between IO- and OBL-relatives did not reach significance it was much larger than in the English study.

Like the English-speaking children, the German-speaking children frequently converted P-, IO-, and OBL-relatives to S/A-relatives. While the conversion errors in English involved a change of word order, however, the conversion errors in German involved a change of morphological case marking. This suggests that English- and German-speaking children draw on different types of linguistic information in their interpretation of relative clauses. More precisely, it seems that the English-speaking children rely primarily on word-order information, while the German-speaking children are more sensitive to morphological cues, notably case marking (cf. Slobin & Bever 1982).

4. General discussion.

4.1. The effect of the main clause. Based on recent observational studies, we hypothesized that relative clauses attached to the predicate nominal of a copular clause would cause fewer problems than relative clauses attached to the direct object of a transitive main clause. This hypothesis is borne out by the data. In both studies, children performed much better on sentences including a copular main clause than on sentences including a transitive main clause. How do we account for this finding?

In our previous studies we discuss several factors that might explain why the earliest relative clauses are embedded in copular constructions. Among other things, we note that these constructions are very frequent because they are pragmatically useful for

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[11] Note that the corresponding sentences of the English study also had a locational meaning; but in contrast to the German-speaking children, the English-speaking children did not replace the relative marker by a locative question word.

parent-child speech. The copular clause includes a deictic pronoun making reference to an element in the surrounding situation. Since preschool children tend to talk about elements in their environment, these constructions are very well suited for the specific communicative needs of young children.

Moreover, we argue that sentences consisting of a copular clause and a relative clause are semantically relatively simple. Specifically, we maintain that although these constructions consist of two clauses, they contain only a single proposition: the copular clause does not denote an independent situation; rather, it functions to establish a referent in focus position such that it becomes available for the predication expressed in the relative clause (cf. Lambrecht 1988). The whole structure denotes a single situation and thus can be paraphrased by a simple sentence.

	Child utterance	Paraphrase
(30)	This is the sugar *that goes in there*. >	This sugar goes in there.
(31)	Here's a tiger *that's gonna scare him*. >	A tiger's gonna scare him.
(32)	What's that *he has around his back*? >	What does he have around his back?

Note that the propositional content of children's early relative clauses is not always pragmatically presupposed as in prototypical subordinate clauses. In fact, Diessel 2004 and Diessel & Tomasello 2000 point out that in most instances the relative clause contains new and unfamiliar information about the referent established in the copular clause. Thus, like simple sentences, children's early relative constructions express new and unfamiliar information in the position after the verb. While the current study does not immediately bear on these factors, it is compatible with our previous account.

4.2. THE EFFECT OF THE RELATIVIZED SYNTACTIC ROLE. A number of studies have suggested that the acquisition of relative clauses is crucially determined by the varying distance between filler and gap. Consistent with this hypothesis, we found that in the English study, subject relatives (i.e. S- and A-relatives) caused fewer problems than other types of relative clauses (i.e. P-, IO-, OBL-, and GEN-relatives); but apart from this finding all other results of our study require a different explanation. Specifically, the filler-gap hypothesis does not explain why in the English study S-relatives caused significantly fewer errors than A-relatives, why there were no significant differences between P-, IO-, and OBL-relatives, and why GEN-relatives were almost always incorrect. Moreover, the filler-gap hypothesis does not account for any of the German data: while it is commonly assumed that German relative clauses include a gap in the canonical position of the relativized element, the gap can be identified only if it is sufficiently determined by other linguistic means, notably by the case role of the relative pronoun. Since the relative pronoun provides all of the information necessary to determine the relativized syntactic role at the beginning of the relative clause, the processor does not have to keep unintegrated information in working memory while processing the relative clause. This suggests that if the varying distance between filler and gap played any role in this study, the effect was limited to the English study and must have been relatively small.

Note that our test sentences include different numbers of referents (which is part of their definition): S-relatives include one referent (disregarding locational/temporal referents in adverbials); A-, P-, IO-, and OBL-relatives include two referents; and GEN-relatives include three referents. In order to control the degree of semantic variation,

we used only animate referents. However, previous studies observed that the number of animate referents can affect children's interpretation of relative clauses (cf. Goodluck & Tavakolian 1982, Hamburger & Crain 1982, Corrêa 1995a). Based on these studies, one might argue that our rejection of the filler-gap hypothesis may not be valid because the varying distance between filler and gap is confounded by the number of animate referents, which may have masked the effect of distance on children's performance.

