

Tomasello's usage-based theory of first language acquisition

Tested on the acquisition of a Dutch adjective-noun agreement rule

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Master Thesis

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“What if the formal linguists’ practice of finding abstract patterns ... is just a metalinguistic game with no psychological significance?” (Tomasello 2003, 303)

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Introduction

'What if the formal linguists' practice of finding abstract patterns is just a meta-linguistic game with no psychological significance?' This question is asked by linguist Michael Tomasello somewhere in the middle of his book *Construction a Language: A Usage-Based Theory of Language Acquisition* (2003:303). Indeed, finding abstract patterns is, and has been, the main enterprise of tens of thousands generative linguists in the past 50 years with an ambition to discover the architecture of Universal Grammar. Unfortunately, it seems like critical discussions about the generativists' linguistic convictions are less common. Linguists in other schools who do not believe in Chomsky's claims often work independently of his theory and tend not to refer to it. A rather peculiar situation has arisen in which people either follow Chomsky's basic theoretical framework, almost as if it were a religious creed, or ignore it. The quote at the beginning of this paragraph shows that Michael Tomasello does engage actively in a debate with generativists, proposing a complete, alternative theory of child language acquisition. What does that theory look like, and how does it relate to generative linguistic work?

Because it has become difficult to see the wood for the trees in generative linguistic theory, it is instructive to start out by clarifying which version of that theory Tomasello (2003) has in mind. The version of the innateness hypothesis that Tomasello argues against is one, which postulates a Universal Grammar (U.G.) consisting of principles and parameters (182-188). According to this theory, two different mechanisms are involved in the acquisition of the mother tongue. First of all, a central activity in language acquisition is parameter setting. U.G. is supposed to contain the blueprint for many grammatical rules in natural language in the form of principles and parameters. Grammar does not need to be 'learnt' by the language-learning child, since learning is only a matter of linking language input to these parameters and then setting them.¹ Once the parameters have been set, a firm core of linguistic knowledge has been established. The second task set to a child that is acquiring its first language is 'real' learning: memorizing that language's words and quirky constructions. This is the 'periphery' of linguistic knowledge.

¹ By writing that learning is 'only' a matter of linking language input, it is meant here that the process is *supposed* to be simple. This is not the place to get into discussions like the 'Linking Problem'.

Tomasello argues against such a dual-mechanism approach.² Rather than postulating a set of contentless, algebraic rules that combine with the lexicon and quirky constructions, this scholar proposes an account of adult speakers' linguistic knowledge of their first language in which all constructions are seen as patterns of usage. Such patterns of usages have been stored, but not in a uniform way: they are represented in the brain, and used in real-life, in more or in less abstract ways, depending on the speaker and on the construction itself. This mental grammar contains many routine formulas and fixed expressions. Overall, the linguistic knowledge of an adult should be considered a 'structured inventory of constructions' (Tomasello 2003:6). The language-learning child builds up linguistic abstractions in a gradual and piecemeal fashion: it takes many years to arrive at an adult-like grammar – and there is no general 'blueprint' for what that grammar looks like, but each adult speaker's grammar is a personal account of his language. So, whereas generativists among each other may propose different ways of describing the very complex object they call grammatical knowledge, Tomasello denies the existence of it. His theory is based on the premise that adults do not need to internalize many linguistic abstractions at all.³

Two important differences separate Tomasello and other linguists with a usage-based approach from a generative attitude. First of all, since the end-stage of language acquisition (a structured inventory of constructions of the language in question) is according to Tomasello much less daunting than the highly abstract adult grammatical representations of the generativists, it now becomes conceivable that a child would actually reach that end-stage

² Critics have argued, for example, scholars in the Mphil Linguistics, University of Utrecht, (http://ressem.blogspot.com/2006_04_01_archive.html) that the Principles and Parameters framework, which originates from the 1980s, is not a very recent account of generative theory to be arguing against. Two arguments may be advanced in Tomasello's defense. It should be noted first of all that many generative linguists are still following this framework. Whatever version of generative theory one chooses to focus one's attack on, this will always mean ignoring other versions of the same theory. But importantly, the essential claim – that there is a dedicated language faculty – has never changed. Moreover, the very recent theoretical work of Chomsky, Hauser and Fitch (2004) this essential claim receives a only very minimalistic interpretation, resulting in fewer testable predictions. These scholars have argued that all Universal Grammar consists of is the concept of Recursion and that most of the skills necessary to acquire language are domain-general. Crucially, the possibility is kept open that U.G., now dubbed the Narrow Faculty of Language or FLN, is actually empty (as Tomasello believes!). Tomasello's choice of arguing against a version of Universal Grammar which makes very clear predictions –the principles and parameters view– seems entirely reasonable.

