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DEVELOPMENT OF WORD ORDER IN GERMAN COMPLEMENT-CLAUSE CONSTRUCTIONS: EFFECTS OF INPUT FREQUENCIES, LEXICAL ITEMS, AND DISCOURSE FUNCTION

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We investigate the development of word order in German children's spontaneous production of complement clauses. From soon after their second birthday, young German children use both verb-final complements with complementizers and verb-second complements without complementizers. By their third birthday they use both kinds of complement clauses with a variety of complement-taking verbs. Early in development, however, verb-final complements and verb-second complements are used with separate sets of complement-taking verbs, and they are used with separate sets of item-specific main-clause phrases. For example, initially phrases such as 'I want to see' were used exclusively with verb-final complements, whereas phrases such as 'do you see' and 'you have to say' were used exclusively with verb-second complements. Only later in development—when specific complement-taking verbs were used with both verb-second and verb-final complements, with a greater variety of main-clause phrases, and when specific main-clause phrases were used with both verb-second and verb-final complements—was there evidence for structural links between these various, item-based, complement-clause constructions.*

Keywords: language acquisition, complement clauses, word order, frequency, variability, discourse function

1. Introduction.

1.1. Development of word order in German subordinate clauses.

Almost all studies that have systematically investigated the development of word order in German subordinate clauses have interpreted children's data as evidence relating to the (partial) acquisition of functional categories and phrase-structure rules (Clahsen 1990, Clahsen et al. 1992, Müller 1996, Müller & Penner 1996, Poeppel & Wexler 1993, Rothweiler 1993, Weissenborn 1990, Weissenborn et al. 1998). It is assumed that phrase structure in adult German has a COMP position that is filled either by a complementizer or a finite verb. When the COMP position is not occupied by a complementizer, as is the case in main clauses, the finite verb moves to this position, yielding a verb-second structure (see 1 below). When the COMP position is occupied by a complementizer, as is the case in subordinate clauses, the finite verb remains in sentence-final position (see 2).

(1) Morgen scheint die Sonne.
tomorrow shines the sun
'The sun will shine tomorrow.'

(2) Ich glaube, dass morgen die Sonne scheint.
I believe that tomorrow the sun shines
'I believe that the sun will shine tomorrow.'

Most data suggest that children quickly learn this rule. According to Rothweiler (1993), for example, German-speaking children make very few word-order errors in their first subordinate clauses. As soon as they produce subordinate clauses with complementizers, they systematically place—or leave—the finite verb in clause-final posi-

* We would like to thank the children and families who took part in the longitudinal studies, especially Leo and his parents. We also want to thank Heike Behrens for making available to us the transcripts from the Rigol children with morphosyntactic tags and Roger Mundry for assistance with the statistical analyses.

tion. At the same time, they put the finite verb in second position in their main clauses (see also Clahsen 1990, Weissenborn 1990).

It has also been observed, however, that children produce verb-second subordinate clauses with complementizers (see 3 below) and verb-final subordinate clauses without complementizers (see 4 below), both of which are not acceptable for adults (e.g. Fritzenschaft et al. 1990, Rothweiler 1993).

(3) *Will die Meerjungfrau haben, dass du hast nicht die.
want the mermaid have that you have not that/it
'I want to have the mermaid so that you don't have it.'
(Fritzenschaft et al. 1990)

(4) *Jetzt siehst du das nicht kaputt ist.
now see you it not broken is
'Now you see it is not broken.' (Rothweiler 1993)

In order to account for these ungrammatical structures, it has been suggested that the children producing them have not acquired the COMP position yet, or that they have an incomplete representation of this functional category (e.g. Clahsen 1990, Müller 1996, Müller & Penner 1996, Rothweiler 1993). For example, Müller and Penner (1996) have argued that children produce structures such as 4 because they have not discovered the Infl or finiteness feature of the COMP position yet; that is, they do not associate tense and agreement with the COMP position and hence do not move finite verbs to this position.

Another word-order pattern that has been observed in German-speaking children's spontaneous speech are verb-second relative and complement clauses without any relativizers or complementizers, which are grammatical and also frequently used by adults.

(5) Ich glaube ich hab zuviel genommen.
I believe I have too.much taken
'I believe I took too much.' (Rothweiler 1993)

According to Rothweiler (1993), these patterns appear only relatively late in German children's spontaneous speech—after verb-final subordinate clauses with complementizers, such as 2. Based on a much larger and denser database than the one available to Rothweiler, however, Brandt et al. 2008 already showed that young German-speaking children regularly produce verb-second relative clauses in their spontaneous speech, and that, in fact, the majority of their first relative clauses are verb-second. Only later in development do they produce more verb-final than verb-second relatives. This developmental pattern cannot be explained by the assumption that young German children do not have a full representation of German phrase structure and/or functional categories, as has been suggested by Clahsen (1990) and Rothweiler (1993). If anything, German-speaking children should produce more verb-final than verb-second patterns early in development if they have not yet fully acquired the COMP position, which is the landing site for finite verbs that are assumed to be sentence-final in the underlying structure. Rather, the development of verb-second and verb-final relative clauses observed in Brandt et al. 2008 suggests that what children are learning are grammatical constructions, that is, form-function mappings, which are not derived from any underlying structure, but which can be considered the basic units of linguistic knowledge and hence of language acquisition (e.g. Goldberg 1995, Tomasello 2003). Brandt et al. 2008 argued that both adults and children use verb-second relative clauses when the relative clause expresses new, foreground information, just like a main clause. Verb-final relative clauses, by contrast, are used to express presupposed information (see also Birkner 2008, Schuetze-Coburn 1984). As has been suggested for English (Diessel & Tomasello

2000), German-speaking children's first relative clauses are formally and functionally closer to main clauses than to subordinate clauses.

In the current study, again based on larger and denser speech samples than the ones available to Rothweiler (1993), we investigate if and when German-speaking children also produce verb-second complement clauses. Moreover, we investigate the functional and semantic features of verb-second and verb-final complement clauses in German children's speech to see whether there is evidence that verb-second and verb-final complements serve distinct functions and thus can be categorized as two distinct constructions. This possibility has been largely ignored in previous studies on the development of word order in German subordinate clauses.

1.2. THE CONTINUUM BETWEEN MAIN AND SUBORDINATE COMPLEMENT CLAUSES. Many studies on the form and function of complex sentences in adults' spontaneous speech have found that a great number of subordinate clauses look rather like main clauses, and that it can be hard to draw a line between main and subordinate clauses (e.g. Auer 1998, Boye & Harder 2007, Schuetze-Coburn 1984, Thompson 2002, Thompson & Mulac 1991, Verhagen 2005). Thompson and Mulac (1991), for example, investigated more than 1,200 complement-clause constructions produced by English-speaking university students. The authors showed that the sentential complements that were used with the two most frequent COMPLEMENT-TAKING VERBS (henceforth CTVs), namely *think* and *guess*, most often lacked a complementizer and were thus formally indistinguishable from main clauses.

(6) I think ∅ exercise is really beneficial to anybody.

Just like a main clause, the complement clause *exercise is really beneficial to anybody* in the preceding example could also be used on its own, that is, without the main clause *I think*. Moreover, Thompson and Mulac (1991), Thompson (2002), and Verhagen (2005) have argued for spoken English and Dutch that most complement clauses actually provide new and/or foreground information that is relevant to the ongoing discourse, and that these complement clauses are thus very similar to main clauses not only on a formal level (because they lack a complementizer), but also in terms of their function.

Thompson and Mulac (1991) also demonstrated that main clauses with 1SG or 2SG pronominal subjects were mostly used with complement clauses that lacked a complementizer.[1] The authors concluded that frequently used phrases, such as *I think* or *I guess*, no longer directly refer to acts of thinking or any other mental activity, but function as epistemic parentheticals that are used to modify the proposition expressed by the preceding or following complement clause. In a second study, Thompson (2002) extended the analysis to three other frequent CTVs and noticed that, except for *see*, the five most frequent CTVs used in spoken English, namely *think*, *guess*, *remember*, and *know*, are mainly used in formulaic main-clause phrases. Most main clauses produced with these verbs had a 1SG pronominal subject, they did not contain any obliques, and the verbs were only used in specific tenses. The function of these formulaic main clauses is 'to frame a clause in subjective epistemic terms' (Thompson 2002:138); they can be categorized as epistemic, evidential, or evaluative fragments or discourse markers. Unlike prototypical simple transitive clauses, these formulaic main clauses do not provide the information most relevant to the ongoing discourse. Thompson goes so far

[1] In the remainder of the article, we mostly use the term 'main clause' to refer to main clauses that are used with sentential complements.

as to say that all but one main clause in the complement-clause constructions in her data can be analyzed as 'fragments', and that it is almost always the complement clause that expresses the information most relevant to the ongoing discourse (2002:152). Thus, she is suggesting that in spoken English, complement clauses do not have the function of prototypical subordinate clauses, which is to provide given and/or background information (cf. Tomlin 1985). This conclusion has recently been challenged by Boye and Harder (2007), who reanalyzed some of Thompson's (2002) data and argue that not all complement clauses that Thompson has categorized as nonsubordinate are really nonsubordinate on both a structural and semantic-functional level (see also Newmeyer 2010). Boye and Harder further suggest that even formulaic main clauses or fragments like *I think* or *I don't care* can express information that is relevant to the ongoing discourse and not secondary to what is expressed in the complement clause, as in the following example from Thompson (2002:132).