Obviously, there is a correlation between the number of (animate) referents and the varying distance between filler and gap in the English study. Note, however, that A-, P-, IO-, and OBL-relatives include the same number of animate referents. This allows us to examine the effect of distance in four types of relative clauses in which distance and animacy are not confounded. Since A-, P-, IO-, and OBL-relatives include varying distances between filler and gap, they should yield significantly different results if distance has a significant effect on children's performance. But three of them, P-, IO-, and OBL-relatives, did not cause any significant differences in the English study, suggesting that the varying distance between filler and gap is not a significant factor for children's performance and that the partial correlation between distance and animacy does not challenge our conclusion.[12]

We suspect that animacy did not have a significant effect in our study because the test sentences we used are different from the ones that have been used in previous experiments. While most of our stimuli consisted of relative clauses attached to the predicate nominal of a copular clause, the 'animacy effect' occurred in OS-relatives as the result of a particular type of mistake: If OS-relatives include three animate referents (the main-clause subject, the main-clause object, and the relative-clause object), English-speaking children sometimes misinterpret the main-clause subject as the actor of the relative clause (cf. Goodluck & Tavakolian 1982). Since most of our stimuli included relative clauses attached to the predicate nominal of a copular clause (in which both main-clause NPs have the same referent), this type of mistake could occur only in a small number of our test items (i.e. in those items that include a transitive main clause).

Finally, it must be emphasized that the German data challenge the filler-gap hypothesis even if the partial correlation between animacy and distance had some (minor) effect in the English study. Since the interpretation of German relative clauses does not rely on the position of the gap, the filler-gap hypothesis does not account for the outcome of the German study despite the fact that the relativized syntactic role and the number of animate referents are to some extent related.[13]

In what follows, we propose an alternative explanation for the data. We suggest that the acquisition of relative clauses is determined by multiple factors affecting different types of relative clauses. We begin our discussion with the factors that seem to have contributed to children's good performance on S- and A-relatives.

One of the most striking findings of the current study is that the English- and German-speaking children basically produced the same types of errors: both often converted P-, IO-, and OBL-relatives to S/A-relatives; changes in the other direction occurred but were significantly less common. If we look at the conversion errors more closely,

[12] That A-relatives caused significantly fewer errors than P-, IO-, and OBL-relatives is consistent with the filler-gap hypothesis, but can also be explained in more general terms by other factors (see below).

[13] Note that we do not claim that the number of referents (animate or inanimate) is irrelevant to our study. After all, the number of referents is part of what distinguishes the various types of relative clauses. Important is that the partial correlation between the number of animate referents and the varying distance between filler and gap did not conceal the effect of distance in our study.

we find that while children changed P-, IO-, and OBL-relatives in some cases, in other cases they repeated them correctly. This suggests that at least some of the children were able to produce P-, IO-, and OBL-relatives despite the fact that they often changed them to S/A-relatives. In other words, children's difficulties in repeating P-, IO-, and OBL-relatives cannot be explained by the lack of grammatical knowledge—most children seemed to know how to form these relative clauses despite the fact that they often repeated them incorrectly. We suggest that the inconsistency of the conversion errors can be explained by the fact that certain types of relative clauses are more easily ACTIVATED than other types; that is, we maintain that the conversion errors are due to the activation of the wrong grammatical pattern.

One piece of evidence supporting this hypothesis comes from a frequent type of repair that occurred in both the English and the German study. When the English-speaking children were given a P-, IO-, or OBL-relative they often started with the word order of a S/A-relative, but then realized that they had made a mistake and corrected the word order (see 33–35). Similarly, when the German-speaking children were given a P-, IO-, or OBL-relative they often started with a relative pronoun in nominative case, which they subsequently changed to a relative pronoun in dative, accusative, or oblique case (36–38). In contrast to P-, IO-, and OBL-relatives, S/A-relatives did not include any repairs of the word order or relative pronoun.