³ A generativist counter-argument could be that this is not a very empirical approach, because adult grammatical knowledge of any natural L1 obviously is quite complex. But we will not focus on this type of criticism in this study.

without the help of any inborn language module. Secondly, according to Tomasello, generativists do not fully appreciate that children come to the task of acquiring language particularly well prepared. Not only are human beings of their very nature tuned to cooperative communication (cf. Tomasello 2008, a monograph on the *Origins of Human Communication*). They are also born with two sets of very helpful domain-general talents, which Tomasello dubs intention-reading (theory of mind) and pattern-finding (categorization) skills (Tomasello 2003:3-4).⁴ Children are endowed with these strong talents, which guide them through the language learning process. This is the second main reason why we do not need to postulate a Language Acquisition Device, if we want to understand how children get ‘from here to there’.⁵

How do children learn their mother tongue, if not by setting parameters? According to Tomasello, various stages in the acquisition process may be distinguished. After individual words, the child produces holophrases⁶, and then the first multi-word utterances begin in the form of pivot schemas. These are schemas with one fixed word and a variable slot, which can be filled with a variety of lexical items.⁷ For example, the pivot schema ‘Wanna _’, can surface as ‘Wanna eat’, ‘Wanna cookie’ etc. Importantly, according to Tomasello, syntactic marking is not

⁴ Among intention-reading skills are ‘the ability to share attention with other persons to objects and events of mutual interest’; ‘the ability to follow the attention and gesturing of other persons; the ability to actively direct the attention of others to objects’ and ‘the ability to culturally (imitatively) learn the intentional actions of others, including their communicative acts.’ Secondly, pattern-finding skills include ‘the ability to form perceptual and conceptual categories, the ability to form schemas of recurrent patterns’; ‘the ability to perform statistically based distributional analyses’; and ‘the ability to create analogies (structure mapping) across two or more complex wholes.’ Tomasello (2008) 3-4 -and perhaps Tomasello (2009), but I have not seen this work- argues quite persuasively that cooperation and having (a multiple order) theory of mind are essential tenets of human communication. Furthermore, much recent linguistic research, for example about statistical learning, testifies to the importance of pattern-finding skills.

⁵ Tomasello seems to be misrepresenting generative theory, since actually it is not true that generativists underestimate the importance of such skills. Rather, the question there is which innate skills are dedicated to language and which are not. Rephrasing Tomasello’s views in generativist terms, he actually is a nativist himself, but believes that UG is not domain-specific. Using the definitions in Chomsky, Hauser and Firth (2004): according to Tomasello, all that exists is FLB (the ‘broad faculty of language’). FLN (the ‘narrow faculty of language’) is empty.

⁶ Tomasello (2003) 36: ‘Children’s early one-word utterances may be thought of as holophrases that convey a holistic, undifferentiated communicative intention.’

⁷ Tomasello (2003) 114-115: ‘Often, there is one word or phrase seems to structure the utterance in the sense that it determines the speech act function of the utterance as a whole ... with the other linguistic item simply filling in the variable slot – the first type of linguistic abstraction.’ Following Braine (1963), Tomasello calls these pivot schemas. Braine (1976) already established that this is a widespread and productive strategy for children acquiring many languages. Tomasello et al. (1997) demonstrated more systematically how these pivot schemas work and that children in this stage to not make generalizations across pivot schemas; each is a constructional island.

part and parcel of these pivot schemas. After this stage comes the stage of the so-called item-based constructions (henceforward, **IBCs**). This is when the child has an adult-like knowledge of a particular construction, but only for a set of examples that she has already acquired. For example, the child may know that ‘break’ is a verb that comes with a ‘breaker’ and a ‘breakee’, and that ‘kiss’ involves a ‘kisser’ and someone ‘being kissed’. But these verb descriptions are islands of knowledge, as it were: they are all isolated, unconnected. In this stage, she does not generalize across separate examples of the same kind, nor is she able to apply grammatical knowledge productively. That is, the child does not have a mental category of ‘agent’ and ‘patient’ and will not be able to produce a transitive sentence with a verb she has not heard before. This stage may last a considerable period of time. After the stage of IBCs, the children start making generalizations and overgeneralizations. This is when their pattern-finding skills really set in. In this stage, the island constructions are gradually turning into abstract constructions, but this process may take months or even years.⁸

This study aims to investigate Tomasello’s claims about the L1A learning process by testing acquisition of one particular grammatical rule, a Dutch rule of adjective-noun agreement. Tomasello himself focuses mostly on the acquisition of syntactical patterns when explaining item-based constructions and few studies in the nominal domain have been carried out. But since Tomasello holds that the same learning mechanisms apply to L1A of syntactic and lexical knowledge, lexical-grammatical morphological competence is certainly covered by his proposal. The focus is on the issue of productivity. Note that the extended learning stages described in the previous paragraph are unexpected, according to Tomasello, from a Chomskyan point of view: with the assistance of the principles and parameters in UG, a child should acquire grammatical rules on a most abstract level almost immediately after some individual instances are encountered.⁹ Contrary to what Tomasello proposes, the UG theorist would claim that

⁸ For a discussion of how children in a usage-based approach make generalizations beyond item-based schemas and constructions see Abbot-Smith and Tomasello (2006). Note that Tomasello does not mention or acknowledge that even within the generative school of thought there are L1A theories that posit an early stage of L1A where certain fundamental aspects of UG have not yet emerged. For example, Radford (1990, 1996) argues for a maturational approach to functional categories, proposing that functional categories are biologically determined to emerge at specific points in grammatical development, but they are not available at the early stages of first language acquisition.

⁹ Tomasello (2003) 97-98 writes that ‘generative grammar approaches, whatever their specifics, predict that all of the particular linguistic items and structures that fall under a certain formal description should emerge at the same time in development and be applied productively across all lexical and grammatical items basically immediately [underlining mine].’ Tomasello gives an illustrative example of that view from the work of the generative scholar Radford: ‘Once a child is able to parse an utterance such as “Close the door!” he will be able to infer from the fact

'learning' a rule of grammar should be a brief process in which that rule is acquired completely and with maximum generality.¹⁰ Thus, generality, or to put it differently, productivity, is an important test of these opposing views of the acquisition of grammatical knowledge. Therefore, it will be tested whether and when children are productive with this particular Dutch rule.

