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Interpreting resultative sentences in German: Stages in L1 acquisition

Abstract: This article presents the results of a study on the interpretation and acceptance of adjectival resultatives of German children between 6 and 9 years of age and adults. These results brought to light significant differences, due to age, in the interpretation and acceptance of these resultatives, that is to say, sentences with an adjective in the final position. The youngest participants were prone to accept ungrammatical sentences by assigning a resultative meaning. The ungrammaticality of the sentences in question was not due to semantic inconsistencies but to violations of the selectional properties of verbs, as for instance in **die Kinder erschrecken die Katze ängstlich* ‘the children frighten the cat scared’. In contrast, the adults rejected or amended those sentences. The conclusion is (a) that the children seemed to rely on the sentence structure as a primary cue to compute the meaning of an utterance and (b) that, in contrast with adults, the youngest children in particular had not yet learned the relevant semantic properties of verbs that determine the selectional restrictions and thus the syntactic options of verbs. This means that differences in interpretation and acceptance of sentences are due to differences in knowledge of semantic verb properties between adults and children. The relevant semantic knowledge increases in gradual stages during language acquisition.

Keywords: first language acquisition, frame compliance, grammatical judgments, verb classes, resultative sentences

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1 Introduction

This article presents the results of an empirical study on differences in the interpretation of adjectival resultatives between German adults and children between 6 and 9 years of age. Naigles et al. (1992, 1995) and Naigles et al. (1993) observed

significant differences in sentence interpretation between young English-speaking children and adults. Children tended to accept sentences in which verbs did not have their proper syntactic environment whereas adults rejected these sentences and repaired them. The acceptability of German adjectival resultatives depends on the semantic properties of the lexical verb and that means that these resultatives offer a direct window on the interaction between semantic and syntactic properties (cf. Richter and van Hout 2010).

All relevant German sentences in our study had an adjective in final position expressing, in a resultative reading, a result of an action or a process. Whether specific verbs accept an adjectival resultative depends on their selectional restrictions. In (1) two examples of test sentences are given. Note that (1b) is ungrammatical.

- (1) a. *Der Vater läuft den Schuh kaputt.*
 the father walks the shoe worn out
 ‘The father walks until the shoe is worn out.’
 b. **Die Kinder erschrecken die Katze ängstlich.*
 ‘The children frighten the cat scared.’

It is commonly assumed that resultatives have a complex event structure (cf. Dowty 1979; Hoekstra 1988; Pustejovsky 1991; Neeleman 1995; Wunderlich 1997; Beck and Snyder 2001; Kratzer 2005; Rappaport Hovav and Levin 2001). We argued that the ability of a verb to form adjectival resultatives is determined by its semantics (Richter and van Hout 2010). A verb, for instance, cannot form a resultative construction when it expresses resultativity itself. *Erschrecken* ‘to frighten’ (cf. (1b)) for instance can be paraphrased as ‘to make someone scared’, the expected resultant or end state being that the person in question is scared. Semantic properties of the verb permit the occurrence of a resultative construction in (1a) and exclude the occurrence of a resultative construction in (1b).

Language learners may not yet have acquired the complete set of semantic properties that define the syntactic options or slots of verbs. Research by Naigles and colleagues (cf. Naigles et al. 1992, 1995; Naigles et al. 1993) has shown that young English speaking children had problems with verb semantics and tended to accept sentences where verb and construction are not compatible, for instance a transitive verb in an intransitive environment. They conclude that children are more tolerant when confronted with sentences that are syntactically ungrammatical but are interpretable from a semantic or pragmatic point of view. Children focus more on the sentence frame to obtain the meaning of an utterance than they do on semantic details of the verb and overgeneralize the possible meanings or meaning configurations of verbs by accepting for instance an intransitive verb in

a transitive environment. Naigles and her colleagues coined the term *frame compliance* for this type of interpretational behavior as opposed to *verb compliance* (cf. Naigles et al. 1992, 1995; Naigles et al. 1993). In their experiments they observed that children of about three years old were frame compliant while, in contrast, learners at later stages of the acquisition process were mainly verb compliant. In this article we will address the question of whether *frame compliance* also plays a role in the acceptance and interpretation of adjectival resultatives, in a later stage of L1 acquisition, i.e., the period between 6 to 9 years of age. Children of that age are familiar with adjectival resultatives (cf. Bowerman 1982; Wittek 2002).

If a learner is able to recognize that (1b) is ungrammatical, he or she has presumably acquired the relevant semantic properties of verbs that exclude such a construction. A typical response then is that those learners reject or try to “repair” the sentence in question. If a learner accepts (1b) one may infer that he/she has not fully acquired, or at least does not make use of, all relevant semantic properties of the verb. The learner in fact uses the sentence structure to infer semantic information. He/she has already learned that a construction with a N–V–N–A structure often expresses a process and a resultant state (cf. Wittek 2002). The learner will interpret (1b) as expressing a resultative scene.

We expect that children between 6 and 9 years of age will still use the structure of the sentence as a main cue to compute its meaning as they have not yet fully implemented the semantic properties of verbs, like, for instance, the properties of the time scheme or the property of expressing an accomplished action or process. Several semantic properties of the verb are hard to learn, though that does not mean that children have significant interpretative problems in understanding resultative sentences. A child grammar accepts more sentences than an adult grammar does. German speaking children will be more tolerant than adults when confronted with sentences that have a known structure but are ungrammatical because of violating selectional restrictions.

Richter and van Hout (2010) explain that the semantic verb properties of time scheme, affectedness of the direct object and the affectedness of the subject are the core factors in explaining the (non)occurrence of adjectival resultatives. For instance, the contrast in grammaticality between sentences such as **der Tierarzt tötet das Vieh tot* ‘the veterinarian kills the animals dead’ and *der Tierarzt macht die Tiere gesund* ‘the veterinarian cures the animals’ can be explained as follows: although both verbs have a process oriented time scheme, there is a crucial difference. The verb semantics of *töten* ‘to kill’ expresses affectedness of the direct object and specifies the resultant state, but *machen*, ‘to make’, does not have these semantic properties. Our assumption is that semantic properties of verbs determine constructional options of verbs. The semantic properties of verbs constrain the structural environments in which the verbs may occur.

We follow the analyses in Neeleman (1995) and Wunderlich (1997) showing that verbs and adjectives in adjectival resultatives form complex predicates, for instance *leer essen* ‘to eat empty’, *rot streichen* ‘to paint red’, *kaputt laufen* ‘to run worn out’, etc. We refer also to Snyder (2001) who argues that complex predicate formation is a productive mechanism in Germanic languages. The assumption of complex predicate formation however is not uncontroversial. The Small Clause analysis for instance does not use complex predicate formation as an explanatory mechanism (cf. Hoekstra 1988; Kratzer 2005). Complex predicate formation requires a speaker to decide whether a verb and an adjective match given the (full set of) semantic properties of that verb. That means that a speaker has knowledge on the degree of transitivity of a verb. Verbs that are highly transitive (Hopper and Thompson 1980; Naess 2004) such as *töten* ‘to kill’ or *erschrecken* ‘to frighten’ cannot form a resultative predicate with an adjective whereas verbs with a lower degree of transitivity such as *laufen* ‘to walk/to run’ can.

A significant point in our analysis, and another difference from the Small Clause analysis, is the differentiation between Control and ECM constructions (Wechsler 1997). Consider sentence pairs such as *sie gießt die Tulpen platt* ‘she waters the tulips flat’ (Control resultatives) and *sie pflückt den Baum kahl* ‘she picks the tree bare’ (ECM resultatives). A simple test illustrates the difference between the two types of constructions. Omission of the adjective leads to ungrammaticality in ECM but not in Control constructions:

- (2) a. *Sie gießt die Tulpen.*
 ‘She waters the tulips.’
 b. *Sie pflückt den Baum.*
 ‘She picks the tree.’