(33) There's the cat . . . who fed/Mary fed in the kitchen last night.
(34) This is the girl who bor/Peter borrowed a football from.
(35) Is that the boy who play/Mary played with in the garden?
(36) Ist das der Junge, der/ . . . den Paul heute Abend geärgert hat.
     'Is that the boy who [NOM]/whom [ACC] Paul teased tonight?'
(37) Da ist der Junge, der/dem Paul . . . die Mütze weggenommen hat.
     'There is the boy who [NOM]/(from) whom [DAT] Paul took the cap away.'
(38) Hier ist das Schwein, das . . . vor der Katze/wovor die Katze weggelaufen ist.
     'Here is the pig that (ran) away from the cat/that the cat ran away from.'

What the repairs in 33–38 suggest is that the occurrence of conversion errors does not primarily reflect the lack of grammatical knowledge (or the use of an avoidance strategy); rather, they indicate that children often automatically activate a S/A-relative if they intend to produce a relative clause. This suggests that children's good performance on S/A-relatives can at least partially be explained by the fact that S/A-relatives are more easily activated than other types of relative clauses.

One of the factors affecting the ease of activation is frequency: It is commonly assumed, quite plausibly, that the more frequently a grammatical construction occurs, the more deeply entrenched it is in mental grammar, and the easier it is to activate in language use (cf. Bybee 1985, 1995, Bybee & Hopper 2001). Thus, one might hypothesize that S/A-relatives are more easily activated than P-, IO-, or OBL-relatives because they are more frequent.

However, if we look at the distributional frequencies of the various relative clauses, we find that while S/A-relatives are indeed more frequent than IO- and OBL-relatives, they do not seem to be more frequent than P-relatives. Fox (1987) reports that in adult conversational English S/A-relatives and P-relatives are about equally common, and Diessel (2004) presents data suggesting that in child-directed speech P-relatives might be even more frequent than S/A-relatives: a mean proportion of 56.8% of all relative clauses produced by the mothers of four English-speaking children were P-relatives in

Diessel's data, an average of 35.6% were S/A-relatives, and 7.6% were OBL-relatives; IO- and GEN-relatives did not occur. Interestingly, the children Diessel examined produced S/A-relatives (notably S-relatives) prior to P-relatives and they used them more frequently than their mothers: a mean proportion of 57.3% of the children's relative clauses were S/A-relatives, 37.1% were P-relatives, and 5.7% were OBL-relatives. These data are in accordance with the results of the current investigation. Together they suggest that children have fewer difficulties with S/A-relatives than with P-relatives despite the fact that P-relatives are equally or even more frequent in the ambient language. How then do we account for fact that S/A-relatives cause the fewest problems in language acquisition?

   We suggest that children have fewer difficulties with S/A-relatives than with all other relative clauses because S/A-relatives are similar to simple nonembedded sentences. In fact, children's early S/A-relatives occur in constructions that are only slightly different from simple sentences. As we have shown in our previous work, the earliest relative clauses are often embedded in structures that can be analyzed as syntactic blends or amalgams (cf. Diessel & Tomasello 2000 and Diessel 2004). They consist of an S-relative, or less frequently an A-relative, that is attached to the predicate nominal of a copular clause without an intervening relative pronoun. Similar constructions occur in certain nonstandard varieties of adult speech (cf. Bever & Langendoen 1971, Lambrecht 1988). Some typical examples are given in 39–41.

   (39) That's doggy turn around.
   (40) That's the rabbit fall off.
   (41) That's the roof go on that home.

These sentences 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 (cf. Lakoff 1974, Lambrecht 1988). The constructions are only slightly different from simple sentences: they contain just a single proposition and express the actor by the initial NP.

   Although we did not use syntactic amalgams, some of our test sentences are similar to these constructions; notably, sentences containing a copular main clause and a subject relative have a similar structure: like simple sentences (or syntactic amalgams), they expresses the actor by the initial NP (i.e. the head of the relative clause) (cf. 42–43). In all other relative clauses (i.e. P-, IO- and OBL-relatives), the actor is expressed by the second NP (i.e. the relative-clause subject), while the first NP (i.e. the head of the relative clause) expresses some other semantic role (cf. 44–46). We suggest that this is the reason why the children of the current study had fewer difficulties with S/A-relatives than with other types of relative clauses.