Before we can turn to the experiments, a brief introduction to relevant adjective- noun agreement rule of Dutch is in order (for a more extensive explanation, see chapter 1). Dutch has a two-way gender system for nouns, distinguishing between common gender and neuter gender. This grammatical gender is not visible on the noun itself, but it is on agreeing elements. Definite articles are such agreeing elements, and so the definite article (of which there are two allomorphs) shows the grammatical gender of the noun. Attributive adjectives are also agreeing elements and these come in two allomorphs as well: the bare form, and a form with a schwa suffix added to it, which is realized as {-e} in the spelling. The default rule for attributive adjectives is that they take the allomorph with the schwa suffix.¹¹ For example, the adjective in the indefinite, singular, common gender DP in (1) ends in a {-e}. This rule will be referred to as the **Adjective Inflection Rule (AIR)** in the following.

- (1) *een groene tuin*
 a green garden
 'a green garden'

There is one exception to this rule: if the attributive adjective is contained within an indefinite, singular and neuter DP, the adjective takes the bare, schwa-less allomorph. This is the case in the DP in (2) featuring the neuter noun *huis* 'house'. This rule will be referred to as the

that the verb "close" in English precedes its complement "the door," that all verbs in English precede their complements.' (Radford 1990: 61).

¹⁰ But (how) are language-specific rules of grammatical *morphology* represented in UG? In other words, exactly how does UG facilitate the acquisition of these rules? A generativist would probably not argue that there are specific parameters dealing with the specific rules of specific languages. Such a contention seems untenable, for UG would have to contain so many rules as to make it useless as a language acquisition device. Perhaps UG is mechanism that helps the language learner look for the default rule, as in the *Words-and-Rules Theory* (Pinker and Prince 1991; Pinker 1999). In addition, UG probably contains general information stating that some words are nouns, that nouns may have gender and that other elements may agree with nouns in person, number, gender and case. Tomasello does not say anything about this; perhaps because his own work focuses on verbs and their arguments. We will return to this issue in Chapter 4, *Discussions*. At some later point it would be interesting to compare the results of this study to those of Van Wijk (2006), who carried out experimental studies on the acquisition of Dutch plurality and assessed the *Words-and-Rules* theory on the basis of her findings.

¹¹ For a discussion of the default status of the attributive adjective with a schwa suffix, see section 1.3.3.

Exception Rule (**ER**) in the following. Note that the ER is a highly complex rule: it makes reference to a lexical noun class feature [\pm neuter] and targets semantic features [\pm plural] and [\pm definite], as well as the syntactic category [\pm DET].¹² Both the AIR and ER are summarized in (3) below.

- (2) *een groen huis*
 a green house
 ‘a green house’

(3) **a. Adjective Inflection Rule (AIR):**

‘An attributive adjective in a DP has a schwa suffix, except if ER applies.’

b. Exception Rule (ER):

‘An attributive adjective in a DP that is singular, neuter and indefinite does not have a schwa suffix.’

Tomasello’s predictions about the stages of learning described above will be tested with regard to the ER in this study. If Tomasello’s theory is correct, one expects that a single child will pass through various learning stages before reaching abstract knowledge. Correspondingly, in a pseudo-longitudinal study, one expects to see children in different learning stages. Some children will not have acquired the rule at all. Others will be in a learning stage in which they correctly use the ER sometimes, but only in those examples that they have encountered and memorized already (the **IBC** stage). Thus, these children may have acquired the construction *een groen huis* ‘een groen huis’ and, say, ten other DPs in which the ER applies, and may use the ER correctly in these cases. However, the children’s partial knowledge of the ER is not used productively and is not applied to novel cases: there the AIR is used instead. This is because *een groen huis* ‘een groen huis’ is an island of knowledge. Finally, there will be children who have acquired the ER on a more abstract level, and these children will be productive with this rule. By contrast, a generative type of theory would expect that once the ER is acquired, it will be used with maximum generality. In this view, one would expect to see some children who do not know the rule yet, and other children who show knowledge of the ER and apply that rule productively. However, one would not expect to see differential stages of learning spread out over a longer period.¹³ The predictions, which the UG Hypothesis and the IBC Hypothesis make, are summarized in Table 1. This table states which percentage of children should apply

¹² A comprehensive explanation of the ER is provided in section 1.3.

¹³ Except, of course, if learning that rule is dependent on the acquisition of other grammatical rules.

the ER productively to a new situation. Note that we assume that the acquisition of the AIR and the ER is a matter of parameter-setting, i.e. part of the ‘core’ of grammatical acquisition, and do not form idiosyncratic, ‘peripheral’ rules that need to be learnt.¹⁴

| | Clueless | Learners | Experts |
|----------------|----------|----------|----------|
| UG Hypothesis | 0% | 100% | 100% |
| IBC Hypothesis | 0% | 25%-75% | 75%-100% |

Table 1: Predictions of two theories on LA1

Tomasello’s prediction with regard to the ER will be tested by means of two subsequent studies. The first experiment was an elicited imitation task, the second experiment was an elicited production task, both embedded in a version of the Truth Value Judgment paradigm called the picture-story guessing game. In that paradigm, an experimenter reads a story with pictures to the child, while a puppet, who cannot see the pictures, makes guesses about the story. In both experiments, the child’s official task was to answer the puppet’s questions. The puppet also asked clarification questions about the pictures. The children’s answers to these questions (elicited imitations or elicited productions) were the real test questions in the experiment. This procedure drew attention to the puppet, the story and the guesses, but not to the elicited imitations themselves.