(7) Melissa: It's erasable,
and I'm not marking on it.
Brett: I don't care if it's erasable.

Furthermore, Boye and Harder (2007) argue that the lack of a *that*- or WH-complementizer does not necessarily imply that the complement clause functions like a nonsubordinate main clause and that the main clause is downgraded to a fragment or discourse marker, as demonstrated by the following example.

(8) I wanted to make sure it was OK. (Thompson 2002:140)

Whereas Thompson (2002:140) has argued that the main clause in the example above (only) expresses 'an epistemic stance towards the claim that *it was OK*', Boye and Harder claim that the main clause in this example 'clearly expresses the main point of the utterance' (2007:576). They suggest that we should always look at form and discourse function separately, although some interesting correlations definitely exist between these two levels of linguistic constructions. Similarly, Evans (2007) has demonstrated that some clauses that look like subordinate clauses (e.g. verb-final sentences with complementizers in German) can be used as main clauses.

(9) Ob er krank ist?
whether he sick is
'(You're asking/wondering//I wonder) whether he's sick.' (Evans 2007:383)

The so-called 'insubordinate' sentence in 9 above presumably originates from a subordinate clause used with a main clause. In its 'insubordinate' use, it is used by itself and the main clause has to be restored through conversational inference (Evans 2007:371). We come back to this issue of whether there is always a clear one-to-one mapping between form and discourse function in complement-clause constructions in the results section and discussion.

1.3. VERB-SECOND COMPLEMENT CLAUSES IN GERMAN. That there is a continuum between main clauses and subordinate complement clauses has also been observed in both written and spoken German. As can be seen in 5 above, German has complement clauses that lack a complementizer and have verb-second word order. These borderline cases have been referred to as 'dependent main clauses' (Auer 1998) or 'dependent V2 clauses' (Reis 1997). Just like in English, these complement clauses are indistinguishable from main clauses on a formal level. They lack a complementizer and have verb-second word order. Nevertheless, they can be categorized as complement clauses or dependent clauses because they are used together with complement-taking verbs, which require an (sentential) argument.

As has been argued for complement clauses without complementizers in English and Dutch (Thompson 2002, Verhagen 2005), Auer (1998) suggests that these verb-second complement clauses are rather assertive and not presupposed. That is, unlike prototypical subordinate clauses (cf. Tomlin 1985), they mostly express new and/or foreground, but not presupposed, information. This assumption is supported by the fact that verb-second complement clauses cannot be used with negated main clauses, such as 'I didn't know', or (purely) factive CTVs, such as 'forget' or 'regret', the semantics of which imply that the content of the sentential complement is presupposed (cf. Auer 1998). In other words, we can only express regret about things or negate our awareness of things that are part of our common ground in the current speech situation.

(10) a. *Ich wusste nicht, du hast morgen Geburtstag.
I knew not you have tomorrow birthday
'I didn't know it's your birthday tomorrow.'
b. Ich wusste nicht, dass du morgen Geburtstag hast.
I knew not that you tomorrow birthday have
'I didn't know that it's your birthday tomorrow.'

Interestingly, some verbs that are traditionally categorized as factive verbs, such as 'know', can be read as nonfactives when they are used with verb-second complement clauses (cf. Auer 1998, Reis 1977). Thus, example 11 is grammatical when we interpret the main verb 'know' as nonfactive.

(11) Ich weiß, du hast morgen Geburtstag.
I know you have tomorrow birthday
'I know it's your birthday tomorrow.'

In this example, the main clause would be interpreted as a discourse marker, whereas the complement clause would be interpreted as assertive. Of course, the addressee knows the date of his own birthday; this is not new information to him. An example like 11, however, is possible in a context where the date of the addressee's birthday is relevant to the ongoing discourse without having been the topic of the preceding conversation. The discourse marker *ich weiß* 'I know' marks the information expressed in the complement clause as information that can be considered part of the common ground in the ongoing discourse from then on.

If the same main clause were used with a verb-final complement clause, we would interpret the complement clause as presupposed. Unlike 11, an utterance such as 11′ is very likely to occur after the date of the addressee's birthday was already introduced as a discourse topic in the current conversation.

(11′) Ich weiß, dass du morgen Geburtstag hast.
I know that you tomorrow birthday have
'I know that it's your birthday tomorrow.'

In this example, the CTV 'know' has to be understood as a factive verb; the main clause could be paraphrased as *I know the fact/I'm aware of the fact (that it's your birthday tomorrow)*. We come back to the issue of which CTVs can be used with what kind of complement clauses, and how the whole construction also determines the reading of the verbs, in the results section and discussion.

1.4. DEVELOPMENT OF COMPLEMENT-CLAUSE CONSTRUCTIONS IN GERMAN AND ENGLISH. How German-speaking children acquire both verb-final and verb-second complement clauses and whether these two types of complement clauses serve distinct functions in German children's speech has not yet been systematically investigated. As mentioned above, Rothweiler (1993) found that German-speaking children quickly learn to pro-

duce verb-final complement clauses with complementizers, and that they produce verb-second complements without complementizers rather late. This is somewhat surprising because, as has been suggested for relative clauses (Brandt et al. 2008), German children should find it easier to produce verb-second structures since these are much more frequent in the input than structures with finite verbs in sentence-final position (see e.g. Freudenthal et al. 2007). Verb-second complement clauses, by contrast, are frequently used by German-speaking adults (cf. Auer 1998) and are thus also part of the children's input. Moreover, if we assume that verb-second complement clauses do not involve presupposition, they should be conceptually easier than verb-final complements, which are associated with presupposition.

Rothweiler's (1993) data might not be ideal to reveal any developmental trends because only three of the seven children were recorded more than three times. Overall, there are only thirty-four recordings. This sampling rate is probably too sparse to catch a representative number of exemplars of a complex construction, which can be assumed to be relatively rare early in development (cf. Rowland & Fletcher 2006, Tomasello & Stahl 2004). Moreover, the vast majority of recordings were made when the children were already three or older. In the current study, we look at more and denser data from four German-speaking children starting at the age of 2;0.

To our knowledge, how children acquire various complement-clause constructions with distinct functions has only been systematically investigated in English. Diessel and Tomasello (2001) analyzed the production of complement clauses in seven English-speaking children between the ages of 1;2 and 5;2 and suggested that children first produce complement-clause constructions containing nonsubordinate complements and formulaic main clauses that do not have any propositional meaning (see also Diessel 2004). As can be seen in the following examples, these formulaic main clauses rather function as epistemic markers or attention getters, and the main proposition is expressed in the complement clause.

(12) I think it's in here. (Diessel & Tomasello 2001:111)

(13) See I have a teeth. (Diessel & Tomasello 2001:119)

As has been shown for adults' spontaneous speech (e.g. Thompson 2002), these formulaic main clauses contain a limited number of frequent CTVs and 1SG or 2SG pronominal subjects. The matrix verbs are used in present tense or as imperatives and are not modified. The complement clauses used with these formulaic main clauses lack any formal sign of subordination. Only later in development do English children produce complement clauses with performative and assertive main clauses such as 14 and 15.

(14) See if I can push it. (Diessel & Tomasello 2001:127)

(15) He doesn't know where he's driving. (Diessel & Tomasello 2001:131)

Complement clauses used with performative main clauses, such as 14, contain complementizers; they are formally marked as subordinate clauses. However, Diessel and Tomasello (2001) argued that it is still the complement clause that contains the main proposition in these complex structures. Example 14 could be paraphrased as 14′.

(14′) Can I push it?

Thus, while performative main clauses contain some propositional meaning, they are mainly used to coordinate the interaction (cf. Diessel & Tomasello 2001:108). Only in complement-clause constructions with assertive main clauses, such as 15, it is the main clause that contains the main proposition with the complement clause being embedded in that proposition. These assertive main clauses are more substantial than the formulaic

or performative main clauses; that is, they contain a greater variety of CTVs and subjects and the CTVs are modified and used in a greater variety of tenses. So, these assertive main clauses can be used to serve a greater variety of functions and express a greater variety of propositions than the formulaic or performative main clauses. Diessel and Tomasello (2001) have shown, however, that before the age of 5;0 English-speaking children use both performative and assertive main clauses only with a limited number of CTVs, and that these early structures, therefore, can be considered 'constructional islands'. Similar patterns were found in previous, less comprehensive studies by Bloom and colleagues (1989), Limber (1973), and Shatz and colleagues (1983).

Like other linguistic constructions, such as transitives, actives, or passives, complement clauses are acquired on an item-by-item basis (cf. Tomasello 2000). What is special about this item specificity in early complement-clause constructions is that (i) it is tied to a distinct function, and (ii) this item-specific, form-function mapping continues to be also part of adults' representation of complement-clause constructions. There are complement-clause constructions that contain formulaic main clauses and complement clauses that are neither formally nor functionally subordinate. Other complement-clause constructions contain performative main clauses and complement clauses that are formally marked as subordinate but still function more like main clauses, and there are complement-clause constructions with assertive main clauses and complement clauses that are both formally and functionally subordinate.