   (42) [The man]$_{NP1}$ saw [the boy]$_{NP2}$.   (simple sentence)
            ACTOR
   (43) [The man]$_{NP1}$ who saw [the boy]$_{NP2}$.   (A-relative)
            ACTOR
   (44) [The man]$_{NP1}$ who [the boy]$_{NP2}$ saw.   (P-relative)
                              ACTOR
   (45) [The man]$_{NP1}$ who [the boy]$_{NP2}$ sent a letter to. (IO-relative)
                              ACTOR
   (46) [The man]$_{NP1}$ who [the boy]$_{NP2}$ played with.   (OBL-relative)
                              ACTOR

A similar analysis was proposed by Bever (1970), who argued that young English-speaking children use an NVN-schema in their interpretation of all kinds of syntactic

structures (see also de Villiers et al. 1979, Slobin & Bever 1982, Townsend & Bever 2001). The results of our English study are consistent with Bever's proposal; but since German does not have an NVN-schema, Bever's account is not directly transferable to German.[14] Nevertheless, like English subject relatives, German subject relatives are similar to simple sentences in that both relative clauses and simple sentences express the actor in the first NP, while all other relative clauses express the actor after some other semantic role (cf. 47–51).

(47) [Der Mann]$_{NP1}$, hat [den Jungen]$_{NP2}$ gesehen.   (simple sentence)
      ACTOR

(48) [Der Mann]$_{NP1}$, der [den Jungen]$_{NP2}$ gesehen hat.   (A-relative)
      ACTOR

(49) [Der Mann]$_{NP1}$, den [der Jungen]$_{NP2}$ gesehen hat.   (P-relative)
                  ACTOR

(50) [Der Mann]$_{NP1}$, dem [der Jungen]$_{NP2}$ einen Brief geschickt hat.
                  ACTOR   (IO-relative)

(51) [Der Mann]$_{NP1}$, mit dem [der Jungen]$_{NP2}$ gespielt hat. (OBL-relative)
                  ACTOR

We suggest therefore, as a modification of Bever's hypothesis, that it is primarily the initial position of the agent, rather than a fully developed word-order schema, that accounts for children's good performance on subject relatives in both the English and German study. In other words, we assume that the children of both languages prefer relative clauses in which the actor (i.e. the highest ranked thematic role) is expressed by the sentence-initial NP as in the great majority of simple sentences (both in English and German).[15]

While the sentence-initial position of the actor provides a straightforward account for children's good performance on S/A-relatives, it does not explain why S-relatives caused significantly fewer errors than A-relatives and why children performed differently on P-, IO-, OBL-, and GEN-relatives. In the remainder of this article we suggest some tentative answers to these questions, beginning with children's different performance on S- and A-relatives.

We suggest that S-relatives caused fewer errors than A-relatives because they denote a simpler situation. S-relatives contain a single referent that is characterized by the relative clause. All other relative clauses, including A-relatives, contain at least two referents that are engaged in a transitive activity. Thus, A-relatives are conceptually more complex than S-relatives in that they include an additional referent (cf. Goodluck & Tavakolian 1982, Hamburger & Crain 1982).

P-, IO-, and OBL-relatives yielded somewhat different results in the two studies. While the German-speaking children had significantly fewer difficulties with P-relatives

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[14] German is a so-called verb-second language, in which the finite verb occurs in second position. The position before the verb can be filled by any element, but the subject and certain types of adverbials are most common in preverbal position. In subordinate clauses, the finite verb occurs at the end of the sentence.