Both experiments consisted of two tests, which were carried out in the same session. The first test or ‘pretest’ in each experiment served to divide the experimental subjects into different stages of learning. In the second test or ‘main test’ in each experiment, children were asked to produce an indefinite, neuter and singular DP containing an attributive adjective, which they had not heard before. In order to ensure the novelty of the DP, children had been taught a nonce adjective in the first part of the experiment. The purpose of the main test was to test productivity in the application of ER, especially in the case of children who were still learning.

The study differs from previous experiments in a number of ways. First of all, as Wittek and Tomasello (2005:123) write: ‘there are very few studies of languages other than English specifically directed at the issue of productivity – the abstractness of children’s linguistic constructions at different ages – which require special methodologies such as nonce words and structural priming’. That study itself targeted the German language. To our knowledge, there are no studies of this topic focusing on Dutch. Furthermore, most of the experiments about productivity focus on transitive verbs and their agents/patients or subjects/objects and passivization of transitive verbs. Productivity with grammatical rules in the nominal domain is

¹⁴ A discussion of this point of view is provided in Chapter 1, section 1.4

relatively uncharted territory.¹⁵ Finally, the two experiments carried out in this study had a novel design.

The procedure, materials and outcome of these two experiments are reported in detail in Chapters 2 and 3 of this thesis. The thesis starts out with an introductory chapter (Chapter 1) containing a review of Michael Tomasello's theory of language acquisition and earlier studies on productivity, as well as a broader explanation of the Dutch Adjective Rule. After the presentation of the experiments in Chapters 2 and 3 there is a short chapter in which the implications of the experiments are discussed and improvements for a follow-up experiment are suggested (Chapter 4). The thesis ends with a General Conclusion.

¹⁵ For an overview, see section 2.2.4.

1. Theoretical Background

1.1 Introduction

This chapter presents the theoretical background for the experiments described in the following two chapters. In section 1.2 an overview of the relevant theoretical literature and experimental studies is presented. Section 1.3 focuses on the two rules of adjectival inflection in Dutch (AIR and ER). Section 1.4 states in detail what the experimental hypothesis of this study is. Finally, section 1.5 gives a brief summary/conclusion.

1.2 Tomasello's view on language acquisition

In the General Introduction it was explained that according to Tomasello, the acquisition of a grammatical structure happens in a number of different developmental stages. After holophrases and pivot schemas follows a stage of item-based constructions, which then evolve slowly and in a piecemeal manner into more abstract representations. An overview of experimental evidence, which may be in favour of such a view of learning grammar, is presented now.

1.2.1 Productivity in verbal constructions

One of the things that (must have) triggered Tomasello's ideas was the study of his own daughter's spontaneous utterances. With regard to transitive verbs, Tomasello (1992) described that almost all of his daughter's early multi-word utterances during her second year of life revolved around the specific verbs or predicative terms involved. Tomasello (2003:117) referred to these observations as the Verb Island hypothesis 'since each verb seemed like its own island of organization in an otherwise unorganized language system.' The child had not internalized general semantic or syntactic categories like 'agent', 'patient' or 'instrumental'. Rather, there were scene-specific things like 'kisser', 'person kissed', and 'breaker' and 'thing broken'.¹⁶

¹⁶ However, at the moment many semanticists would deny that theta-roles exist anywhere but in the specific context of a verbs' lexical semantics. Since there is no AGENT or THEME independent of any verb, 'kisser' and 'kissee' are precisely what these linguists assume AGENT and THEME are in case of the verb 'kiss'. Cf. Dowty (1991).

This observation about Tomasello's daughter had a potential to undermine the very underpinnings of generative theory. Many studies had marveled at young English children's understanding of word order as an indicator of subject- and objecthood in transitive sentences. For example, Hirsh-Pasek and Golinkoff (1996) tested 17-month-old children by means of a preferential looking paradigm.¹⁷ These children heard the sentence "Where's Cookie Monster tickling Big Bird?" They preferred the television screen in which Cookie Monster was the actor and Big Bird the object of the action over one in which Big Bird was the actor and Cookie Monster the object of the action. Generative linguists interpreted the results of studies like these as evidence of innateness: children could not have acquired this piece of grammar at such an early developmental stage *without* a Universal Grammar to guide them. But based on Tomasello (1992) there is reason to doubt that these children's accomplishment was as impressive as the generativists supposed. It could be the case that like Tomasello's daughter, all young children at first only have a knowledge of Verb Islands. Many experiments have been carried out by Tomasello and colleagues to test whether subjects of various ages had acquired English transitive constructions in an abstract, productive way.

Wittek & Tomasello (2005:104) summarize the evidence that has emerged from these studies. According to these authors, 'at least five different lines of research suggest that English-speaking-children construct their linguistic abstractions more slowly and in a more piecemeal manner than was previously believed.' The first type of research identified by Wittek and Tomasello consists of analyses of children's spontaneous speech. Lieven, Pine and Baldwin (1997) used a method that combined periodic sampling and maternal diaries. These researches found that virtually all of the children in the study used most of their verbs in only one construction type. Furthermore, when children started to use the determiners *a* and *the*, the sets of nouns in which these determiners were used did not overlap.¹⁸ In other words, the children did not use verb constructions and definite articles in a fully productive manner.

A second set of experiments using an act-out comprehension task found that children only become productive with transitive constructions after a certain age. For example, testing

¹⁷ The authors characterized the task as preferential looking, though it resembled the picture selection task more: the children were told to look at something specific.