These constructions are presumably historically related. It has been suggested that assertive main clauses have developed into performatives and formulaic phrases (e.g. Boye & Harder 2007, Thompson & Mulac 1991). And Diessel and Tomasello (2001) have suggested that they are also related in ontogeny, where children produce formulaic main clauses with nonsubordinate complements before performative and assertive main clauses.

1.5. PREDICTIONS.

ORDER OF EMERGENCE OF VERB-FINAL AND VERB-SECOND COMPLEMENT CLAUSES. Following the results from Diessel and Tomasello (2001) and based on the idea that verb-second complements are assertive, whereas verb-final complements express presupposed information (cf. Auer 1998), we predict that German-speaking children produce verb-second complement clauses before verb-final complement clauses. Following the results from Rothweiler (1993), by contrast, we predict that we find verb-final complement clauses before verb-second complement clauses in German children's spontaneous speech.

LEXICAL DIFFERENCES BETWEEN THE VERB-FINAL AND VERB-SECOND CONSTRUCTIONS. Based on the assumption that children are learning various complement-clause constructions, we predict that they use different sets of lexical items in each construction, as has been suggested by the usage-based approach (e.g. Goldberg 2005, Tomasello 2003) and the lexicalist constraint-based framework (e.g. MacDonald et al. 1994, Trueswell & Tanenhaus 1994). Especially, it has been shown for English that some CTVs are much more likely to be used with a complementizer than others (e.g. Garnsey et al. 1997, Roland et al. 2006). So, our hypothesis is that both German-speaking children and adults prefer to use a specific set of CTVs with verb-second complements and without complementizers and another set of CTVs with verb-final complements and with complementizers.

FUNCTIONAL DIFFERENCES BETWEEN THE VERB-FINAL AND VERB-SECOND CONSTRUCTIONS. Finally, our prediction is that the word order in the complement clause depends

on the function of both the main clause and the complement clause. Based on data from Dutch- and German-speaking adults and English-speaking children and adults (cf. Diessel & Tomasello 2001, Thompson & Mulac 1991, Verhagen 2005), we hypothesize that German-speaking children use formulaic main clauses, for example, epistemic markers, attention getters, or discourse markers, with verb-second complements expressing assertive propositions and full assertive main clauses with verb-final complements expressing presupposed propositions.

2. DATA AND METHODS.

2.1. DATABASE. The main analysis is based on the Leo corpus. Leo is growing up in a middle-class family in a mid-size German city. His parents have higher education and speak Standard German. The data consist of 383 one-hour recordings of child-adult interactions between the ages of 2;0 and 5;0. During the first year of the study, the recordings were made five times a week and were supplemented by diary utterances collected by Leo's parents. In the diary, Leo's parents wrote down the child's most sophisticated utterances, that is, those that were syntactically and conceptually most complex at any particular time. The diary data is especially valuable in the context of the current study because we are examining the development of complex linguistic constructions, which are probably not used very frequently before the age of 3;0. Thus, it is important to have dense sampling and diary data to catch the infrequent utterances containing these rather complex constructions early in development (cf. Rowland & Fletcher 2006, Tomasello & Stahl 2004). After the age of 3;0, Leo was recorded five times a month. Overall, the corpus includes nearly half a million words and 6,300 diary utterances. The transcripts were automatically tagged by a German version of the CHILDES MOR-program (MacWhinney 2000), developed by Behrens (2000), and linked to the corresponding sound files.

The input data is based on recording samples from Leo's mother. The samples were taken from several age periods (of the child): 2;0–2;2, 2;8, 3;2, and 4;10. Overall, we included thirty-six one-hour recordings for the input sample.

In order to see whether Leo's development is comparable to that of other German-speaking children, we partially investigated the development of complement-clause constructions in three additional children from the Rigol corpus, which is accessible on CHILDES.[2] The data were transcribed and tagged with the same CHILDES MOR-program that was used for the Leo corpus (Behrens 2000, MacWhinney 2000). The children come from middle-class families. The data is not as dense as that from Leo, but it covers a longer time period (2;0 till about 7;0). All three children were recorded twice a month between 2;0 and 4;0 and once a month after that. There are about 130 half-hour recordings from each of these three additional children included in the current study.

We only included finite complement clauses in our analysis. In order to extract these, we first did an automatic search for all utterances that contained at least two verbs with the help of the CLAN-program (MacWhinney 2000). In a second step, we extracted all finite complement-clause constructions by hand. The constructions that were included in the analysis had to contain a complement-taking verb (CTV), such as 'think', 'say', or 'see', and a finite clause directly following or, in some rare cases, preceding the CTV.

[2] http://childes.psy.cmu.edu/data/Germanic/German/

For the main analysis, we obtained 2,034 complement clauses from Leo and 1,253 complement clauses from his mother. As supporting data, we obtained 484 complement clauses from Pauline, 451 from Sebastian, and 417 from Cosima.

2.2. CODING AND ANALYSIS. First of all, we coded each complement clause for word order. Complement clauses were coded as verb-second or verb-final. Complement clauses that contained only a subject and a verb had to be coded as ambiguous because it is impossible to tell whether they are verb-second or verb-final.

(16) Verb-second complement clause
Ich glaube, er schläft zu Hause.
I believe he sleeps at home
'I believe he's sleeping at home.'

(17) Verb-final complement clause
Wusstest du nicht, dass er zu Hause schläft.
knew you not that he at home sleeps
'Didn't you know that he was sleeping at home?'

(18) Complement clause with ambiguous word order
Ich glaube, er schläft.
I believe he sleeps
'I believe he's sleeping.'

A small number of complement clauses displayed verb-first word order.

(19) Sag mal, sollen wir den Bagger holen?
say PRT shall we the digger get
'Say should we get the digger?'

These verb-first complement clauses only cover 1–2% of the children's complement-clause data and 3% of the complement clauses in the input, and we excluded them from the analyses because our main focus here is on the development of verb-second versus verb-final complement clauses.

Then we determined the CTV for each complement-clause construction in Leo's data, his input, and the Rigol corpus. In 16 above, the CTV is *glauben* 'believe'; in 17 above, the CTV is *wissen* 'know'. The more detailed analyses reported below are based on Leo's complement-clause constructions containing one of his ten most frequent CTVs, which cover 89% (1,809/2,034) of the child's data: *gucken* 'look' (N = 1,097), *glauben* 'believe' (N = 231), *wissen* 'know' (N = 160), *sagen* 'say' (N = 100), *denken* 'think' (N = 63), *sehen* 'see' (N = 56), *heißen* 'mean' (N = 43), *zeigen* 'show' (N = 21), *überlegen* 'think about' (N = 21), and *fragen* 'ask' (N = 17).

Furthermore, we determined the form of the main clauses by coding them for subject, tense, presence or lack of obliques or negation, and indicative vs. interrogative, where indicative was the default and only interrogatives were marked with a 'Q'. In 16 above, the CTV is used with a 1SG pronominal subject, in present tense, without any obliques or negation, and in indicative mode. So, the main clause *ich glaube* 'I believe' would have been coded as 1SG CTV-PRES. In 17 above, the main clause *wusstest du nicht* 'didn't you know?' would have been coded as 2SG CTV-PAST-Q NEG because the CTV is used with a 2SG pronominal subject, in past tense, with negation, and as an interrogative. Based on this coding, we determined Leo's nine most frequent main-clause frames. For example, 14% of his complement-clause constructions contained a main clause coded as 1SG CTV-PRES. Leo's nine most frequent main-clause frames account for 82% (1,660/2,034) of the child's complement-clause constructions. Finally, we determined which CTVs are predominantly used in which frames, and how the various main-clause frames and the accompanying complement clauses are used in discourse.

3. RESULTS.

3.1. DEVELOPMENT OF WORD ORDER IN COMPLEMENT CLAUSES.

AGES 2;0–2;6. Overall, 95% (1,926/2,034) of Leo's finite complement clauses could be unambiguously coded as either verb-final or verb-second. About one-third (19/61) of Leo's complement clauses produced before the age of 2;6, however, had to be coded as having ambiguous word order because they did not contain more than a verb, and sometimes a subject or object. These sentences were excluded from the analysis and, thus, the data for the age period between 2;0 and 2;6 are not very robust. Moreover, more than half of the sentential complements produced before 2;6 that are clearly verb-final contain the verb *kommen* 'come' in third-person singular and half of them contain the subject *Zug* 'train' in the subordinate clause.

(20) Fahrplan gucken, ob der Zug kommt.
schedule look if the train come
'Look schedule if the train comes.'

Thus, while Figure 1 suggests that Leo produces more verb-final than verb-second complements early in development, as has been found for other German-speaking children by Rothweiler (1993), a great number of these sentences are quite item-specific. And the pattern would also look very different if we included the ambiguous sentential complements. None of these ambiguous complements contain a complementizer; they are thus more similar to verb-second than to verb-final complements on the surface (see 18 above).