In contrast to ECM resultatives, the postverbal NP in Control resultatives is an argument of the verb which poses semantic restrictions onto that NP (cf. Dowty 1979; Carrier and Randall 1992; Simpson 1983; Levin and Rappaport Hovav 1995). In Richter and van Hout (2010) it has been shown that the contrast between Control and ECM resultatives also can be explained by verb semantics. Levinson (2010) makes another distinction, i.e., between pseudo-resultative and “true” resultative constructions. For instance, she analyses *Mary sliced the bread thin* not as a resultative, but as a pseudo-resultative construction, as it is not the bread that becomes thin, but the action of cutting that leads to thin slices of bread. The sentences we used in our test did not include pseudo-resultatives. We used regular resultative constructions.

Learning the meaning of verbs is a complex task in language acquisition. It is not, however, only the youngest children that have problems with the semantics

of the verb. Naigles et al. (1992, 1995) and Naigles et al. (1993) tested the sentence comprehension of English speaking children between 2;6 and 12 years of age and of adults. The study revealed that the youngest children in particular showed a frame compliant comprehension pattern. For instance, in a sentence such as *the elephant comes the giraffe* the young children tended to accept the presented ungrammatical frame by interpreting the sentence as expressing a transitive scene. In contrast, the adults were verb compliant and repaired the sentence according to the restrictions of the verb. In addition, Naigles and her colleagues observed that the complexity of sentences influences the comprehension pattern in all groups. When confronted with complex sentences even the adults tended towards a frame compliant comprehension pattern. The majority of participants in all groups (even roughly 75 percent of the adults) were frame compliant when confronted with the complex frame N–V–N–P–N, for instance *the camel stays the penguin next to the ramp*. A clear and gradual shift from frame compliant to verb compliant behavior was observable with the sentence frames N–V–P–N (for instance *the lion puts in the ark*) and bare transitive sentences. With this frame, children between 9 and 10 years of age had already reached verb compliant behavior.

Frame compliance by children was also observed by Ambridge et al. (2008) who showed that English children between 6 and 9 years of age tended to overgeneralize the meaning of verbs (see also Braine and Brooks 1995; Brooks and Tomasello 1999; Brooks et al. 1999) when they were confronted with ungrammatical sentences. They accepted for instance intransitive verbs in a transitive frame such as *the funny man giggled Bart* and interpreted the sentence's meaning as it is *the funny man* who causes *Bert* to giggle thereby assigning a transitive meaning to the verb.

Following Wagner (2006), who coined the term *transitive bias*, one could argue that frame compliance is a stage within a cognitive maturational process. In her study in which English children of 2, 3, and 5 years of age performed an event counting task, she came to the conclusion that structural cues, i.e., the transitive sentence frame, N–V–N, are highly relevant for sentence comprehension of the youngest children. In contrast, the older children did not show such a bias. The study of Wittek (2002) supports the assumption that children have more problems with verb semantics than adults. She tested German children between 4 and 5 years of age, plus an adult control group. Wittek reported that all children were in doubt about the end state orientation of obligatory telic verbs such as *wecken* 'to wake up' (Wittek 2002). In a sentence such as *die Mutter weckt den Vater* 'mother wakes up the father', most children tolerated a nontelic and nonresultative reading.

Our research question is whether frame compliance remains a powerful factor in later L1 acquisition, at primary school age, when the interpretation of adject-

tival resultatives is being studied. If frame compliance is part of the acquisition process, we expect this to show up when stimuli are being presented that are unacceptable due to violations of the selectional restrictions of verbs. Children accept these utterances as the structure meets their grammatical criteria. Children of primary school age have not yet acquired the full set of semantic properties of verbs. Moreover, we expect a developmental pattern with a gradual increase of verb compliance in older age groups.

The frame compliant phase of language acquisition is, in particular at early stages, can be characterized as the syntactic bootstrapping strategy (Landau and Gleitman 1985; Gleitman 1990). It means that children observing a verb in a N–V–N–A structure will hold the assumption that the verb's semantics fits that construction. Taking Construction Grammar (Goldberg 1995, 2006) as the point of departure, the prediction would follow that children in our test group will assign a resultative interpretation to the N–V–N–A structures. Pinker (1989) takes the opposite view by formulating the semantic verb class hypothesis which states that children at the age of our test group have already formed different semantic verb classes.¹ If that is true the question still arises whether children's verb classifications are fine-grained enough to sort out ungrammatical uses of verbs. Moreover, if there is the beginning of verb classes at such a young age, it may be the case, as argued by Tomasello (1992, 2003), that children start generalizing from prototypical verbs.

The sentence frames that were used in our study are of the type N–V–N–A and N–V–N. The first frame has a sentence final adjective that leads the hearer's attention to a possible resultant state. We expected the children to accept ungrammatical sentences such as *die Kinder erschrecken die Katze ängstlich* 'the children frighten the cat scared' and that they interpret the adjective as denoting an end state of a process that affects the entity denoted by the direct object. The second frame is transitive and the children were expected to accept the direct object and interpret it as a patient manipulated by the agent subject even in ungrammatical sentences such as *die Mutter läuft den Schuh* 'the mother walks the shoe'. We expected frame compliance to shift gradually to verb compliance over time. Furthermore, the children were expected to know the semantics of verbs in general; for instance, the test sentence *die Mutter isst den Teller* 'the mother eats the dish' should be rejected as the children were expected to know that one can only eat things that are edible and that a dish is not an element of the set of edible things.

1 Grimshaw (1994) advocates an amalgamation of the two hypotheses.

The structure of the article is as follows. In Section 2, the verb types used in the test sentences in our study are defined and an overview of the set of test items is given. In Section 3 the methods and in Section 4 the results of the study are presented. Section 5 contains the conclusion and discussion.

2 The test and the test sentences

21 Verb types

In the test sentences five different verbs with different syntactic properties were used. Our first distinction in selecting the verbs was their capacity to take resultative adjectives. Type 1 verbs have the property –RES (the verb cannot occur in resultative sentences), type 2 verbs have the property +RES (the verb can occur in resultative sentences). Within the type 1 group a distinction was made between a transitive accomplishment verb, i.e., *erschrecken* ‘to frighten’, exhibiting properties of prototypical transitivity (Hopper and Thompson 1980) since at least in one reading *erschrecken* ‘to frighten’ has a nonaffected agent subject and an affected patient object, and a low transitive verb, i.e., *betrachten* ‘to observe’, which is not an accomplishment verb (Hopper and Thompson 1980; Vendler 1967). *Betrachten* ‘to observe’ is low transitive as it does not require an agent subject and an affected patient object, but rather an affected agent subject.² The type 2 class contained three verbs, viz. the accomplishment verb *schneiden* ‘to cut’ (Vendler 1967), and two verbs of lower transitivity (Hopper and Thompson 1980), viz. *essen* ‘to eat’ and *laufen* ‘to walk/to run’. All verbs are frequently used words which belong to basic German vocabulary (Pregel and Rickheit 1987). Grammatical and ungrammatical adjectival resultatives of the five verbs are shown in the sentences in (3):

- (3) a. **Die Kinder erschrecken die Katze ängstlich.* (type 1: –RES)
 ‘The children frighten the cat scared.’
 b. **Die Kinder betrachten die Oma rot.* (type 1: –RES)
 ‘The children observed the grandmother red.’
 c. *Der Vater schneidet das Brot klein.* (type 2: +RES)
 ‘The father cuts the bread small.’
 d. *Der Opa isst den Teller leer.* (type 2: +RES)
 ‘The grandfather eats the plate empty.’
 e. *Der Vater läuft den Schuh kaput.* (type 2: +RES)
 ‘The father walks until the shoe is worn out.’

² The notion of *affected agent* originates from Saksena (1980).