¹⁸ In a slightly different type of study, Lieven, Behrens, Spears and Tomasello (2003) analyzed creativity in the utterances of a single child (2;1) over a six-week period. The researches found that only 37% of the utterances were new (i.e. had not been said earlier in the corpus). Moreover, in 74% of the new utterances only one operation was required to change the utterance into a previous utterance or schema. 26% required more than one operation to match a previous utterance. In the author's view, this child was actually not very creative at all, and what she produced was merely small variations of entrenched schemas or memorized items.

children just under three years of age, Akhtar and Tomasello (1997) taught children the novel verb *meek* referring to a novel action on a novel apparatus with two toy characters. The experimenters asked “Can you make X meek Y?” Only three of the twelve children (25%) performed above chance. So, although the 17-month-old children in Hirsh-Pasek and Golinkoff (1996) had understood the relevance of the SVO order for ‘tickling’, children double that age failed to understand the same grammatical information in case of a novel verb.

The third type of study used elicited production tasks. For example, Tomasello and Brooks (1998) carried out an experiment teaching 2- and 3-year-olds novel verbs. Very few of them at either age produced a full transitive utterance with the novel verb when they had heard it used in an intransitive context. Brooks and Tomasello (1999) tested, among other things, whether 3-year-olds who had heard a transitive verb used in the passive would use it in the active. Only 35% of them did so.¹⁹

A fourth type of experiment examined children’s abstract representations of the SVO order in a different way (e.g. Abbot-Smith, Lieven and Tomasello (2001) and Akhtar (1999)). Subjects were taught a novel verb in a non-canonical word order for English, for example, in a sentence such as ‘The cat the dog is pilking’. These children were then invited to use the novel verb themselves. Children below three years of age used the novel verb in the unusual way in which they had heard it. Children who were older than three years of age used the canonical English word order (SVO) when they had to use the new verb. These studies may show that children under three do not represent the SVO order of English transitive constructions on an abstract level, but rather on a case-by-case basis.²⁰

The fifth type of study was a priming experiment such as that of Savage, Lieven, Theakston and Tomasello (2003). In this study 3-year-old children were primed with instances of a syntactic construction in a picture-naming game. When it was their turn to name a picture they were not influenced by the prime if there was not substantial lexical overlap between the prime and the utterance they wanted to produce. This may suggest again that the syntactic SVO structure was not represented in an abstract manner.

Based on these studies it was concluded in Tomasello (2003: 132) that neither in comprehension nor in production do English-speaking children fully understand word order as a productive syntactic device for marking agents and patients until after three years of age. A

¹⁹ The study by Wittek and Tomasello (2005) mentioned above was a replication of the experiment of Brooks and Tomasello (1999), this time examining German children. The German-speaking children’s level of productivity was similar to that of English speaking children of the same age.

²⁰ An alternative explanation is that the children under three were unable to parse the target sentences at all, given that it was ungrammatical; rather they learnt it as “a holophrase”, as a fixed lexical expression.

later experiment by Gertner *et al.* (2006) seemed to undermine these conclusions. In that experiment, children of only 21 months old understood the syntactic marking of transitive word order in an abstract, verb-general way. However, Dittmar *et al.* (2008) showed that these findings were misleading and that Tomasello's earlier conclusion was in their eyes still essentially correct.²¹

At the very least, the findings related in this section compel us to see results like that of Hirsh-Pasek and Golinkoff's study (1996) in a new light.

1.2.2 Productivity in the domain of morphology

In the previous section, we dealt with studies of productivity with transitive verbs and their argument structure. Now we will review studies aimed at morphology. Pizzuto and Caselli (1994) analyzed samples in the spontaneous speech of three Italian-speaking children from approximately 1.5 to 3 years of age. They focused on the morphology of simple finite main verbs. There are six possible forms for each verb root in Italian (1st, 2nd and 3rd person singular and plural), but 47% of all verbs used by children were used only in one form, and 40% were used in only two or three forms. Only 13% of the verbs appeared in four or more forms, but approximately half of these were highly frequent, highly irregular forms that could only be rote-learned. The conclusion was that Italian children do not master the whole verb paradigm for all their verbs at once, but rather they only master some endings with some verbs – and often different ones with different verbs.²² Thus, their use of verb endings did not suggest productive, abstract knowledge.

Wittek and Tomasello (2005) investigated whether German children who were taught the nonce noun *Doso* could productively use this word in the nominative, accusative and dative (i.e. when they had learnt it in some other case). German nouns, like Dutch nouns, have a grammatical gender that is expressed on agreeing elements like determiners (and sometimes on the noun itself). Thus the singular noun *Doso* would have four forms: *der Doso* in the nominative, *des Dosos* in the genitive, *dem Doso* in the dative and *den Doso* in the accusative. Wittek and

²¹ According to Dittmar *et al.*, in Gertner *et al.* (1996) children had learned crucial elements of the task in the familiarization phase of the experiment. In a new experiment with almost the same methodology Dittmar *et al.* (2008) showed that the “priming” phase was apparently necessary to arrive at such young ages of productive children. As they argue: ‘what these findings suggest is that the children had to go through some kind of learning or priming period in which the additional linguistic experience prepared them for the task.’ (580). So, the study by Gertner *et al.* (2006) does not undo the lower boundary for productivity of 2.5 years old.

²² Studies of the verbal paradigm of a number of other languages have similar results. For references to these studies, see Tomasello (2003) 199.