FROM 2;6 ON. In the period between 2;6 and 3;0, we find almost 400 finite complements in Leo's data, out of which only twenty-one (5%) display ambiguous word order and had to be excluded from the analysis. Approximately the same amount of data can be found in the following periods, each covering six months. The data from the periods after 2;6 are thus much more robust, and we can see that as soon as Leo starts using complement clauses productively, he uses as many verb-second as verb-final complements or even more verb-second than verb-final complements (see Fig. 1).

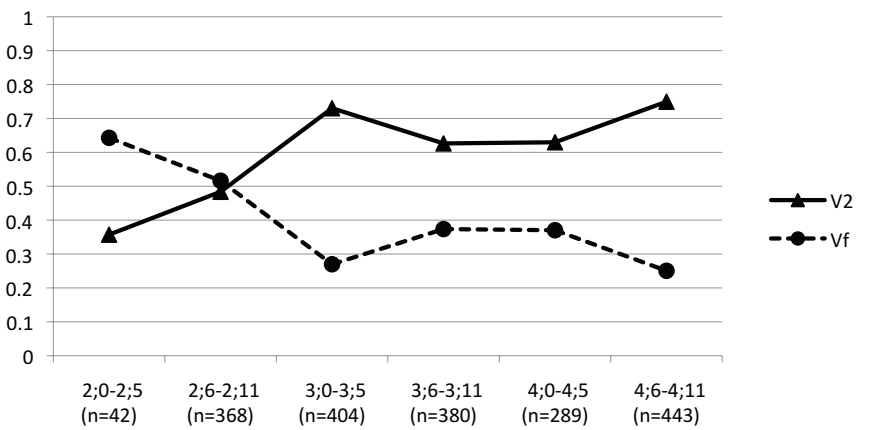

FIGURE 1. Development of word order in Leo's complement clauses.

One reason for the predominance of verb-second complement clauses in the child's data might be the predominance of verb-second complements in his input, where 73% (880/1,212) of all finite complements that could be coded in terms of word order display

verb-second order. How this word order is related to lexical biases and constructional function in both the child's and adult's speech is discussed in the following sections.

When we look at the data from the additional three children from the Rigol corpus, we do not see a developmental pattern that fully supports the findings from Rothweiler (1993) either. The three children produce more verb-second than verb-final complements early in development. Only at the age of 5;0 do they start producing more verb-final than verb-second complements, as can be seen in Figure 2.[3]

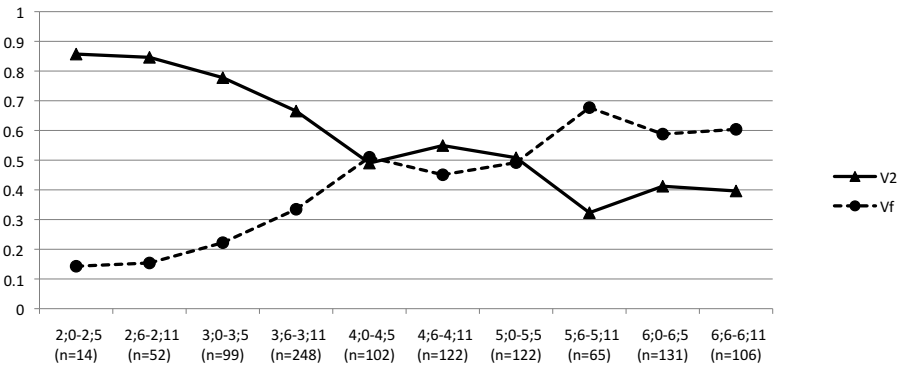

FIGURE 2. Development of word order in Rigol children's complement clauses.

One reason for the difference between the developmental patterns observed in the current study and the one reported by Rothweiler (1993) might be that Rothweiler did not consider verb-second complement clauses following perception verbs in the imperative because the lexicon entries for these verbs do not allow for verb-second complements. This is derived from the fact that in German grammar, verb-second complements can only replace complements that are otherwise introduced by a 'that'-complementizer. Perception verbs in the imperative, however, cooccur with WH- or 'if'-complements. And complement clauses introduced by complementizers should be verb-final in German. Nevertheless, as is shown in §3.3 below, even complement clauses introduced by WH-complementizers are used both in verb-final and verb-second forms in spontaneous speech.

(21) Guck mal, was das ist.
look PRT what that is
'Look what that is.'

(21′) Guck mal, was ist das?
look PRT what is that
'Look what's that?'

Of course, example 21′ is not a prototypical exemplar of what is traditionally considered a complement-clause construction. As is discussed in more detail in §3.4 below, it could be analyzed as a main clause introduced by an attention getter (cf. Diessel & Tomasello 2001). As noted above, however, verb-second complements following mental-state verbs are not the most prototypical exemplars of complement-clause constructions either. As has been shown for many other linguistic constructions (see for ex-

[3] We summarized the data from all three children for the graph below because they all show the same developmental pattern.

ample Taylor 1998), complement clauses lie on a continuum, with truly subordinate, verb-final complements on one end and assertive, verb-second complements on the other end. Since verb-final and verb-second complements seem to serve two distinct functions, they might even be considered two distinct, yet related, constructions. Working in a cognitive linguistic, usage-based framework, we did not exclude less prototypical members from our data set a priori. We thus did not exclude any verb-second complement clauses as long as they were used together with a CTV that can also be used with verb-final complements of any kind.

In the children's data analyzed for the current study, about 50% of all verb-second complement clauses follow the perception verb *gucken* 'look'. If we excluded the complement clauses following perception verbs in the imperative, as Rothweiler (1993) did, we would still find more verb-second than verb-final complements in the first complement-clause constructions produced by the Rigol children. They all used more verb-second than verb-final complements before the age of 3;0, one even up to 4;0. In Leo's data, we would find more verb-final than verb-second complements early in development. We would still find a large number of verb-second complements, however, after the age of 2;6 (i.e. 46% verb-second complements from 2;6 to 2;11, 40% from 3;0 to 3;5, 30% from 3;6 to 3;11, 37% from 4;0 to 4;5, and 53% from 4;6 to 4;11).

3.2. COMPLEMENT-TAKING VERBS AND WORD ORDER. Not all CTVs are readily used with verb-second complements. Factive CTVs in particular cannot be used with verb-second complements because their semantics implies that the proposition of the following complement is presupposed. And verb-second complements are not understood as presupposed, but assertive (cf. Auer 1998) (see discussion of 10 and 11 above). It has also been suggested that frequent CTVs are more likely to be used without any complementizers and with assertive complements than infrequent CTVs (Thompson & Mulac 1991). The CTV thus seems to be a good predictor for the word order and presence or absence of complementizers in the accompanying complement clause (see also Garnsey et al. 1997, Roland et al. 2006).

Table 1 below shows Leo's ten most frequent CTVs and how often they are used with verb-final complement clauses by him and by his mother. The frequency counts indicate the number of complement-clause constructions containing the specific CTV in the child's data. The data is based only on the complement clauses that are either clearly verb-final or verb-second. So, if 27% of Leo's complement clauses used with the CTV *gucken* 'look' are verb-final, this implies that 73% of his complement clauses used with *gucken* 'look' are verb-second. Like Rothweiler (1993), we also found very few word-order errors. That is, the verb-second complements were almost always used without complementizers, whereas the verb-final complements were almost always used with complementizers.

Half of Leo's ten most frequent CTVs—namely, *wissen* 'know', *sehen* 'see', *überlegen* 'think about', *zeigen* 'show', and *fragen* 'ask'—show a verb-final bias. The pattern with the same verbs in the input is very similar. This indicates that the acquisition of complement-clause constructions in German may be driven by distributional patterns in the input. That is, children do not simply learn verb-second before verb-final complements or vice versa, but, based on their input, they learn to use specific lexical items with specific construction types.

There is also one CTV, however, that shows different biases in the child's data and in the input. Whereas Leo mainly uses *wissen* 'know' with verb-final complement clauses, his mother is more likely to use this CTV with verb-second complements. As men-

	VERB-FINAL COMPLEMENT	
	LEO	INPUT
gucken 'look' (*N* = 1,045)	0.27	0.17
glauben 'believe' (*N* = 220)	0.02	0.01
wissen 'know' (*N* = 153)	0.72	0.47
sagen 'say' (*N* = 88)	0.30	0.18
denken 'think' (*N* = 59)	0.10	0.23
sehen 'see' (*N* = 54)	0.78	0.54
heissen 'mean' (*N* = 33)	0.33	0.00
überlegen 'think about' (*N* = 20)	0.90	0.60
zeigen 'show' (*N* = 19)	0.95	0.70
fragen 'ask' (*N* = 17)	0.76	1.00

TABLE 1. Leo's ten most frequent complement-taking verbs and proportions of verb-final complement clauses.

tioned in the introduction, *wissen* 'know' can be used and interpreted both as a factive verb and as a nonfactive verb, and we come back to this point in the final section of the results, where we look at specific exemplars of complement clauses containing *wissen* and other CTVs and see how they are used in context.