The type 1 verbs (*erschrecken* ‘to frighten’, *betrachten* ‘to observe’) obligatorily require a direct object and cannot occur in resultative constructions. *Erschrecken* is an accomplishment verb (Vendler 1967) as it requires an agent subject, volitionally instigating an action or process and a patient direct object. The patient is affected by the process/action (cf. Hopper and Thompson 1980; Naess 2004). *Erschrecken* expresses a process that leads to a resultant state and therefore cannot occur in a resultative construction (Richter and van Hout 2010). This also holds for verbs such as *aufessen* ‘to eat up’, *töten* ‘to kill’ and *zersägen* ‘to saw up’. The second verb, *betrachten* ‘to look at’, is not an accomplishment verb as it does not express a telic event. It is hard to decide to which Vendler class *betrachten* ‘to look at’ could belong. It is possibly in an intermediary position between state and process verbs. In contrast to *erschrecken* ‘to frighten’, it is the subject of *betrachten* ‘to look at’ that seems to be affected by the process/activity expressed by the verb. The common property of *erschrecken* ‘to frighten’ and *betrachten* ‘to observe’ is that they are both prefix verbs. Note that in German no prefix verb can occur in adjectival resultative constructions.³

The type 2 verb *schneiden* ‘to cut’ is an accomplishment verb, like verbs such as *hämmern* ‘to hammer’ and *gießen* ‘to water’.⁴ These verbs exhibit features of prototypical transitivity (Hopper and Thompson 1980). In contrast to *erschrecken* ‘to frighten’, *töten* ‘to kill’ or *zersägen* ‘to saw up’ however, these verbs do not inherently express a resultant state. In resultative sentences the postverbal NP is a regular argument of the verb (Control resultatives). In our intuition an intransitive use of these verbs is not ungrammatical thus sentences such as *er hämmert stun-*

3 There is often a semantic-syntactic difference between a bare verb and its prefix variant as the following examples show: *aufessen* ‘to eat up’, *zerschneiden* ‘to cut into pieces’ and *wegstreichen* ‘to caress away’ can never occur in resultative constructions while in contrast the bare verbs often can: *sie isst den Teller leer* ‘she eats the dish empty’, *er schneidet das Papier klein* ‘he cuts the paper small’, *sie streichelt ihn glücklich* ‘she caresses him happy’. The prefixes clearly can add a resultative component to the meaning of a verb. As a sentence may only contain one expression of resultativity (Tenny 1987) the occurrence of a prefix verb in a resultative construction is barred.

4 One could doubt whether *hämmern* ‘to hammer’ and *gießen* ‘to water’ are kernel achievement verbs since at least for *hämmern* it is possible to occur in an intransitive construction. However, whilst process verbs cannot have an affected patient object, *hämmern* ‘to hammer’ and *gießen* ‘to water’ denote, overtly or not, an entity that is affected by the process expressed by the verb. They exhibit thus some decisive criterion of achievement verbs. In Richter and van Hout (2010) verbs such as *hämmern* ‘to hammer’ and *gießen* ‘to water’ are assigned to a separate class of verbs between “prototypical” achievement verbs like *töten* ‘to kill’ and process verbs like *laufen* ‘to walk/to run’. In the present article we used the classification of Vendler (1987) and assumed no additional verb classes.

denlang ‘he is hammering for hours’, *er schneidet stundenlang* ‘he is cutting for hours’ and *er gießt stundenlang* ‘he is watering’ should be possible.

The type 2 verb *essen* ‘to eat’ can occur in resultative sentences, like the verbs *trinken* ‘to drink’ and *fahren* ‘to drive’. These verbs can occur both in transitive and in intransitive environments. Consider sentences such as *ich esse* ‘I am eating’, *ich trinke* ‘I am drinking’ and *ich fahre* ‘I am driving’. In resultative constructions the postverbal NP is not an argument of the verb (ECM resultatives). These verbs share common properties with process/activity verbs and are thus of lower transitivity than verbs such as *erschrecken* ‘to frighten’, *schneiden* ‘to cut’ and *hammer* ‘to hammer’. Naess (2004) argues that the subject of *essen* ‘to eat’ is not only an agent but in addition it is affected by the process expressed by the verb. This should hold also for *trinken* ‘to drink’. Note, that *fahren* ‘to drive’ can occur both in ECM resultatives and in Control resultatives. A sentence such as *er fährt das Auto kaputt* ‘he drives the car in pieces’ can mean that the car the agent is driving breaks down, but it can also be another car that breaks down when the actor is driving, say, a truck.

The type 2 verb *laufen* ‘to walk/to run’, like (in a certain reading) the verbs *sitzen* ‘to sit’ and *schlafen* ‘to sleep’, express processes and are thus process/activity verbs. Note that with the latter two verbs expressions such as *das Kissen platt sitzen* ‘to sit the pillow flat’ and *sich schön schlafen* ‘to sleep oneself beautiful’ are possible. Their degree of transitivity is low as they do not require an object denoting an affected patient. In resultative sentences the postverbal NP is not an argument of the verb (ECM resultatives). In resultative sentences with *schlafen* ‘to sleep’ the postverbal NP is a reflexive pronoun, the construction being known as fake reflexive (Simpson 1983), for instance in *sie schläft sich schön* ‘she sleeps herself beautiful’.

22 The set of test sentences

Table 1 below gives all fifteen sentences, representing five verbs in three conditions. In the right column the intuitive grammatical judgments are given. (“v” stands for grammatical, “?” stands for dubious, “*” stands for ungrammatical). In the test sentences common verbs, nouns and adjectives were used (Pregel and Rickheit 1987) to ensure that the children knew all the words used. Condition I includes the transitive sentences of the frame N–V–N. Condition II includes resultative sentences of the frame N–V–N–A with the adjective modifying the postverbal NP. Condition III includes sentences of the frame N–V–N–A, too; however, here the adjective modifies the subject–verb–complex and functions as a manner adverb.

Condition I: N–V–N

Verbs	Type	Sentence	Grammaticality
1. erschrecken 'to frighten'	1	der Hund erschreckt die Katze 'the dog frightens the cat'	✓
2. betrachten 'to look at'	1	die Mutter betrachtet die Katze 'the mother looks at the cat'	✓
3. schneiden 'to cut'	2	die Mutter schneidet das Brot 'the mother cuts the bread'	✓
4. essen 'to eat'	2	die Mutter isst den Teller 'the mother eats the dish'	*
5. laufen 'to walk/ to run'	2	die Mutter läuft den Schuh 'the mother walks the shoe'	*

Condition II: N–V–N–A resultative

Verbs	Type	Sentence	Grammaticality
1. erschrecken 'to frighten'	1	die Kinder erschrecken die Katze ängstlich 'the children frighten the cat scared'	*
2. betrachten 'to look at'	1	die Kinder betrachten die Oma rot 'the children look at the grandmother red'	*
3. schneiden 'to cut'	2	der Vater schneidet das Brot klein 'the father cuts the bread into pieces'	✓
4. essen 'to eat'	2	der Opa isst den Teller leer 'the grandfather eats the dish empty'	✓
5. laufen 'to walk/ to run'	2	der Vater läuft den Schuh kaputt 'the father walks until the shoe is worn out'	✓

Condition III: N–V–N–A adverbial

Verbs	Type	Sentence	Grammaticality
1. erschrecken 'to frighten'	1	der Vater erschreckt die Kinder leise 'the father frightens the children softly'	?
2. betrachten 'to look at'	1	der Opa betrachtet den Hund ängstlich 'the children look at the grandmother red'	✓
3. schneiden 'to cut'	2	der Opa schneidet das Brot lustig 'the grandfather cuts the bread funnily'	?
4. essen 'to eat'	2	der Vater isst den Teller lustig 'the father eats the dish funnily'	*
5. laufen 'to walk/ to run'	2	der Opa läuft den Schuh lustig 'the grandfather walks the shoe funnily'	*

Table 1: Classification of the complete set of test sentences according to condition, verb type and intuitive grammaticality (✓ = grammatical; * = ungrammatical; ? = dubious). The five verbs occur in all three conditions

Assignment of the adjective to the postverbal NP is also possible in depictive sentences as for example in *er trinkt die Milch heiß* ‘he drinks the milk hot’. However, the adjective cannot express a result of the process as milk cannot become hot as a result of drinking it. In our test sentences no depictive interpretation of the adjective is possible. For instance, in *die Kinder erschrecken die Katze ängstlich* ‘the children frighten the cat scared’, the adjective expresses a possible result of the frightening process. In test sentences such as *der Vater isst den Teller lustig* ‘the father eats the dish funnily’, a depictive reading is excluded because of the semantic incompatibility of the postverbal noun and the adjective. Our assumption was that differences between the groups in our study would come to light particularly in the ungrammatical sentences, as observed before by Naigles et al. (1992, 1995), Naigles et al. (1993), Schütze (1996), Mandell (1999) and Ambridge et al. (2008).