Tomasello found that half of the children between 2.5 and 3 years old productively used *Doso* in the nominative case in a transitive sentence to mark syntactic case, and 67% used *Doso* in the accusative case productively. The results for the dative were much worse (8%) but this may have to do with other factors. Wittek and Tomasello (2005) interpreted this evidence as supporting Tomasello's main hypothesis of gradual, piecemeal learning, because there was a subset of children among those that had been tested who were not productive with the knowledge they had of a certain piece of grammar.²³

1.2.3 Conclusion

In this section some central studies by Tomasello and other researchers have been discussed. According to Tomasello, these experiments show that at some point in their linguistic development, children are productive with certain syntactical or morphological rules. However, there is a stage *before* that in which they are not productive, although they correctly apply the rule to some known nouns and verbs. These facts may not point to instantaneous parameter setting, but suggest that learning a grammatical rule takes time and happens in a piecemeal fashion. In the next section, we will discuss the ER.

1.3 Dutch grammatical gender, attributive adjectives and the ER

The ER is partly based on the grammatical gender of nouns, and as a result, the acquisition of ER depends in part on the acquisition of gender. For this reason, it is necessary to give a brief introduction to Dutch grammatical gender before discussing the ER itself.

1.3.1 Dutch grammatical gender

Dutch has a two-way gender system, distinguishing between neuter and common (or 'uter') gender. In an earlier time, Dutch also had a feminine and masculine gender distinction. This still holds for southern and eastern dialects, but the standard variety has a two-way gender system (Weerman, Bisschop and Punt 2006:7). It is the gender of the noun that determines the form of any agreeing elements. These agreeing elements are determiners (articles and demonstratives), relative pronouns, and attributive adjectives. There are two forms of the definitive article: *de* and

²³ Of course, one could also argue that the study shows that there is *considerable* productivity. A study by Tomasello, Akhtar, Dodson and Rekau (1997) points to such a conclusion. The authors taught 22-month-olds the novel word *wuggie*. Among other things, these children were able to say that they saw two *wuggies*, when they had never heard this plural used. However, Tomasello's point of view is that UG predicts instantaneous productivity of 100% of children in a tested group, and that scores of 50%-67% show that there is an acquisition trajectory rather than instantaneous parameter setting.

het. The article *de* is used for common nouns such as *de muis* ‘the mouse’, whereas *het* is used for neuter nouns such as *het huis* ‘the house’.

Gender is a lexically specified property of nouns which means that it needs to be learnt on a case-by-case basis (cf. Deutsch and Wijnen 1985; Donalson 1987). Some nouns have a more or less predictable gender, these predictions can be made on the basis of the semantic class of the noun or morphological characteristics.²⁴ For example, names of musical instruments, such as *de piano* ‘the piano’, *de fluit* ‘the flute’ have common gender as do names of the seasons, like *de lente* ‘the spring’, *de zomer* ‘the summer’, *de herfst* ‘the autumn’, *de winter* ‘the winter’ (Unsworth 2008:369). Names of metals (*het goud* ‘the gold’, *het zilver* ‘the silver’) are neuter (Blom, Polisenska and Weerman 2008:260). Besides semantics, morphology sometimes provides a cue to the grammatical gender of a noun. The most important rule concerns diminutives: all diminutivized nouns are neuter, irrespective of the gender of the root noun. For example, although *de muis* ‘the mouse’ is of the common gender, *het muisje* ‘the little mouse’ with the diminutive suffix *-je* added to it, is neuter as becomes clear from the change of the definite article into *het*. Furthermore, nouns ending with the suffix *-isme* (*sofisme* ‘sofism’, *institutionalism* ‘institutionalism’) are generally neuter, whereas nouns ending with the suffix *-heid* (*schoonheid* ‘beauty’, *ijdelheid* ‘vanity’) are common gender. However, the gender of most nouns is not covered by such rules, but is simply random and as such, the acquisition of gender often boils down to word learning (Unsworth 2008:370).

The L1 acquisition of grammatical gender and of grammatical rules that depend on gender is influenced by the asymmetric frequency of nouns with *de* and *het* in the input. *de* outnumbers *het* in input to adults by a ratio of about 3:1 (Blom, Polisenska and Weerman 2008:302). The predominance of *de* is partly due to the fact that there are more common nouns; moreover, the definite determiner for plural DPs is always *de*. Thus, the definite article *de* is encountered much more frequently in language learners’ input than *het*.²⁵ Studies on monolingual L1 and on bilingual L1 (2L1) acquisition indicate that children overgeneralize *de* with neuter nouns until at least the age of six, for example producing *de huis* ‘the house’, but children hardly ever overgeneralize in the other direction (Unsworth 2008: 370).

²⁴ Although within these patterns, there are still always exceptions. Almost nothing can really be ‘predicted’ about morphology or lexical redundancies. See Booij (2002: 6-18; 21-54).

²⁵ We did not find whether the ratio of *de* : *het* words is different in the input to children, but will assume that it is not.

1.3.2 Attributive adjectives and the ER

Having finished our discussion of Dutch gender, we will now move on to discussing Dutch adjectival inflection. There are two forms of the Dutch adjective: the bare form and a form with a schwa suffix, realized as {-e} in the spelling, for example *gek* /'gek/ ‘crazy’ versus *gekke* /'gekə/.²⁶ In order to describe the distribution of these forms, a distinction first needs to be made between predicative and attributive adjectives. Predicative adjectives always have the bare form *gek*, as is illustrated in the DPs in (4) – (6). In these sentences, *gekke* is ungrammatical.

- (4) *De man is gek.*

the man is crazy

‘The man is crazy.’

- (5) *Wij vinden de man gek.*

we find the man crazy

‘We consider the man to be crazy.’