3.3. DEVELOPMENT OF COMPLEMENT-TAKING VERBS AND COMPLEMENT-CLAUSE WORD ORDER. Overall, Leo used seventy-three different CTVs up to the age of 5;0, when the recordings stopped. However, before the age of 2;6, only eleven of these different CTVs showed up in his complement-clause constructions. As demonstrated in Table 2 below, Leo continued to produce more, and a greater variety of, CTVs throughout development. The fact that more and more verbs appeared in the slot of the CTV suggests that the complement-clause construction(s) are becoming more verb-general and abstract as the child gets older. Supporting evidence for a verb-by-verb acquisition of complement-clause constructions comes from the data of the other three German children. Like Leo, they did not use the full range of CTVs from the beginning, but used more and more different verbs with complement clauses as they grew older (see Table 2).

	NUMBER OF NEW CTVS			
	LEO	SEBASTIAN	PAULINE	COSIMA
2;0–2;5	11	0	2	2
2;6–2;11	33	5	7	3
3;0–3;5	5	4	1	1
3;6–3;11	11	3	2	2
4;0–4;5	8	3	2	2
4;6–4;11	5	0	1	2
5;0–7;5	n/a	17	24	8
TOTAL	**73**	**32**	**39**	**20**

TABLE 2. Development of complement-taking verbs.

It could be claimed that our samples at the youngest age bands are just too small, or that our data is not dense enough to include all possible and infrequent CTVs (cf. Rowland & Fletcher 2006, Tomasello & Stahl 2004). However, at least for the data from Leo, it is unlikely that the number of CTVs that can be observed up to a certain point in development is only a matter of sample size. In order to control for sample size, we divided the complement-clause utterances produced by Leo into samples of sixty. That is, we took the first sixty complement-clause utterances produced by Leo, the second sixty complement-clause utterances produced after the first set, and so forth. Then we

counted the number of different CTVs that showed up in the first set of sixty complement-clause utterances, in the second set, and so on. We also divided a random sample of 600 complement-clause utterances of the mother into batches of sixty and calculated the number of different CTVs within each batch. In order to be able to compare the input data with the child's data, we only considered the data from the recordings after 3;0 for the child, which were not augmented by diary data. This allowed us to see how many different CTVs occur within samples containing the exact same number of complement-clause utterances produced at different points in development and by different speakers (child vs. mother). Figure A in the appendix shows that, in a sample of the same size, there is a greater variety of CTVs in the input than in Leo's data. On average, the mother used 15.7 (range: 11–19) different CTVs in a sample of sixty complement-clause utterances, whereas Leo used only 10.8 different CTVs (range: 6–17). Moreover, the variety of CTVs found in a sample of sixty increased as Leo grew older. In the first ten sample sets of sixty complement-clause utterances produced by Leo after 3;0, there is an average of 8.2 different CTVs (range: 6–12), whereas in the last ten sample sets, there is an average of 12.8 different CTVs (range: 9–17).

Based on Diessel and Tomasello's (2001) findings on the development of complement-clause constructions in English, we might hypothesize that German-speaking children first use the CTVs that have a verb-second bias. Based on Rothweiler's (1993) findings on the development of word order in German subordinate clauses, by contrast, we should predict that German children first use the CTVs that have a verb-final bias. Overall, Leo showed a significant tendency to first use those CTVs that he primarily used with verb-second complements ($rS = -0.49$, $N = 73$, $p = 0.0001$, NPerm = 10000). We also found a correlation, however, between input frequencies and order of acquisition for the complement-taking verbs; that is, Leo first produced the CTVs that were most frequently used by his mother ($rS = -0.63$, $N = 73$, $p = 0.0001$, NPerm = 10000). As Table 1 above shows, the most frequent CTVs also have a verb-second bias. So there is confound between verb bias and input frequency.

We also found that there is confound between frequency and flexibility of CTVs. That is, the most frequent CTVs are used in a relatively small number of main-clause frames both in the input and in the child's language. Remember that we coded each main clause that was used with a complement clause in terms of subject, tense, obliques or negation, and indicative vs. interrogative. The high-frequency CTV *glauben* 'believe', for example, occurred 186 times in the input sample. And Leo's mother used it in six different main-clause frames. Just one of these frames, however, accounts for 177 (95%) of the tokens; that is, 95% of the time, *glauben* 'believe' was used in the fixed phrase *ich glaube* 'I believe'. The CTV *glauben* thus shows a highly skewed distribution. In order to determine how flexibly the frequent CTVs were used, we calculated Shannon Weaver values. The Shannon Weaver value is a measure to determine how evenly a given item is distributed ($H' = \text{sum}(Pi * \log_{10}(Pi))$, where Pi = proportion of CTV tokens covered by a specific main-clause frame). For example, a given CTV might occur in four different main-clause frames. If it is predominantly used in just one of these four different frames and the distribution is skewed, it gets a low Shannon Weaver value. If the verb occurs in each of these four frames with almost equal frequencies, it gets a high Shannon Weaver value. The values were standardized by ln (number of items).

Table 3 shows that the most frequent CTVs also have the lowest Shannon Weaver values both in the input and in the child's data. Overall, the verbs with low Shannon Weaver values in the input, that is, the verbs that were used least flexibly by Leo's mother, were used by Leo earlier than the verbs with high Shannon Weaver values, that

	SHANNON WEAVER	
CTV	LEO	INPUT
gucken 'look' (*N* = 1,045)	0.23	0.28
glauben 'believe' (*N* = 220)	0.16	0.15
wissen 'know' (*N* = 153)	0.69	0.59
sagen 'say' (*N* = 88)	0.92	0.77
denken 'think' (*N* = 59)	0.82	0.92
sehen 'see' (*N* = 54)	0.83	0.87
heissen 'mean' (*N* = 33)	0.66	not def.
überlegen 'think about' (*N* = 20)	0.92	0.88
zeigen 'show' (*N* = 19)	0.87	0.79
fragen 'ask' (*N* = 17)	0.97	0.88

TABLE 3. Complement-taking verbs and distribution across main-clause frames.

is, the verbs that were used in a relatively great variety of syntactic frames (*rS* = 0.69, *N* = 25, *p* = 0.0003, NPerm = 10000).[4] Hence, Leo first acquired the CTVs that have a verb-second bias, and that are used most frequently and least flexibly. Most often, these three factors are confounded. As has been suggested before, frequently used main-clauses phrases, such as *I think*, presumably turn into formulaic main clauses that are predominantly used with nonsubordinate, German verb-second, complement clauses (cf. Auer 1998, Diessel & Tomasello 2001, Thompson & Mulac 1991).

We have shown, however, that Leo and the other children also use a great number of verb-final complement clauses from the beginning (see Figs. 1 and 2), and as Figure 3 below illustrates, some frequent CTVs (e.g. *wissen* 'know', *gucken* 'look', and *sagen* 'say') are mainly used with verb-final complements early in development, and some of these (e.g. *wissen* 'know') continue to be primarily used with verb-final complements by Leo throughout development. Other frequent CTVs (e.g. *glauben* 'believe' and *denken* 'think'), by contrast, are mainly used with verb-second complements early in development and continue to be used with verb-second complements throughout development and also in the input (cf. Table 1 above). Again, our data does not fully confirm either the verb-second first or the verb-final first hypotheses. Leo is using both kinds of complement clauses in parallel from the start, but he is using different sets of CTVs and, as we see, different, item-specific, main-clause frames with each kind.

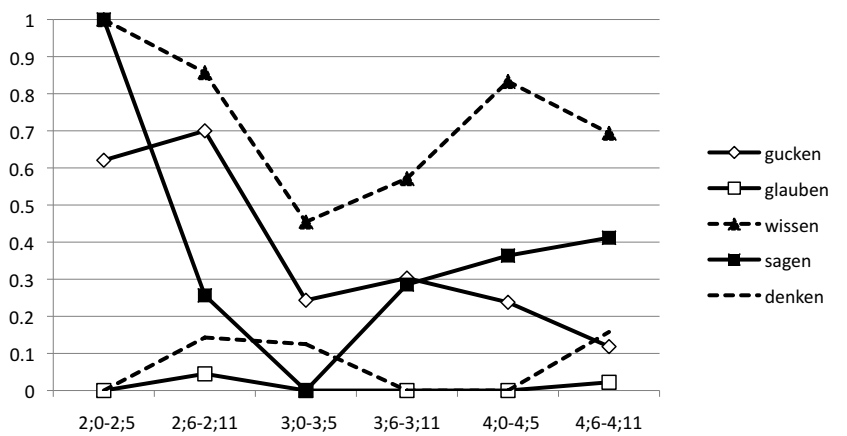

FIGURE 3. Development of verb-final complement clauses for Leo's five most frequent complement-taking verbs.

[4] This statistical analysis only includes CTVs that were used by both Leo and his mother and for which we were able to determine Shannon Weaver values.

On first sight, these data support Diessel and Tomasello's (2001) claim that early complement-clause constructions are 'constructional islands'. Specifically, Diessel and Tomasello have claimed that the performative and assertive main clauses occur only with a small number of specific CTVs in English-speaking children's speech before the age of 5;0; that is, only a limited number of CTVs are used with complement clauses that are formally marked as subordinate. In Leo's data, however, we find thirty-three different CTVs used with verb-final complements and twenty-one different CTVs used with verb-second complements between the ages of 2,6 and 3;0 already. Both structures are thus used quite productively from early on. Moreover, some verbs, such as *gucken* 'look' and *sehen* 'see', are used with both verb-second and verb-final complements as soon as they are used as complement-taking verbs.