3 Methods

3.1 Procedure: the picture arrangement task

The set of fifteen grammatical and ungrammatical sentences presented in Table 1 were evaluated by children and adults. The sentences were read to each participant in a neutral tone. Then the experimenter presented colored picture cards to the participant. Cards depicted the participants (drawings on blue cards), processes (drawings on red cards) and attributes (drawings on green cards) (see the Appendix for a concrete example) of each sentence. The participants were told to arrange the cards on a sheet of paper with colored areas according to their interpretation of the sentences. There were two blue slots and one red slot for the cards. When a green card (adjective) was available (N–V–N–A sentences) it had to be assigned to one of green areas below the two blue slots, to indicate to which part of the sentence the adjective belonged. The experimenter explicitly mentioned the option that any card could be left out if the participant had the impression that the corresponding word did not fit in the sentence (the instruction is given in appendix B). Explicit mention was also made of the option to reject a sentence completely. The sentences were presented in a random order. Participants were tested individually; each session took roughly fifteen minutes. With each participant a training session with four sentences was done.

As explained, the participants had to decide for sentences of the frame N–V–N–A whether the adjective was to be assigned to the pre- or to the postverbal NP. When the adjective card was placed below the postverbal noun, the interpretation was that the participant considered the adjective to express a resultant state

of an action performed by the agent of the scene. Take for instance the test sentence *der Vater schneidet das Brot klein* ‘the father cuts the bread small’. Figure 1 depicts the colored slots.

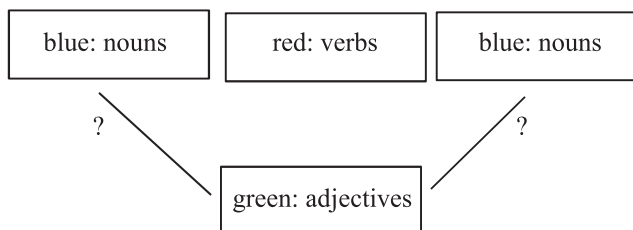


Fig. 1: Options for the assignment of the adjective

All participants first placed the picture card representing ‘the father’ on the blue area on the left. Then the verb card was placed on the red area and the card representing ‘the bread’ on the blue area on the right. Finally the participants had to decide whether the adjective card had to be placed on the green area below ‘the father’ or below ‘the bread’. The participant had thus to consider three options: if (s)he decided that the bread gets small because the father cuts it then (s)he had to place the card depicting the property small on the green area below the card depicting the bread. If (s)he decided that father cuts the bread in a small manner (s)he had to place the card depicting small below the card depicting the father. If (s)he decided that the word small does not fit into the sentence at all, (s)he could leave that card out.

For the N–V–N sentences we used the same sheet of paper as for the sentence with final adjective, including the green areas. The redundant green areas (for the placing of the adjectives) did not cause any confusion amongst the participants.

In the picture arrangement task, the participants implicitly made judgments of acceptability because they had the option of either partially or entirely rejecting the sentence (for a discussion on acceptability judgments, cf. Newmeyer 1983; Sorace 1996; Schütze 1996). The participants were not asked to pass an explicit judgment on the sentences, nor were they asked to make truth value judgments (Crain and McKee 1985).

The picture card test as sketched out above is not an established procedure in psycholinguistic research. In order to see whether this method works the five transitive N–V–N sentences constituted a control condition. The reason for using the picture card procedure and not, for instance, the acting out procedure used by Naigles et al. (1992, 1995), is that the former allows us to register more precisely

whether participants interpret the final adjective in resultative sentences as denoting a resultant state. In a sentence such *die Kinder erschrecken die Katze ängstlich*, for instance, it would be difficult to act out possible meaning variations since to frighten the cat means almost the same as to frighten the cat scared. An additional and decisive argument for using the picture assignment card procedure was that the children were trained to assign word classes to colors and to represent sentences by arranging cards according to the word order in the sentence. Grammar education is an important subject at primary schools in Germany. In language didactics a lot of methods is developed in order to let children learn grammatical rules and principles by means of playing a game. The procedure we used in the test is a somewhat extended version of a task frequently used in German primary schools and we acted on the assumption that all our participants were familiar with the task.

3.2 Participants

Four groups from forms 1 to 4 of a primary school in Kleve (Germany) were tested. The school is located in the city of Kleve and is nonconfessional. Only German L1 children were tested as we were interested in the stages of first language acquisition. Table 2 gives an overview of the four groups of children and the adults.

	Number of participants	Mean age	Age group
class 1	9	6;1	6
class 2	14	7;1	7
class 3	15	8;3	8
class 4	14	9;2	9
adult control group	8	adults	

Table 2: Number of participants and mean age per group in the School Test

3.3 Dependent and independent variables

There were two independent variables; (i) *group*, that is the four groups of children from four school classes (age groups 6, 7, 8, 9) plus the adult (Ad.) control group and (ii) *condition*, that means the three conditions, each comprising five sentences. Dependent variables were “acceptance” (relevant in all conditions)

and “resultative interpretation of the sentence” (relevant in conditions II and III). We took it as acceptance when a participant made use of every picture card within a sentence’s set of cards. As stated above the participants were told that they could reject the sentence completely or that any card could be left out if they had the impression that it would not fit in the given sentence. For instance when a participant rejected the adjective card *ängstlich* ‘scared’ in the sentence *die Kinder erschrecken die Katze ängstlich* ‘the children frighten the cat scared’ we concluded that the sentence was not accepted.

We took it as a resultative interpretation when a participant assigned the adjective card to the postverbal noun. When, for instance, a participant, confronted with the sentence *der Opa betrachtet den Hund ängstlich* ‘the grandfather looks at the dog scared’, placed the adjective card depicting *ängstlich* ‘scared’ on the area below the blue card depicting the dog we concluded that the participant interpreted the sentence’s meaning as the grandfather looking at the dog having the result the dog becoming scared.

We took it as a adverbial interpretation when a participant assigned the adjective card to the preverbal noun. Take for instance the sentence *der Vater erschreckt die Kinder leise* ‘the father frightens the children softly.’ When a participant placed the adjective card on the area below the blue card depicting the father than the conclusion was the sentence was interpreted as the father frightens the children in a soft way.

4 Results

4.1 Condition 1: N–V–N

Five sentences (see Table 1) define the (control) condition I. The nonacceptance results for the five groups are given in percentages in Figure 2, split out for each group and each sentence.

Sentences (1) to (3) were completely unproblematic. The diagram shows that the overwhelming majority in all groups rejected sentence (4) *die Mutter isst den Teller* ‘the mother eats the plate.’ Nearly all participants detected the semantic incompatibility between *essen* ‘to eat’ and *Teller* ‘plate’. It is important to note that the youngest participants did not accept this sentence, meaning that they are capable of rejecting sentences. The youngest participants knew that a dish does not belong to the set of edible things and, consequently, they did not accept sentence (4). The groups differed with respect to sentence (5). Roughly 80 percent of the youngest participants (age group 6) were frame compliant. They did not iden-