- (6) *Zij maken de man gek.*

they make the man crazy

‘They drive the man crazy.’

By contrast, if the adjective is used attributively, the schwa suffix is added, as is illustrated in the singular definite and indefinite DPs in (7) and (8) and the plural definite and indefinite DPs in (9) and (10). The common gender noun *de man* ‘the man’, plural *mannen* ‘men’ is used in all examples. In these cases *gek* would be ungrammatical.

- (7) *de gekke man*

the crazy man

‘the crazy man’

- (8) *een gekke man*

a crazy man

‘a crazy man’

- (9) *de gekke mannen*

the crazy men

‘the crazy men’

- (10) *gekke mannen*

crazy men

‘crazy men’

²⁶ The doubling of the consonant {k} in the spelling of *gekke* ‘crazy’ is an orthographical convention to indicate that the vowel /e/ is still a short vowel, but there is no doubling of the consonant in the pronunciation.

There is one rather peculiar exception to this rule about attributive adjectives (which holds in all Dutch dialects in the Netherlands), which we dubbed the ER.²⁷ If a DP is singular and indefinite and neuter, the adjective takes the bare form. This is shown in (11). Unless all of these three contextual conditions obtain, the regular inflected form must be used (i.e. the AIR applies) as in (12)–(14). All four examples feature the neuter noun *het huis* ‘the house’, plural *de huizen* ‘houses’.

- | | |
|--------------------------------|----------------------------------|
| (11) a. <i>een gek huis</i> | (12) a. <i>het gekke huis</i> |
| b. * <i>een gekke huis</i> | b. * <i>het gek huis</i> |
| a crazy house | the crazy house |
| ‘a crazy house’ | ‘the crazy house’ |
-
- | | |
|-----------------------------------|--------------------------------|
| (13) a. <i>de gekke huizen</i> | (14) a. <i>gekke huizen</i> |
| b. * <i>de gek huizen</i> | b. * <i>gek huizen</i> |
| the crazy houses | crazy houses |

²⁷ In Oversees Dutch (OD) the situation is different, as a result of L2 acquisition of the Dutch language and resulting pidginization. The following examples were all taken from Weerman, Bisschop and Punt (2006) 20-21. First of all, in Surinam Dutch, the bare adjective form for singular, indefinite, neuter DPs is often lost, as in (15) and (16). Both nouns *probleem* ‘problem’ and *salaris* ‘salary’ are neuter gender.

- (15) *een grote probleem* (OD)
 a big problem
 ‘a big problem’

- (16) *een normale salaris* (OD)
 a normal salary
 ‘a normal salary’

The same situation is found in Iowa Dutch, a variant of Dutch spoken by a group of orthodox Dutch protestants that emigrated to Iowa in the nineteenth century. By contrast, in Negerhollands (NH) which came to be spoken at the Virgin Islands in the Caribbean, when slaves from Africa were confronted with Dutch, no attributive adjectives have an overt suffix, as in (17) and (18):

- (17) *di ander dack* (NH)
 the other day
 ‘the other day’

- (18) *en niu kerrek* (NH)
 a new church
 ‘A new church’

'the crazy houses'

'crazy houses'

The ER thus targets three features of the DP (number, definiteness and gender).²⁸ Note, moreover, that the gender of the noun is inaudible in an indefinite DP, because the telltale definite article is not there. This poses an extra complexity to the language learning child. It is thus not surprising that this rule is difficult to acquire for Dutch L1 learners, but it is also the cause of persistent mistakes for L2 learners.²⁹

1.3.3 The default

Since there are two allomorphs of the adjective (the bare form and the form with a schwa suffix) the question arises what is the default form. Two analyses are possible, as Weerman, Bisschop and Punt (2006) show, adding a discussion of the relevant literature. The first option would be to argue that the bare forms in predicative adjectives and in a subclass of attributive adjectives form one class. In schematic form, the result would be a rule as in table 19 (from Weerman et al. 2006:10).

(19) Analysis 1: Inflection on Dutch adjectives

| | |
|--|-----------|
| If attributive, and not indefinite, singular, neutral: | Otherwise |
| - Ω | - |

Under this view, the schwa suffix is considered a special case that applies under certain circumstances, whereas the bare form is the default case. The second option would be that the bare form of predicative adjectives and that of a subclass of attributive adjectives are two separate cases. An analysis along the lines of (20) is the result:

(20) Analysis 2: Inflection on Dutch adjectives

| Attributive | Predicative |
|----------------------------------|-------------|
| If indefinite, singular, neutral | Otherwise |
| - | - Ω |

²⁸ Instead of saying that the rule applies to indefinite DPs, as has been done here and in most of the relevant studies, Blom (1994) argues that one should refer to a category of 'undetermined' DPs instead. This is because the rule also applies to DPs like *winters Amsterdam* 'wintry Holland', *heel Nederland* '(the) whole (of) the Netherlands', *voormalig president Gorbatsjov* 'former president Gorbatsjov'.

²⁹ There are some idiosyncratic lexicalized exceptions, for example *het onvermijdelijk gevolg* 'the inevitable consequence', *het Europees parlement* 'the European parliament', *de geheim agent* 'the secret agent'. These are neuter, singular but definite DPs with bare adjectives. These cases are discussed by Blom (1994).

In (20) a distinction is made between predicative and attributive adjectives. For predicative adjectives, the situation is simple, for the form is always schwa-less. For attributive adjectives, the suffix schwa is the default. The bare form appears only in a special subset of cases.