As indicated above, it has been suggested that CTVs carry different meanings depending on whether they are used with verb-second or verb-final complements (cf. Auer 1998). More generally, it has been suggested that the meaning of a specific verb is (partially) determined by the meaning and function of the construction in which the verb is used (e.g. Goldberg 2005, Kaschak & Glenberg 2000). Moreover, looking at the acquisition of the verb *go* in English, Theakston and colleagues (2002) have suggested that children only gradually build links between various forms of the same verb used in various syntactic structures. In the final section of the results, we investigate in what kinds of syntactic frames the CTVs are used, and how the word order in the complement clauses is determined by the form and function of the main clause.

3.4. INTERACTIONS BETWEEN COMPLEMENT-TAKING VERBS, MAIN-CLAUSE FRAMES, AND WORD ORDER. We have shown that certain frequent CTVs are predominantly used without complementizers and verb-second complement clauses, whereas other CTVs are mainly used with complementizers and verb-final complements. We have also shown that the child uses most CTVs the same way that his mother does (cf. Table 1). Now Table 4 below demonstrates that the word order of the sentential complements often also depends on the form of the main clause in which the CTV is used. Remember that we coded each main clause that was used with a complement clause in terms of subject, tense, obliques or negation, and indicative vs. interrogative, where indicative was considered the default and only interrogatives were marked with a 'Q'. In Table 4 below, we list Leo's nine most frequent main-clause frames together with his ten most frequent CTVs. The frequency counts indicate how many times a particular frame was used by Leo and how many times a particular verb occurred in that frame in the child's data. The proportions in the two columns on the right indicate for Leo and his mother how many times they used a specific CTV in a specific main-clause frame with verb-final complements. Again, the data displayed here are based on the complement-clause constructions that were either clearly verb-second or verb-final. So, if 20% of the complement clauses that Leo used with *gucken* 'look' in a CTV-IMP (OBL) frame are verb-final, this implies that 80% of the complement clauses used with this verb in this main-clause frame are verb-second.

Now, if we look at the CTV *gucken* 'look' for example, we can see that both Leo and his mother rarely use it with verb-final complements when it is embedded in an imperative main clause (CTV-IMP (OBL)). However, when the same CTV is modified by a modal auxiliary (MODAL CTV-INF), or when it is used in present tense and with a 1SG pronominal subject (1SG CTV-PRES), both Leo and his mother almost always use it with verb-final complements. Now, if we look at the CTV *denken* 'think', we can see that, unlike *gucken* 'look', both Leo and his mother never use this verb with verb-final complements when it is embedded in a 1SG CTV-PRES frame, that is, when it is used with a

FRAME	EXAMPLE	CTV	VERB-FINAL COMPLEMENT LEO	VERB-FINAL COMPLEMENT INPUT
CTV-IMP (OBL)	*Guck mal (hier)*	*gucken* 'look' (N = 930)	0.20	0.09
(N = 1,015)	'Look (here)'	*sagen* 'say' (N = 3)	1.00	0.21
		gucken 'look' (N = 34)	1.00	0.87
		sehen 'see' (N = 10)	1.00	1.00
		sagen 'say' (N = 5)	0.20	0.33
MODAL CTV-INF	*... will gucken*	*wissen* 'know' (N = 4)	1.00	1.00
(N = 82)	'... want to look'	*überlegen* 'think about' (N = 3)	1.00	0.60
		denken 'think' (N = 1)	0.00	1.00
		fragen 'ask' (N = 1)	1.00	1.00
		zeigen 'show' (N = 1)	1.00	n/a
		glauben 'believe' (N = 205)	0.01	0.00
		gucken 'look' (N = 10)	1.00	1.00
		wissen 'know' (N = 10)	0.60	0.75
1SG CTV-PRES	*Ich glaube*	*denken* 'think' (N = 8)	0.00	0.00
(N = 299)	'I believe'	*zeigen* 'show' (N = 5)	1.00	1.00
		sagen 'say' (N = 4)	0.50	0.00
		überlegen 'think about' (N = 4)	1.00	n/a
		fragen 'ask' (N = 3)	0.67	n/a
		wissen 'know' (N = 7)	0.71	n/a
		gucken 'look' (N = 7)	1.00	1.00
		fragen 'ask' (N = 3)	0.67	n/a
1SG CTV-PRES OBL	*Ich weiß schon*	*denken* 'think' (N = 3)	0.00	0.00
(N = 36)	'I know already'	*zeigen* 'show' (N = 2)	1.00	n/a
		glauben 'believe' (N = 1)	0.00	0.00
		sagen 'say' (N = 1)	0.00	n/a
		sehen 'see' (N = 1)	1.00	0.00
1SG CTV-PRES NEG	*Ich weiß nicht*	*wissen* 'know' (N = 23)	1.00	1.00
(N = 29)	'I don't know'			
		wissen 'know' (N = 59)	0.56	0.36
2SG CTV-PRES-Q	*Weißt Du*	*sehen* 'see' (N = 7)	0.00	0.14
(N = 83)	'do you know'	*sagen* 'say' (N = 3)	0.00	n/a
		denken 'think' (N = 1)	0.00	n/a
		heissen 'mean' (N = 13)	0.46	0.00
		sehen 'see' (N = 5)	1.00	1.00
		wissen 'know' (N = 4)	0.50	n/a
3SG CTV-PRES	*Das heißt*	*sagen* 'say' (N = 3)	0.67	0.00
(N = 47)	'this means'	*zeigen* 'show' (N = 2)	0.50	n/a
		gucken 'look' (N = 2)	0.50	n/a
		fragen 'ask' (N = 1)	1.00	n/a
3SG CTV-PRES-Q	*Heißt das*	*heissen* 'mean' (N = 13)	0.23	n/a
(N = 37)	'does this mean'	*wissen* 'know' (N = 2)	1.00	n/a
		sagen 'say' (N = 1)	0.00	n/a
1SG CTV-PAST	*Ich dachte*	*denken* 'think' (N = 20)	0.10	0.00
(N = 32)	'I thought'	*sagen* 'say' (N = 5)	0.00	n/a
		wissen 'know' (N = 2)	1.00	n/a

TABLE 4. Main-clause frames, complement-taking verbs, and word order.

1SG pronominal subject and in present tense. Table 4 above shows many of these interactions. Some main-clause frames are predominantly used with verb-final (or verb-second) complements, but this does not hold across all CTVs that are used in these frames. By contrast, some CTVs are predominantly used with verb-final (or verb-

second) complements, but this does not hold across all main-clause frames in which these verbs appear. These interactions are best explained by the various functions of the main-clause frames, the various semantics of the CTVs, and the various functions of the complement clauses. In order to get a better idea of these various functions and semantics of the main and subordinate clauses and verbs involved in complement-clause constructions, we take a closer look at some of these main-clause frames and how they are used with both verb-second and verb-final complements in context. All exemplars provided below were produced by Leo. The age at which they were produced is indicated in parentheses.

(22) CTV-IMP (OBL)

a. Verb-final (3;6.22)
CHI: **Guck mal, wo die Karibik ist.**
look PRT where the Caribbean is
'Look where the Caribbean is.'
…
CHI: Mama, wo ist die Karibik?
Mum where is the Caribbean
'Mum, where is the Caribbean?'

b. Verb-second (4;9.7)
CHI: **Guck mal, was machen sie denn da?**
look PRT what make they PRT there
'Look what are they doing there?'
MOT: Tischfussball spielen.
tabletop.soccer play
'Playing tabletop soccer.'

As has been suggested for English (Diessel & Tomasello 2001), imperative main clauses preceding sentential complements are mainly used as attention getters; that is, they are used to draw the interlocutor's attention to what is expressed in the complement clause. In this case, it is the complement clause, and not the main clause, that expresses the information that is most relevant to the ongoing discourse. Looking at our examples from Leo, this seems to be the case for both verb-second and verb-final complements. Note that, in the first example, Leo is actually paraphrasing the verb-final complement clause as a verb-second interrogative main clause. In the second example, Leo's mother is answering the question that was expressed in the verb-second complement clause in her turn following Leo's complement-clause construction. In these cases, word order does not seem to be reliably used as a marker for new/foreground vs. old/background information. Both verb-second and verb-final complements contain information or requests that seem to be more relevant to the ongoing conversation than the content of the main clause. There is thus some evidence in our data that sentences that are marked as subordinate are not necessarily always used and interpreted as subordinate (for similar crosslinguistic findings from adults' spontaneous speech, see Evans 2007).

(23) MODAL CTV-INF

a. Verb-final (4;0.19)
CHI: Damit man weiss, welche Untersuchung man kriegt.
so you know which examination you get
'So you know which examination you get.'
MOT: Wie funktioniert das, erzähl mal ganz genau.
how work that tell PRT totally exactly
'How does it work, tell me exactly.'

…

CHI: **Man muss sagen, welche Untersuchung man kriegt.**
you must say which examination you get
'You have to say which examination you get.'

b. Verb-second (3;0.25)
CHI: **Mama soll sagen, du musst nicht husten.**
Mum shall say you must not cough
'Mum should say, you don't have to cough.'
MOT: Du musst nicht husten, Leo.
you must not cough Leo
'You don't have to cough, Leo.'