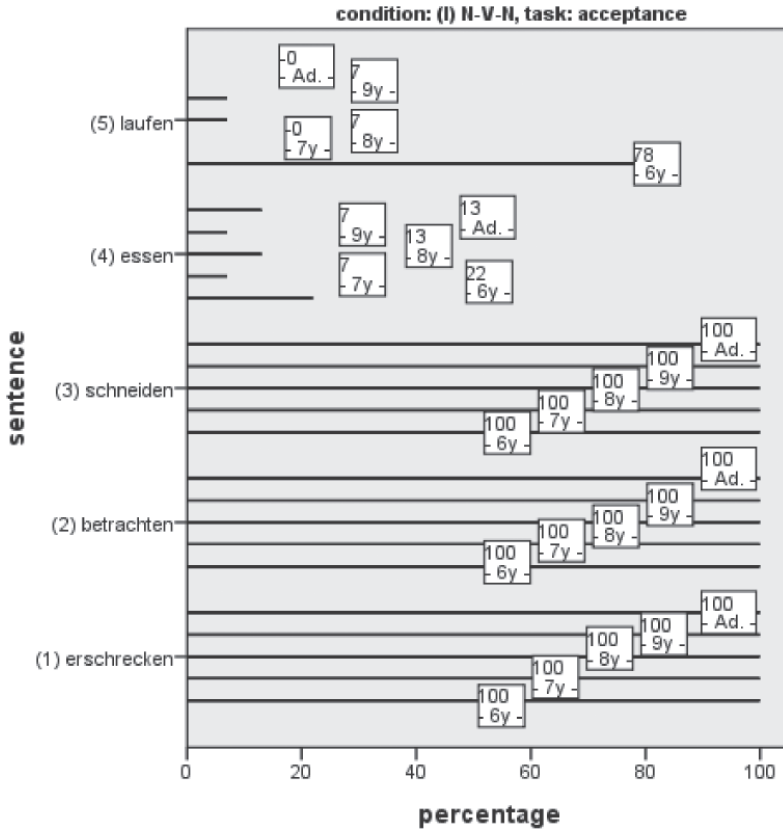


Fig. 2: The percentages of acceptance of the five condition I sentences in the five age groups

tify the ungrammaticality of the sentence *die Mutter läuft den Schuh* ‘the mother walks the shoe’ which is ungrammatical due to violations of the selectional restrictions of the verb. The other groups behaved more like the adults in that the children from 7 to 9 years were mainly verb compliant. The youngest children were apparently not sure about the intransitivity of *laufen*. For this sentence a chi-square analysis yielded a significant result ($\chi^2 = 32.60, p = .000, df = 4$). That means that there is a relationship between age group and whether or not this sentence was accepted. The reactions of the youngest participants to sentence (5) suggest that the children’s concept of *laufen* ‘to walk/to run’ comprises tools for walking and running.

The effects of sentence and age group were confirmed by a GLM analysis, with the logit as linking function, and sentence as within subject variable (SPSS 16, GLM). A significant effect was found for all three possible effects: age group

(Wald chi-square (4) = 18.165, $p = .001$), sentence (Wald chi-square (2) = 109.673, $p = .000$), and their interaction (Wald chi-square (4) = 272.064, $p = .001$). The significant interaction effect of age group and sentence tells us that the groups did react differently to the sentences. Groups 2, 3, 4 and the adult group found sentence 5 less acceptable than sentence 4. In contrast, the youngest children exhibited the opposite behavior. The overwhelming majority judged sentence (5) to be much more acceptable than sentence (4). With sentence (5) the youngest participant were clearly frame compliant.

4.2 Condition II: N–V–N–A resultative

We turn to the five sentences of condition II with the N–V–N–A frame. The age group results of accepting the sentences are given in Figure 3.

Sentences (3) to (5) were quite uncontroversial (note however that more than 30 percent of the youngest children in age group 6 did not accept sentence (4)). Chi-square analyses revealed a significant or an almost significant relationship between acceptance of a sentence and group in sentences (1) *die Kinder erschrecken die Katze ängstlich* ‘the children frighten the cat scared’ ($\chi^2 = 9.42$, $p = .053$, $df = 4$) and (2) *die Kinder betrachten die Oma rot* ‘the children look at the grandmother red’ ($\chi^2 = 20.21$, $p = .000$, $df = 4$). There are, in addition, considerable differences between the groups in dealing with ungrammatical sentences (1) and (2). In sentence (2) a perfect complementary distribution of the reactions of the youngest group and the adults can be observed, that is, all children accepted the sentence while in contrast all adults rejected it. Sentence (1) has a similar pattern, but less outspoken. In both sentences there is a gradual shift from the youngest children to the adults, implying a positive correlation between age and acceptance. The older the participants are, the more they tend to reject the ungrammatical sentences or, in other words, the older the participant is, the more verb compliant they are.

The effects of sentence and age group was confirmed by a GLM analysis, with the logit as linking function, and sentence as within subject variable (SPSS 16, GLM). A significant effect was found for all three possible effects: age group (Wald chi-square (4) = 284.547, $p = .000$), sentence (Wald chi-square (4) = 528.743, $p = .000$), and their interaction (Wald chi-square (10) = 7084.577, $p = .000$). The significant interaction effect of *group* and *sentence* tells us that the groups did react differently to the sentences. Age groups 2, 3, 4 and the adult group found sentence (2) less acceptable than sentence (1). In contrast, the youngest children exhibited the opposite behavior. With sentence (2) the youngest participant were clearly frame compliant.

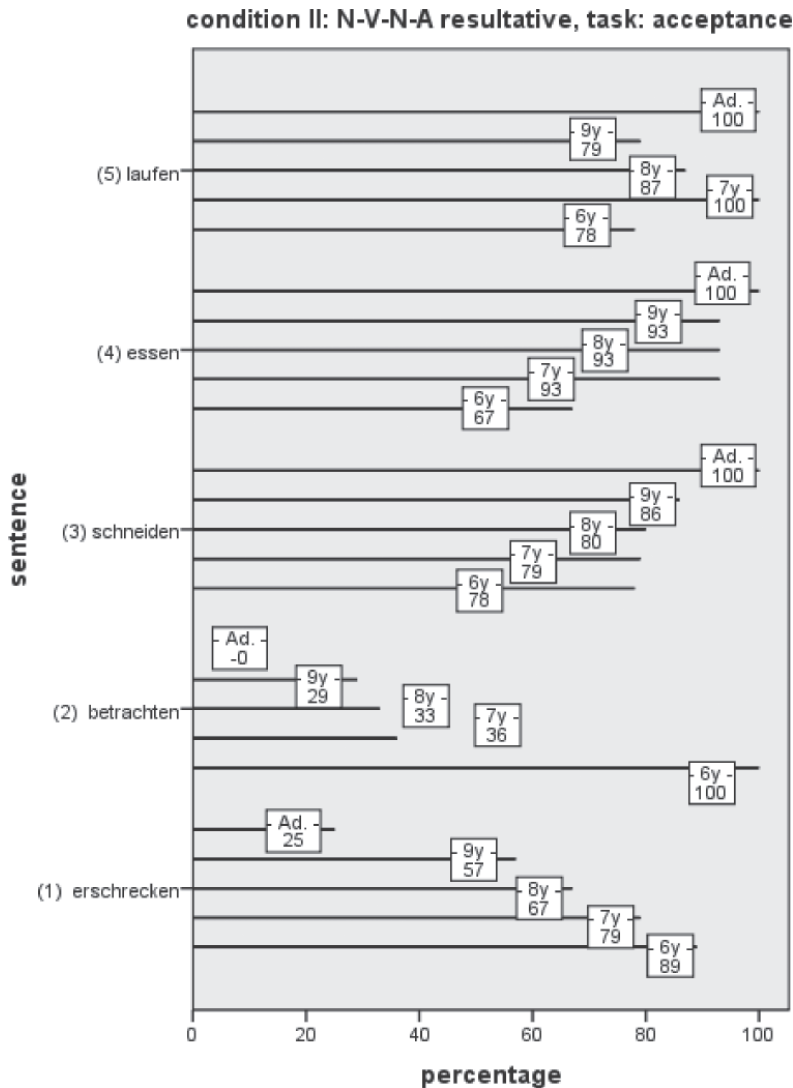


Fig. 3: The percentages of acceptance of the five condition II sentences in the five age groups

Do the patterns found indeed reflect a resultative interpretation by all groups when they accept an utterance? The interpretation was checked by analyzing the assignment of the adjective by the respondents. The respondents could assign the adjective to the postverbal (NP (the resultative interpretation), or to the preverbal noun / verb part (the adverbial interpretation). Table 3 gives the number and percentages of the resultative assignments.