[15] Interestingly, this would also account for the results of a recent study on the processing of relative clauses in Chinese by Hsiao and Gibson (2003). In contrast to English and German, Chinese uses relative clauses before the head noun. This raises the interesting question of how Chinese speakers process relative clauses. Hsiao and Gibson show that in Chinese, object relative clauses cause fewer difficulties than subject relative clauses, which can be explained by both the filler-gap hypotheses and a word-order theory like the one suggested by Bever. However, our account would also be compatible with Hsiao and Gibson's data; in fact, we believe that it would provide a more straightforward account for their findings than the theories they discuss.

than with IO- and OBL-relatives, the English-speaking children did not perform differently with these constructions. We suggest that the differences between P-, IO-, and OBL-relatives were relatively small in the English study because these three types of relative clauses share an important feature in English. As can be seen in 52, they involve the same sequence of nouns and verbs, which distinguishes them from all other relative clauses.

(52) NP [V . . .]$_{REL}$ (S-relative)
     NP [V . . .]$_{REL}$ (A-relative)
     NP [NP V . . .]$_{REL}$ (P-relative)
     NP [NP V . . .]$_{REL}$ (IO-relative)
     NP [NP V . . .]$_{REL}$ (OBL-relative)
     NP [[GEN N] V . . .]$_{REL}$ (GEN-relative)

Since the common word order of P-, IO-, and OBL-relatives caused the same difficulties for the English-speaking children, the differences between them were relatively small. In the German study, children's performance on P-, IO-, and OBL-relatives was different because in German these relative clauses do not share an exclusive feature: each relative clause includes a different case form of the relative pronoun. Moreover, we suspect that the German-speaking children had particular problems with OBL-relatives because OBL-relatives have a unique form in German: in contrast to all other relative clauses, German OBL-relatives are introduced by a preposition that governs the case of the relative pronoun. Although children seemed to understand the locational meaning of OBL-relatives, they frequently repeated them incorrectly because they had difficulties with their structure. Very often, they replaced the preposition and relative pronoun with the locative question word *wo* or omitted the relative pronoun after the preposition.

Finally, we suggest that children's failure to repeat GEN-relatives can be explained by the particular semantic and syntactic structure of these constructions. In contrast to all other relative clauses, GEN-relatives establish the link between the head noun and the relative clause by a genitive attribute, which even many adult speakers find difficult to process. In addition, the low frequency of GEN-relatives might have contributed to children's poor performance on these constructions. Note, however, that frequency alone does not provide a sufficient explanation for the data. Like GEN-relatives, IO-relatives are very rare: both types of relative clauses are highly infrequent in the ambient language and do not occur in children's spontaneous speech (see above). But in contrast to GEN-relatives, IO-relatives were often repeated correctly (in the English study, 31.5% of the IO-relatives were correct, as were 21.4% in the German study). We suggest that the children had fewer difficulties with IO-relatives than with GEN-relatives because IO-relatives are similar to P-relatives. Like P-relatives, IO-relatives are attached to an NP that is affected by the activity expressed in the relative clause, whereas GEN-relatives are formally and conceptually distinct from all other relative clauses.

5. CONCLUSION. In sum, our study has shown that the varying distance between filler and gap does not provide a sufficient explanation for the acquisition of relative clauses. Challenging the filler-gap hypothesis, we have proposed a multifactorial analysis of the acquisition process. Some of the factors we have discussed affect both relative clauses in English and relative clauses in German, but others are language-specific (cf. Clancy et al. 1986). What many of these factors have in common is that they concern the similarity or relationship between constructions.

- S- and A-relatives caused few problems because they are similar to simple sentences.

- English P-, IO-, and OBL-relatives caused basically the same amount of problems because they are related to each other by a common word order.
- IO-relatives caused relatively few problems, given that IO-relatives are highly infrequent in the ambient language, because they are similar to P-relatives.
- GEN-relatives and German OBL-relatives caused tremendous problems because they are structurally and conceptually dissimilar from other types of relative clauses.

Note that this account explains both why the overall results were similar across studies and why there were some minor differences in children's performance on P-, IO-, and OBL-relatives in the two studies. In both languages, the acquisition of relative clauses is crucially affected by the similarities between the various types of relative clauses and their relationships to simple sentences; but since the relative clauses of the two languages have different structures, similarity plays a somewhat different role in the acquisition of English and German relative clauses. In particular, the structures of P-, IO-, and OBL-relatives led to different responses.