As has been shown in Table 1 above, *sagen* 'say' is a CTV that is mainly used with verb-second complements by both Leo and his mother. This is also the case when the verb is modified by a modal auxiliary (cf. Table 4 above). In the vast majority of complement-clause constructions with *sagen* 'say', the complement clause directly cites what somebody has said or should say, as shown in the example with the verb-second complement above. Complement clauses following *sagen* 'say', however, can also express old/background information, as can be seen in the example with the verb-final complement clause above, where the content of the complement clause has been mentioned before. Here the verb-final word order clearly marks subordination and presupposition.

Overall, CTVs are very likely to be used with verb-final complements when they are used in this MODAL CTV-INF frame, that is, when they are modified by a modal auxiliary (cf. Table 4 above). This supports the assumption that verb-second complements are more likely to be used with formulaic main clauses that do not contain any obliques or other kinds of modification, and that can be analyzed as epistemic markers or attention getters whose content is only secondary in the ongoing discourse. Once the CTV is modified, however, the main clause gains in communicative weight.

(24) 1SG CTV-PRES
a. Verb-final (4;9.9)
MOT: Der Zug fährt durch die Nacht, dring.
the train goes through the night 'dring'
'The train goes through the night, "dring".'
CHI: Nee, **ich glaub, dass es nicht dring macht.**
no I believe that it not 'dring' makes
'No, I believe that it doesn't make "dring".'
MOT: Meinste nicht?
mean.you not
'You don't think so?'

b. Verb-second (2;10.21)
CHI: **Ich glaub, ich habe Hecht.**
I believe I have pike
'I believe I have a pike.'
MOT: Das ist ein Hecht, meinst du, ja?
that is a pike mean you yes
'That's a pike, you think?'

The 1SG CTV-PRES main-clause frame is mainly used with the CTV *glauben* 'believe', and when used with this verb, it is almost always followed, or in some cases preceded, by a verb-second complement clause. The pattern is similar for the CTV *denken* 'think'. When used with other CTVs, however, this main-clause frame is also frequently used

with verb-final complements. This is probably due to the fact that, unlike the other CTVs used in this frame, both *glauben* 'believe' and *denken* 'think' are very frequently used with 1SG pronominal subjects, in present tense, and without any modification. In fact, *glauben* 'believe' is hardly used with any other subjects or in any other tenses in the corpus. Patterns such as *ich glaube* 'I believe' or *ich denke* 'I think' have probably turned into unanalyzed chunks that function as epistemic parentheticals (cf. Thompson & Mulac 1991). When these epistemic parentheticals are used together with a complement clause, it is the complement clause that expresses the new/foreground information and thus functions like a main clause. It is thus not surprising that the complement clauses cooccurring with these epistemic parentheticals also display main-clause word order.

As shown in the example above, however, the fixed phrase *ich glaube* 'I believe' can also be used with a verb-final complement clause. In this example, it is actually unclear if the main or the complement clause expresses the information most relevant to the ongoing discourse. Whereas the complement clause in Leo's utterance seems to be more relevant to the discourse topic than the main clause, the mother is actually addressing Leo's mental state, that is, what is expressed in the main clause, in her turn following Leo's complement clause. In fact, the utterance by the mother suggests that Leo should have put the negation in the main clause, and that they are really discussing mental attitudes toward an expected reality (whether or not the train will make a specific noise) and not reality itself. Hence, the content of the main clause should be more relevant than the content of the complement clause. Again, this example illustrates that there is not always a clear one-to-one mapping between word order and subordination in children's speech or in spontaneous speech in general.

(25) 1SG CTV-PRES NEG
Verb-final (4;4.7)
CHI: **Ich weiss nicht, wie Gott aussieht.**
I know not how God looks.
'I don't know what God looks like.'
MOT: Ja, natürlich weisst du das nicht, aber hast du nicht eine
Yes of.course know you that not but have you not a
Vorstellung, wie er aussehen könnte?
imagination how he look could
'Of course, you don't know that, but can't you imagine how he might look like?'

One relatively frequent main-clause frame that is exclusively used with verb-final complements is the one shown above where the CTV is negated. Leo only uses this frame with *wissen* 'know'. As has been pointed out by Auer (1998), negated CTVs or CTVs with negative semantics, such as *forget*, can only be used with complements expressing presupposed information. It is thus not surprising that the sentential complements following *ich weiss nicht* 'I don't know' are all verb-final in our corpus. What is also shown in the example above is that, in her turn following the complement clause produced by Leo, the mother refers to Leo's mental state expressed in the main clause. Leo's mental state is thus the focus of this short dialogue. The complement clause, by contrast, refers to something that has already been the topic of the preceding turns.

(26) 2SG CTV-PRES-Q
a. Verb-final (2;9.26)
CHI: **Weisst du, wo der ICE fährt?**
know you where the ICE drives
'Do you know where the ICE (train) is driving?'

CHI: Auf dieser Strecke hier fährt der weisse ICE.
on this track here drives the white ICE
'The white ICE (train) is driving on this track here.'

b. Verb-second (3;1.23)
CHI: **Weisst du, die ICEs haben nur noch Öl gegessen.**
know you the ICEs have only still oil eaten
'You know, the ICEs have only eaten oil.'
MOT: Die ICEs haben nur noch Öl gegessen?
the ICEs have only still oil eaten
'The ICEs have only eaten oil?'

When used in the 2SG CTV-PRES-Q main-clause frame, the CTV *wissen* 'know' does not directly refer to a mental state anymore. Phrases such as *weiss du* 'you know?' function as discourse markers that are used to introduce shared, common background information, or to check whether some background information, which is relevant to the ongoing discourse, is available to the hearer (cf. Schiffrin 1988). These main clauses are not used or understood as questions about the interlocutor's state of mind. The speaker who asks these questions mainly answers them himself, as shown in the examples above. The information or the request for information that is relevant to the ongoing discourse is expressed in the complement clause. This seems to be the case for both verb-final and verb-second complement clauses. However, this main-clause frame is predominantly used with verb-second complements that just mention the relevant information. Verb-final complement clauses that are used with this phrase express indirect questions, but these questions are almost always answered by the speaker who posed them.

These examples demonstrate that complement clauses and their accompanying main clauses are used for a great variety of functions in children's speech already. The word order and function of the complement clause is often related to the CTV, but more importantly it is related to the form and function of the whole main clause. CTVs take on different meanings in different main-clause frames. In a phrase such as *ich weiss nicht* 'I don't know', the verb *wissen* is more likely to refer to a mental state than in a phrase such as *weisst du?* 'you know?'. But does the child really work with all of these forms and functions productively from the start? We end this section with an overview of when Leo starts using which frequent CTVs in which main-clause frames with verb-second and/or verb-final complements.

First of all, Table 5 demonstrates that Leo did not use all frequent CTVs in all frequent frames. This can partly be explained by clashes between the semantics of the verbs and the form of the main clauses. For example, although verbs can take on different meanings in different syntactic configurations (e.g. Goldberg 2005, Kaschak & Glenberg 2000, Theakston et al. 2002), it is impossible to use a mental-state verb in imperative mode. This cannot explain, however, why Leo never used the nonmental CTVs *zeigen* 'show' or *fragen* 'ask' in an imperative main-clause frame (coded as CTV-IMP (OBL)), or why he only negated the CTV *wissen* 'know'. In addition, Table 5 shows that Leo did not start to use a specific CTV across all main-clause frames simultaneously. For example, he used the verb *glauben* 'believe' in the phrase *ich glaube* 'I believe' (coded as 1SG CTV-PRES) with a verb-second complement clause at 2;3, but it took seven months until he used the same verb in almost the same phrase with an oblique and a verb-second complement. It also took seven months until he used the phrase *ich glaube* 'I believe' with a verb-final complement clause. At the same time, he used two other CTVs, namely *gucken* 'look' and *überlegen* 'think about', in the 1SG CTV-PRES frame

	CTV-IMP (OBL)		MODAL CTV-INF		1SG CTV-PRES		1SG CTV-PRES OBL		1SG CTV-PRES NEG	
	V2	V-final	V2	V-final	V2	V-final	V2	V-final	V2	V-final
gucken	2;3	2;10		2;3		2;10		2;10		
glauben					2;3	2;10	2;10			
wissen				3;1	2;9	3;0	4;6	2;10		2;7
sagen		2;8	2;10	4;0	2;8	3;9	4;6			
denken			3;3		3;5		2;10			
sehen				2;9				4;10		
heissen										
überlegen				2;10		2;10				
zeigen				3;10		4;3		3;7		
fragen				3;5	3;11	4;4	4;10	2;10		

	2SG CTV-PRES-Q		3SG CTV-PRES		3SG CTV-PRES-Q		1SG CTV-PAST	
	V2	V-final	V2	V-final	V2	V-final	V2	V-final
gucken			2;7	2;5				
glauben								
wissen	2;6	2;8	3;10	4;0		2;10		2;9
sagen	4;3		2;9	2;9	4;6		2;10	
denken	3;2						2;5	3;5
sehen	2;7			2;9				
heissen			2;10	3;5	4;1	4;1		
überlegen								
zeigen			4;7	4;6				
fragen				4;3				

TABLE 5. Development of complement-taking verbs, main-clause frames, and word order.

and with verb-final complements, but it took almost a year until he used the verb *sagen* 'say' in the same syntactic configuration. Staying in the same column, we can also see that he never used the phrase *ich denke* 'I think' with a verb-final complement clause although he used the highly similar phrase *ich glaube* 'I believe' with both verb-second and verb-final complements.