Sentence/age group	6 years	7 years	8 years	9 years	adults	Total
(5) laufen 'to walk/to run'	7/7 (100)	14/14 (100)	12/13 (92)	11/11 (100)	8/8 (100)	52/53 (98)
(4) essen 'to eat'	5/6 (83)	13/13 (100)	12/14 (86)	11/13 (85)	8/8 (100)	49/54 (91)
(3) schneiden 'to cut'	5/7 (72)	11/11 (100)	8/12 (67)	12/12 (100)	8/8 (100)	44/50 (88)
(2) betrachten 'to look at'	9/9 (100)	5/5 (100)	5/5 (100)	4/4 (100)	0/0 —	23/23 (100)
(1) erschrecken 'to frighten'	7/8 (87)	11/11 (100)	8/10 (80)	5/8 (63)	1/2 (50)	32/39 (82)
Total	33/37 (89)	54/54 (100)	45/54 (85)	43/48 (90)	25/26 (96)	200/219 (91)

Table 3: Number and percentages of assignment of the adjective to the postverbal NP of the sentences in condition II: resultative interpretation

Table 3 shows that in 91% of the cases the assignment confirmed the resultative interpretation. There is no clear path of development over the age groups. The differences between the verbs were small, varying between 82% and 100%. The adverbial reading of *laufen* ‘to walk/to run’ and *betrachten* ‘to look at’, that is, the interpretation of the adjective as manner adverb, was excluded by all groups, with only one exception. These two verbs strongly seem to confine the scope of the adjective to the postverbal NP. The adjective *kaputt* in sentence (5) cannot be an adverb since in this case *laufen* ‘to walk/to run’ would be interpreted as a transitive verb in *der Vater läuft den Schuh* ‘the father walks the shoe’.

4.3 Condition III: N–V–N–A adverbial

The five sentences of condition III have the N–V–N–A frame. The results for the five age groups and the sentences are given in Figure 4.

Figure 4 shows clear differences between the sentences, although all sentences show variation between the groups. The adults are again fairly categorical. They accept the first three sentences and reject sentences (4) and (5). Gradual shift from nonacceptance to acceptance or, in other words, a shift from frame to verb compliance can be seen for the ungrammatical sentence (5) in particular. For this sentence a chi-square analysis yielded an almost significant relationship between acceptance and group ($\chi^2 = 9.03$, $p = .062$, $df = 4$). Sentences (1) to (3) share a U-shaped distribution with the adults and the youngest age group obviously accepting these sentences, whereas the other age groups are more in doubt.

The effects of sentence and age group was confirmed by a GLM analysis, with the logit as linking function, and sentence as within subject variable (SPSS 16, GLM). A significant effect was found for all three possible effects: age group (Wald chi-square (4) = 108.595, $p = .000$), sentence (Wald chi-square (4) = 860.784, $p = .000$), and their interaction (Wald chi-square (13) = 4621.451, $p = .000$). The significant interaction effect of age group and sentence tells us that the groups did react differently to the sentences. The result of sentence (4) is surprising, i.e., the high degree of acceptance of *der Vater isst den Teller lustig* ‘the father eats the dish funnily’ within the groups of children. Recall that in condition I only roughly 20 percent of the youngest group accepted the sentence *die Mutter isst den Teller* ‘the mother eats the dish’. In that sentence a majority of children only recognized the semantic incompatibility between verb and direct object. A possible explanation is that in contrast to the N–V–N frame the more complex N–V–N–A frame has helped along the acceptance of the sentence.

Do the patterns of acceptance observed involve an adverbial interpretation? The interpretation was checked by analyzing the assignment of the adjective by

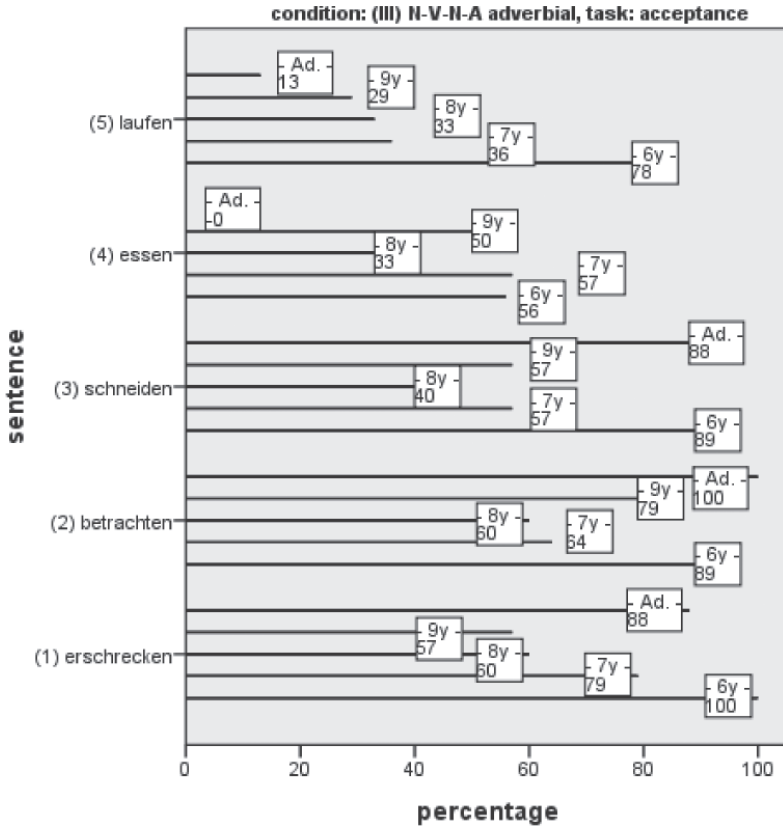


Fig. 4: The percentages of acceptance of the five condition III sentences in the five age groups

the respondents. The respondents could assign the adjective to the postverbal (NP (the resultative interpretation), or to the preverbal noun/verb part (the adverbial interpretation). Table 4 gives the number and percentages of the adverbial assignments.

The overall adverbial assignment, 80% of the cases, is high, which validates the acceptance scores as corresponding to an adverbial interpretation, but it is lower as the percentage found for the assignments for the Condition II sentences (91%). As for the verbs, *erschrecken* 'to frighten' has a lower adverbial percentage (64%) than the other verbs. *Erschrecken* expresses a process that leads to a resultant state and therefore cannot occur in a resultative construction (Richter and van Hout 2010), inviting for a non-resultative reading, with success given the scores of the adults. They seem to realize that an adverbial interpretation is the only way out to interpret the sentence.

Sentence/age group	6 years	7 years	8 years	9 years	Adults	Total
(5) laufen 'to walk/to run'	6/7 (85)	5/5 (100)	5/5 (100)	4/4 (100)	0/0 —	20/21 (95)
(4) essen 'to eat'	5/5 (100)	6/8 (75)	5/5 (100)	7/7 (100)	0/1 (0)	23/26 (88)
(3) schneiden 'to cut'	5/8 (63)	8/8 (100)	5/6 (83)	8/8 (100)	6/7 (85)	32/37 (86)
(2) betrachten 'to look at'	4/8 (50)	5/9 (56)	8/9 (89)	10/11 (91)	8/8 (100)	35/45 (78)
(1) erschrecken 'to frighten'	7/9 (78)	5/11 (46)	4/9 (44)	5/8 (63)	7/7 (100)	28/44 (64)
Total	27/37 (74)	29/41 (71)	27/34 (79)	34/38 (89)	21/23 (91)	138/173 (80)

Table 4: Number and percentages of assignment of the adjective to the verb part of the sentences in condition III: adverbial interpretation

The children seem to be in doubt and the outcomes indicate a development over time, as the overall scores of the adverbial assignment seem to increase the older the children are. The most important effect, however, is brought about by the lower assignment scores for the two youngest age groups in combination with the U-shaped behavior observed for sentences (1) to (3) in Figure 4. The two youngest age groups more easily accept a resultative interpretation of the adverbial sentences, indicating that they are frame compliant. They accepted these utterances for the wrong reasons. The U-shaped behavior in combination with the assignment scores in Table 4 provide additional evidence that younger children are frame compliant, having a free interpretation of the N–V–N–A pattern. The older children develop an adverbial interpretation. They become more verb compliant, taking into account the semantic properties of the verb.⁵

5 Conclusion and discussion

Remarkable though consistent contrasts were observed between adults and children in evaluating ungrammatical sentences. This could be seen with the youngest group of children in particular: they tended to accept both ungrammatical resultative and ungrammatical transitive sentences. Our explanation is that children have their own way of interpreting the involved verbs. When they accepted for instance a sentence such as *die Kinder erschrecken die Katze ängstlich* ‘the children frighten the cat scared’, they interpreted the verb not as strongly transitive, expressing an end state inherently, but as low transitive. The children apparently took the sentence frame, or in other words, the construction as the cue to obtain the meaning of the sentence even though the sentence in question was ungrammatical, that is, if the verb did not fit in the construction. Such interpretation patterns occur when not all relevant semantic properties of verbs have yet been acquired. It is important to note that the youngest children in particular were frame compliant while the older groups sometimes showed an adult-like interpretation pattern. That means that our study showed that the children’s bias toward linking structure to meaning (frame compliant) disappears as they get older, in favor of a verb compliant interpretation pattern, and that the transition from frame to verb compliance progresses gradually, but systematically.