Of course, in addition to similarity there are other factors that seem to have affected the outcome of this study: the distributional frequency of the various types of relative clauses, the conceptual and linguistic structure of individual relative constructions, and possibly the varying distance between filler and gap in English relative clauses. But the most general factor appears to be the similarities between the various types of relative clauses and their relationships to other constructions of the grammar.

We suggest that relative clauses constitute a network of interrelated constructions that children acquire in a piecemeal, bottom-up fashion by relating new relative-clause construction to constructions they already know. The development begins with S-relatives in copular constructions, which are similar to simple sentences, and it ends with GEN-relatives, which are structurally and conceptually distinct from all other relative clauses (for a theoretical account of this proposal see Diesel 2004; see also Tomasello 2003).[16]

APPENDIX A: ENGLISH TEST SENTENCES.

1. There is the boy who played in the garden yesterday.
2. This is the dog that slept under the tree this afternoon.
3. Is that the rabbit that came into the house last night?
4. Peter saw the woman who sat on the bench this morning.
5. This is the man who saw Peter on the bus this morning.
6. There is the dog that bit Mary in the house yesterday.
7. Is that the man who helped the farmer in the garden?
8. Mary heard the dog that scared the little cat last night.
9. This is the girl who the boy teased at school this morning.
10. There is the cat that Mary fed in the kitchen last night.
11. Is that the man who Peter met on the street yesterday?
12. Mary fed the cat that the dog chased around the tree.
13. This is the girl who Peter borrowed a football from.
14. There is the girl who the little boy gave his football to.
15. Is that the boy who the woman sent a letter to?
16. Peter talked to the woman who Mary showed her bike to.
17. This is the dog that the cat ran away from this morning.
18. There is the horse that the little cat jumped on yesterday.
19. Is that the boy who Mary played with in the garden?

[16] Interestingly, Brian Joseph pointed out to us that the same piecemeal development is characteristic of certain types of diachronic change, for example, morphological change, some syntactic change, and especially the creation of paradigms (cf. Joseph 1997, 2001).

20. Peter spoke to the man who Mary danced with last night.
21. There is the woman whose horse Peter heard on the farm.
22. This is the woman whose cat caught a mouse yesterday.
23. Is that the boy whose dog barked at the farmer this morning?
24. Mary looked for the man whose cat Peter found in the house.

Appendix B: German test sentences.

1. Da ist die Katze, die grade auf den Baum geklettert ist.
2. Hier ist das Schwein, das vorhin auf der Erde gelegen hat.
3. Ist das die Katze, die gestern im Stall geschlafen hat?
4. Peter streichelt das Pferd, das in den Garten gelaufen ist.
5. Da ist der Junge, der den Mann im Garten gesucht hat.
6. Hier ist der Hund, der Gabi in die Hand gebissen hat.
7. Ist das der Mann, der Peter heute Morgen geholfen hat?
8. Gabi streichelt den Hund, der die kleine Katze erschreckt hat.
9. Da ist der Mann, den das Mädchen im Stall gesehen hat.
10. Hier ist der Hase, den Gabi im Garten gestreichelt hat.
11. Ist das der Junge, den Paul gestern Abend geärgert hat?
12. Paul ruft den Hund, den die kleine Katze grade gekratzt hat.
13. Da ist der Junge, dem Paul die Mütze weggenommen hat.
14. Hier ist das Mädchen, dem die Frau ein Buch vorgelesen hat.
15. Ist das die Frau, der das Mädchen einen Ball gegeben hat?
16. Peter sieht den Bauern, dem Paul sein Fahrrad gezeigt hat.
17. Da ist das Pferd, auf dem Gabi vorhin geritten ist.
18. Hier ist das Schwein, vor dem die Katze weggelaufen ist.
19. Ist das die Katze, mit der Gabi im Garten gespielt hat?
20. Peter kennt den Mann, zu dem die kleine Katze gerannt ist.
21. Da ist die Frau, deren Pferd Paul im Stall gefüttert hat.
22. Hier ist die Frau, deren Katze eine Maus gefangen hat.
23. Ist das der Bauer, dessen Hund den Hasen gejagt hat?
24. Paul kennt den Mann, dessen Hund Peter grade gerufen hat.

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