These data suggest that we are dealing with constructional islands on a fine-grained level. Diessel and Tomasello (2001) have argued that, early in development, English-speaking children only use a limited number of CTVs with complement clauses that are formally marked as subordinate. In the current study, we showed that German-speaking children use both verb-final and verb-second complements from the start, and that they use both structures with a variety of CTVs from early on. As shown in the previous section, however, both verb-final and verb-second complement clauses are used with a variety of main-clause frames with various functions. And if we look at this more specific level, we can see that Leo does not readily use all frequent verbs in all kinds of syntactic configurations.

4. DISCUSSION. Based on research on the development of complement clauses in English (Diessel & Tomasello 2001), we would have predicted that German-speaking children use verb-second before verb-final complement clauses. Alternatively, based on a similar study on the development of complement clauses in German (Rothweiler 1993), we would have predicted that German-speaking children first use verb-final complements. Neither hypothesis could be fully confirmed by the current data. Instead, what our data suggest is that the children are learning complement-clause constructions with various forms and functions in parallel.

It has been claimed for adult German that 'dependent main clauses' or 'dependent V2 clauses' are functionally different from verb-final subordinate clauses. Whereas verb-final subordinate clauses usually contain presupposed and familiar information, verb-second subordinate clauses or dependent main/V2 clauses are more likely to express new information and/or information that is more relevant to the ongoing discourse than the information expressed in the main clause (e.g. Auer 1998, Reis 1997, Wegener 1993). It has been argued that this distinction between verb-final subordinate clauses expressing presupposed information and verb-second 'dependent clauses' expressing new information is already apparent in Old High German and in Middle High German texts (e.g. Eroms 1980, Hinterhölzl 2009, Petrova 2009). We can thus consider verb-final and verb-second complement clauses in German as two distinct argument-structure constructions with two distinct forms and functions. So, the question is not really whether German-speaking children first use verb-final or verb-second complement clauses, but how they acquire these two constructions in parallel and figure out the differences and similarities between the two.

As has been shown for many other syntactic constructions (e.g. Garnsey et al. 1997, MacDonald et al. 1994, Tomasello 2003), these two complement-clause constructions are used with different sets of lexical items. Especially, we could show that some CTVs are predominantly used with verb-final complement clauses, and that other CTVs are predominantly used with verb-second complement clauses. Moreover, for most CTVs, these distributional patterns are the same in the input and in the child's data.

Furthermore, the children showed a piecemeal, verb-by-verb acquisition of complement-clause constructions. Early in development, they used only a limited number of CTVs, and it turned out that Leo first used those CTVs that were most frequently used in complement-clause constructions in his input. These findings are in accordance with corpus and experimental data on the acquisition of complement-clause constructions in English, which suggest that young English-speaking children have a stronger representation of complement-clause constructions with high-frequency CTVs than complement-clause constructions with low-frequency CTVs (Dąbrowska et al. 2009, Diessel & Tomasello 2001, Kidd et al. 2006). Like other syntactic constructions, both complex and simple (e.g. relative clauses or transitives), complement clauses are first used and understood when they contain the same lexical items that are most frequently used in these constructions in the input (e.g. Brooks & Tomasello 1999, Kidd et al. 2007, Tomasello 2003). More generally, our findings support the view that linguistic rules and schemas gradually develop out of lexically specific instances, and that some rules and schemas might never be fully generalized and applied to all possible lexical items (e.g. Joseph 1997, Langacker 2000).

Furthermore, Leo first used those CTVs that were used least flexibly by his mother—that is, those CTVs that are mainly used in fixed main-clause phrases, such as *ich glaube* 'I believe'. Children presumably learn and store these fixed phrases as lexically specific chunks. This is supported by the fact that it takes a while until specific main-clause frames are used with more than just one specific CTV (cf. Table 5). As suggested elsewhere, words or linguistic items that frequently cooccur are put together into chunks, which are represented, processed, and produced as one linguistic unit (e.g. Bannard & Matthews 2008, Bybee 2006, Pierrehumbert 2001). The meaning or function of the chunks is not just a composition of the meanings of their parts. Instead, the chunks take on new meanings and functions derived from their literal meaning. In the case of frequent main-clause phrases used with sentential complements, it has been suggested

that verbs and subjects that are frequently used together turn into chunks that function as epistemic markers, attention getters, or discourse markers. These formulaic main clauses do not directly refer to acts of thinking or perception anymore and can thus be assumed to be cognitively and structurally less demanding than complement-clause constructions with fully assertive main clauses and truly subordinate complement clauses, such as *yesterday Peter still believed that he would win*. The complement clauses used with formulaic main-clause phrases express some information relevant to the ongoing discourse. They are functionally nonsubordinate.

In fact, we also showed that Leo first used those CTVs that are predominantly used with verb-second, presumably nonsubordinate complements; however, he does not always seem to systematically use specific CTVs with verb-final complement clauses and other CTVs with verb-second complement clauses from the start. For example, the CTV *gucken* 'look' is predominantly used with verb-second complements by both Leo and his mother, but Leo is more likely to use this verb with verb-final complements early in development. Similarly, although the verb *sagen* 'say' is most often used with verb-second complements by both Leo and his mother, Leo first uses this verb with a verb-final complement. One reason for this is that the word order in the complement clauses is influenced not only by the CTV, but also, and more importantly, by the form and function of the whole main clause. For example, we showed that the CTV *gucken* 'look' is only used with verb-second complements when the main clause is an imperative (cf. Table 4). Now if we look at the period before 3;0 where Leo produced more verb-final than verb-second complement clauses with *gucken* 'look', we see that the proportion of imperative main clauses with *gucken* is also much lower than in the following periods. Before 3;0, less than 50% of Leo's main clauses with *gucken* are imperatives; after 3;0, about 90% of Leo's main clauses with *gucken* are imperatives. The interaction between verbs and alternative complement-clause constructions is thus more complex than the interaction between verbs and alternative argument-structure constructions, which children seem to be aware of quite early (cf. Snedeker & Trueswell 2004). Most CTVs are used in a variety of main-clause frames, many of which serve distinct functions. Moreover, the CTVs presumably take on different meanings depending on the syntactic configuration. We have shown that not all verbs are readily used in all kinds of main-clause frames and syntactic configurations, which suggests that we are dealing with a number of distinct, yet related, constructions.

Further research will have to show how exactly these various main-clause frames and verb-second and verb-final complements are related to each other. For example, does the acquisition of verb-second complements support or hinder the acquisition of verb-final complements and vice versa? Research by Abbot-Smith and Behrens (2006) and Morris and colleagues (2000) suggests that the acquisition of a linguistic construction can be supported by another linguistic construction that is formally similar to the target construction. By contrast, the acquisition of a linguistic construction seems to be hindered by another linguistic construction that has the same function or meaning as the target construction. Training and modeling studies will have to show whether the acquisition of verb-second complements has an impact on the acquisition of verb-final complements and vice versa, or whether the acquisition of verb-second complements can be supported by the acquisition of other verb-second structures, and whether the acquisition of verb-final complements can be supported by the acquisition of other verb-final structures.

APPENDIX

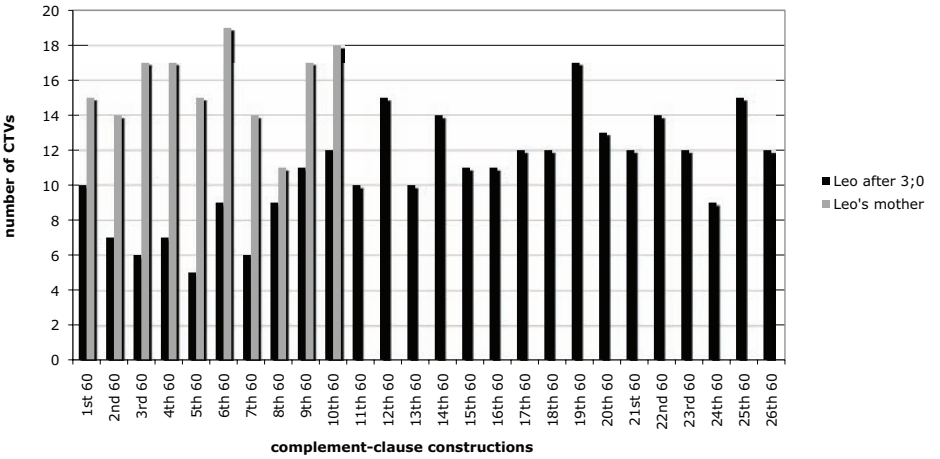

FIGURE A. Sampling across age and number of complement-taking verbs.

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