What did the children do in detail when accepting and not accepting sentences? When confronted with an ungrammatical N–V–N–A sentence as *die Kinder erschrecken die Katze ängstlich* ‘the children frighten the cat scared’, chil-

⁵ It is not clear to us yet whether our results mirror developmental processes as put forward for instance by Karmiloff-Smith (1992).

dren might base the interpretation on the resultative patterns they have heard earlier. They assigned a resultative meaning to this sentence frame, not being aware that the verb does not fit into the construction at hand. That means that they were using a syntactical bootstrapping strategy which was (already) successful at earlier stages of the acquisition process (cf. Landau and Gleitman 1985; Gleitman 1990). The youngest children in our test group particularly showed this interpretation pattern, as they had not yet acquired the complete set of semantic and syntactical properties of verbs. This strategy is corroborated by the non-acceptance of the sentence *die Mutter isst den Teller* 'the mother eats the dish' by the youngest age group. It is in fact the only sentence they clearly reject, for semantic reasons. The overwhelming majority of the children was aware that a dish normally cannot be eaten and consequently the sentence was rejected. A sentence had to express a plausible scene in the world. The free semantic interpretation of the younger age groups was confirmed by their choices in the adverbial sentences of condition III. The younger age groups varied between an adverbial and resultative reading, but the older age groups took the adverbial reading, when they accepted the sentences. The older age groups are more verb compliant and guided by the semantic properties of the lexical verb.

Strong frame compliance by younger children means that these children do not dispose of a fine grained verb classification system that allows them to decide whether a verb may occur in a resultative construction. This observation forms no direct counterevidence to the semantic verb class hypothesis (Pinker 1989), but it questions how fine-grained the class distinctions are in young speakers. Our adults had no real problems in judging the sentences. They checked whether the verb properties were compatible with the constructional properties, given that the semantic relations within the sentence were found to be plausible.

It was obvious that even the youngest participants were familiar with the presented constructions. That is to say, their syntax allowed for processing the resultative, adverbial and transitive sentences. The differences between children and adults in our study are thus not due to differing syntactical knowledge but to differences in the knowledge of the verb semantics.

In Richter and van Hout (2010) it was shown that abstract semantic verb properties such as time scheme and affectedness of subject and object determine whether a verb can form (or can occur in) adjectival resultatives. Acquiring the complete set of verb properties is a complex and hard task in language acquisition that needs time. The present study provides evidence that German children at early primary school age have not completed this learning task. Note that a semantic cue can be decisive.

The implication is that the shift from frame to verb compliance is related to the increase of lexical knowledge. This knowledge, however, is not solely

idiosyncratic. A child learns with age that groups of verbs share semantic properties (see, e.g., Pinker 1989; Ambridge et al. 2008). An increasing knowledge of these properties and an increasing linguistic experience enable speakers to classify verbs more and more, according to their semantics and consequently also to their syntactical behavior.⁶

It is not clear yet what factors precisely induce the transition from frame to verb compliance. Ambridge et al. (2008) conclude that the formation of semantic verb classes as postulated by Pinker (1989) is not a sufficient explanation but that in addition frequency effects play an important role. That is, with frequently occurring verbs children at primary school age overgeneralize less and are less frame compliant than with infrequently occurring verbs. However, in our study we observed that the youngest age group was frame compliant in a sentence with the high frequent German verb *laufen* ‘to walk/to run’. Note however that even adults can be frame compliant under certain circumstances, for instance when confronted with complex ungrammatical sentences (Naigles et al. 1992, 1995; Naigles et al. 1993).

The results of our study showed that the method we used, i.e., the picture card arranging task, worked. The children had no problems in understanding what was expected from them. When confronted with unproblematic resultative and transitive sentences, the children placed the picture cards quickly and correctly on the coloured sheets. When confronted with semantically dubious sentences such as *die Mutter isst den Teller* ‘the mother eats the dish’ the children reacted appropriately to their stage of language development, as they noticed the semantic incompatibility of the verb *essen* ‘to eat’ and direct object *den Teller* ‘the dish’. The interpretation by the participants was checked by the analysis of the assignment outcomes that confirmed the resultative or adverbial readings of the sentences accepted. The adverbial results confirmed the frame compliance of the younger children, as they turned out to vary between resultative and adverbial readings.

A reason why the task worked for children was certainly due to their language training in which they got familiar with such a task. Many of them made use of the option of leaving out cards when they had the impression that the corresponding word would not fit into the sentence. Most importantly, the picture card arranging task delivered results that gave an answer to our initial question on the compliance behavior of German children at primary school age. Our data revealed a gradual, systematic transition from frame to verb compliance. The question to

⁶ Additional evidence comes from simulations of human learning processes by artificial networks. See for instance Desai (2007).

be answered next is which semantic properties need to be acquired over time, in what order or hierarchy.

References

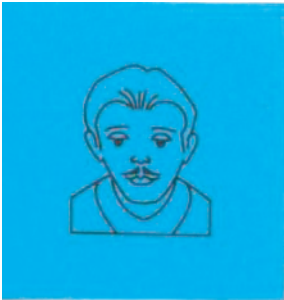
- Ambridge, Ben, Julian M. Pine, Caroline F. Rowland & Chris R. Young. 2008. The effect of verb semantic class and verb frequency (entrenchment) on children's and adults' graded judgments of argument-structure overgeneralization errors. *Cognition* 106. 87–129.
- Beck, Sigrid & William Snyder. 2001. Complex predicates and goal PP's: Evidence for a semantic parameter. In Anna H.-J. Do, Laura Dominguez & Aimee Johansen (eds.), *Proceedings of the 25th Annual Boston University Conference on Language Development*, 114–122. Somerville, MA: Cascadilla Press.
- Bowerman, Melissa. 1982. Reorganizational processes in lexical and syntactic development. In Eric Wanner & Lila R. Gleitman (eds.), *Language acquisition: The state of the art*, 319–346. Cambridge: Cambridge University Press.
- Braine, Martin D. S. & Patricia J. Brooks. 1995. Verb argument structure and the problem of avoiding an overgeneral grammar. In Michael Tomasello & William E. Merriman (eds.), *Beyond names for things: Young children's acquisition of verbs*, 352–376. Hillsdale, NJ: Lawrence Erlbaum.
- Brooks, Patricia J. & Michael Tomasello. 1999. How children constrain their argument structure constructions. *Language* 75(4). 720–738.
- Brooks, Patricia J., Michael Tomasello, Kelly Dodson & Lawrence B. Lewis. 1999. Young children's overgeneralizations with fixed transitivity verbs. *Child Development* 7(6). 1325–1337.
- Carrier, Jill & Janet H. Randall. 1992. The argument structure and syntactic structure of resultatives. *Linguistic Inquiry* 23(1). 173–234.
- Crain, Stephen & Cecile McKee. 1985. The acquisition of structural restrictions on anaphora. In Stephen Berman, Joe-Woong Choe & Joyce McDonough (eds.), *Proceedings of the sixteenth annual meeting of the North Eastern Linguistic Society*, 94–110. Amherst: University of Massachusetts Press.
- Desai, Rutvik. 2007. A model of frame and verb compliance in language acquisition. *Neurocomputing* 70. 2273–2287.
- Dowty, David R. 1979. *Word meaning and Montague grammar: The semantics of verbs and times in generative semantics and in Montague's PTQ*. Dordrecht: Reidel.
- Gleitman, Lila, R. 1990. The structural sources of verb meanings. *Language Acquisition* 1. 3–55.
- Goldberg, Adele E. 1995. *Constructions: A construction grammar approach to argument structure*. Chicago: University of Chicago Press.
- Goldberg, Adele E. 2006. *Constructions at work: The nature of generalization in language*. Oxford: Oxford University Press.
- Grimshaw, Janet. 1994. Lexical reconciliation. *Lingua* 92. 411–430.
- Hoekstra, Teun. 1988. Small clause results. *Lingua* 74.101–139.
- Hopper, Paul J. & Sandra A. Thompson. 1980. Transitivity in grammar and discourse. *Language* 5(1). 251–299.
- Karmiloff-Smith, Annette. 1992. *Beyond modularity: A developmental perspective on cognitive science*. Cambridge, MA: MIT Press.

- Kratzer, Angelika. 2005. Building resultatives. In Claudia Maienborn & Angelika Wöllstein-Leisten (eds.), *Event arguments in syntax: Foundations and applications*, 177–212. Niemeyer: Tübingen.
- Landau, Barbara & Lila R. Gleitman. 1985. *Language and experience: Evidence from the blind child*. Cambridge, MA: Harvard University Press.
- Levin, Beth & Malka Rappaport Hovav. 1995. *Unaccusativity. At the syntax-lexical semantics interface*. Cambridge, MA: MIT Press.
- Levinson, Lisa. 2010. Arguments for pseudo-resultative predicates. *Natural Language and Linguistic Theory* 28 (1). 135–182.
- Mandell, Paul (1999). On the reliability of grammaticality judgement tests in second language acquisition research. *Second Language Research* 15(1). 73–99.
- Naess, Ashild. 2004. *Transitivity: from semantics to structure*. Nijmegen: Radboud University Nijmegen dissertation.
- Naigles, Letitia, Anne Fowler & Atesa Helm. 1992. Developmental shifts in the construction of verb meanings. *Cognitive Development* 7. 403–428.
- Naigles, Letitia, Anne Fowler & Atesa Helm. 1995. Syntactic bootstrapping and Down Syndrome. In Michael Tomasello & William E. Merriman (eds.), *Beyond names for things. Young Children's acquisition of Verbs*, 299–330. Hillsdale, NJ: Erlbaum.
- Naigles, Letitia, Lila R. Gleitman & Henry Gleitman. 1993. Children acquire word meaning components from syntactic evidence. In Esther Dromi (ed.), *Language and cognition: A developmental perspective*, 104–140. Norwood, NJ: Ablex.
- Neeleman, Ad. 1995. Complex predicates in Dutch and English. In Hubert Haider, Susan Olsen & Sten Vikner (eds.), *Studies in comparative Germanic syntax*, 219–240. Dordrecht: Kluwer.
- Newmeyer, Frederic J. 1983. *Grammatical theory: Its limits and its possibilities*. Chicago, IL: University of Chicago Press.
- Pinker, Stephen. 1989. *Learnability and cognition: The acquisition of argument structure*. Cambridge, MA: MIT Press.
- Pregel, Dietrich & Gert Rickheit. 1987. *Der Wortschatz im Grundschulalter*. Hildesheim: Olms.
- Pustejovsky, James. 1991. The syntax of event structure. *Cognition* 41. 47–81.
- Rappaport Hovav, Malka & Beth Levin. 2001. An event structure account of English resultatives. *Language* 77(4). 766–797.
- Richter, Michael & Roeland van Hout. 2010. Why some verbs can form a resultative construction while others cannot: decomposing Semantic Binding. *Lingua* 120(8). 2006–2021.
- Saksena, Anuradha. 1980. The affected agent. *Language* 56. 812–826.
- Schütze, Carson T.. 1996. *The empirical base of linguistics. Grammaticality judgments and linguistic methodology*. Chicago: The University of Chicago Press.
- Simpson, Jane. 1983. Resultatives. In Beth Levin, Malka Rappaport & Annie Zaenen (eds.), *Papers in lexical-functional grammar*, 143–158. Bloomington, IN: Indiana University Linguistics Club.
- Sorace, Antonella. 1996. The use of acceptability judgments in second language acquisition research. In W. C. Richie & T. K. Bhatia (eds.), *Handbook of second language acquisition*, 375–409. San Diego, CA: Academic Press.
- Snyder, William. 2001. On the nature of syntactic variation: evidence from complex predicates and complex word-formation. *Language* 77. 324–342.
- Tenny, Carol. 1987. *Grammaticalizing aspect and affectedness*. Cambridge, MA: MIT dissertation.
- Tomasello, Michael. 1992. *First verbs: A case study of early grammatical development*. Cambridge: Cambridge University Press.

- Tomasello, Michael. 2003. *Constructing a language: a usage-based theory of language acquisition*. Cambridge, MA: Harvard University Press.
- Vendler, Zeno. 1967. *Linguistics in philosophy*. Ithaca, NY: Cornell University Press.
- Wagner, Laura. 2006. Aspectual bootstrapping in language acquisition: Telicity and transitivity. *Language Learning and Development* 2(1). 51–76.
- Wechsler, Stephen. 1997. Resultative predicates and control. *Proceedings of the 1997 Texas linguistic society conference*, 307–321. University of Texas at Austin.
- Wittek, Angelika. 2002. *Learning the meaning of change-of-state verbs*. Berlin & New York: Mouton de Gruyter.
- Wunderlich, Dieter. 1997. Argument extension by lexical adjunction. *Journal of Semantics* 14. 92–144.

Appendix A: Picture cards of the sentence *der Vater schneidet das Brot klein* ‘the father cuts the bread small’

der Vater
‘the father’



schneidet
‘cuts’



das Brot
‘the bread’



klein
‘small’

Appendix B: Instruction for the children in the present study

Versuchsleiter (VL): “Wir wollen uns mit dir einige Bildergeschichten angucken. Wir haben ein paar ganz kurze Geschichten (Sätze) mitgebracht und auch die passenden Bilder dazu. Lass uns das mal ausprobieren!”

‘Experimenter (Exp): “We want to look at some picture stories with you. Here are some very short stories and these are the pictures. Let’s try.”’

Exp places the sheet with the colored areas and the picture cards for the sentence “Opa gießt den Baum” (grandfather waters the tree) on the table.

VL: “Die kleine Geschichte (der kleine Satz) ist ‘Opa gießt den Baum’. Versuche mal, die Karten in die richtige Reihenfolge zu bringen.”

‘Exp: “The little story is ‘Opa gießt den Baum’. Just try to put these picture cards in the right order.”’

Child tries to place the picture cards in a good order, Exp helps her.

VL: “Jetzt gibt es noch grüne Felder. In unserer nächsten Geschichte haben wir auch grüne Karten. Wir wollen jetzt die Geschichte (den Satz) ‘die Oma streicht den Stuhl rot’ legen. Wird der Stuhl rot? oder ist die Oma rot? Was meinst du, wo gehört das grüne Kärtchen hin?”

‘Exp: “Look there are some green areas. And in our next story we also have some green cards. Let’s place the cards for the next story, ‘die Oma streicht den Stuhl rot’ (grandmother paints the chair red). What do you mean? Does the chair become red or is the grandmother red? Where does the green card belong?”’

Exp shows the picture cards and points to the two possible areas on the sheet.

VL: “Jetzt nehmen wir die Geschichte (den Satz) ‘der Vater isst das Brot lustig’. Wird das Brot lustig oder isst der Vater lustig?”

‘Exp: “Now here is another story. ‘Der Vater isst das Brot lustig’ (the father eats the bread funny). Does the bread become funny or is the father eating on a funny manner?”’

Exp. shows the picture cards and points to the two possible fields on the sheet.

VL: “Jetzt kommt wieder eine andere Geschichte (ein anderer Satz) ‘die Oma gießt die Blume klein’. Was meinst du, wie können jetzt die Kärtchen liegen? Wenn du aber denkst, dass du die Geschichte (den Satz) nicht verstehst, sagst du uns das! Wenn du irgendein Kärtchen nicht hinlegen willst, lege es einfach beiseite.”

‘Exp: “Again we have a new story for you ‘die Oma gießt die Blume klein’. What do you think? How can the picture cards be placed now? If you think that you don’t understand the sentence, let us know. If you want leave any card out just set it aside.”’