In the literature, both views have been argued for.³⁰ Crucially, these views make different predictions. If (19) is the correct analysis, learners are expected to overgeneralize the bare form when they have found out that this is the default – also in attributive positions where this is not adult-grammatical. By contrast, an analysis along the lines of (20) expects children not to make mistakes in the predicative case and to overgeneralize schwa in the attributive case. As will be explained presently (in section 1.3.4), experimental studies show that the analysis in (20) accurately reflects the mistakes made by L1 learners, whereas the analysis in (19) does not. Thus, it is assumed in this study that in the case of attributive adjectives, the form with a schwa suffix is the default. The marked schwa-less is realized by a rule (ER) that overrules the default rule (AIR) by means of a blocking mechanism.

1.3.4 Age of acquisition of noun gender and adjectival inflection

Blom, Polisenska and Weerman (2008) carried out an experimental study on the acquisition of adjectival inflection in Dutch. Their conclusion is that children overgeneralize the schwa suffix in contexts requiring a bare adjective (i.e. contexts in which ER applies) over a long acquisition trajectory – the children that were tested were between three and seven years old. The youngest children (3 years old) overgeneralized the schwa suffix in 84% of all cases (they used the bare adjective correctly 16% of the time). These data confirm the findings of Schlichting (1996), who found that the first determiner-adjective-noun combinations with a bare adjective appear between the age of 2;6 and 3;0. However, the acquisition process does not seem to go very fast. The oldest children (7 years old) in the study by Blom, Polisenska and Weerman (2008) supplied the bare adjective in ER contexts correctly in 75% of the cases, which is still far from adult-like. Overgeneralizations of the ER were almost non-existent. However, Blom, Polisenska and Weerman indicate a complicating factor in the interpretation of these results: a large percentage of the errors are due to a wrong perception of the gender of the nouns that were tested. This study had involved a separate test on noun gender, revealing a similar pattern of overgeneralization of common gender to neuter nouns. How many mistakes children made when the errors were corrected for whether nouns were perceived as neuter or common is unclear.

³⁰ For an overview of the discussion see Weerman, Bisschop and Punt 11.

Weerman, Bisschop and Punt (2006) also tested children between three and seven years of age on their knowledge of the ER and of the gender of the nouns which were used in the test. Then, they corrected the results of the ER test with the results of the gender test. That is, if a child overgeneralized the ER and produced for example, *een gekke huis* ‘a crazy house’ (while it should have been *een gek huis*, see section 1.3.2 above) this was not counted as an overgeneralization if that child thought that *huis* ‘house’ is a noun of the common gender. Of course, if *huis* were a common noun, *een gekke huis* would have been the correct form. The results turned out to be different from those in Blom, Polisenska and Weerman’s study. 61% of children aged three overgeneralized the schwa suffix in ER contexts. However, when this statistic was corrected for wrong gender classification, only 24% was left. The overgeneralizations of the schwa suffix remained frequent in the subsequent ages (71%, corrected 30% for children aged four; 45%, corrected 26% for children aged five) but the older children hardly ever overgeneralized the schwa suffix in ER contexts: 4% for children aged 6 and 3% for children aged 7, and these two percentages did not have to be correct for wrong gender classifications, because these were all correct by that age. As in the study by Blom, Polisenska and Weerman, overgeneralizations of the bare adjective in non-ER contexts were rare: 7% for children aged 3 and this number gradually dropped until it was only 2% for children of seven years old. Still, these percentages were higher than in Blom, Polisenska and Weerman’s study, in which it had been consistently 0% or 1%.

These two studies indicate that there is a lengthy acquisition trajectory of noun gender and the ER. Given these results, the pretest in the present study should ideally include children between three and six years of age. Productivity was not tested for in Blom, Polisenska and Weerman (2008) and Weerman, Bisschop and Punt (2006): in this respect this study is the first of its kind, as far as we know. However, it was not deemed practical to include children who were as young as three years of age. Probably one would have to design a separate methodology to deal with such young children. Therefore it was decided to limit the children in this study to the range of four to seven years of age.³¹

³¹ The findings of Weerman, Bisschop and Punt suggest that the ER has been acquired by age six. However, in the school classes which we tested, there were some seven-year-olds. As the introductory session had been with the whole group, we decided to test these children as well. In the first experiment there were 21 seven-year-olds, of whom in fact only 28% turned out to have answered all pretest and test trials correctly. In the second experiment there was one seven-year-old and she answered all pretest and test trials correctly.

1.4 The acquisition of the ER and AIR in a generative framework

In this section we will consider the acquisition process of this linguistic phenomenon in a Principles and Parameters paradigm. We assume that in this paradigm, the acquisition of AIR and ER should be analysed in terms of parameter-setting. As is shown in Figure X below, two mechanisms are relevant: on the one hand, Universals and Parameters guide the acquisition process of these rules, but on the other hand, there is also an element of learning:

1. Universals:³²

- Linguistic elements may agree with other linguistic elements, in which one or both item(s) carry markers of that agreement.
- Adjectives and DPs may agree in the features of gender, number, definiteness, case, person.
- Rules of agreement may differ according to the syntactic configuration of adjective and noun relative to one another.

2. Parameters:

2.1 There is adjective-noun agreement, yes/no. If the answer to 2.1 is “yes”, consider 2.2.

2.2 Adjective-noun agreement is head-driven/dependent-driven. If the answer to 2.2 is “head-driven”, consider 2.3.

2.3 The agreement is of the following type:

A. Adjectives in attributive position

- Adjective *in attributive position* agrees with DP in gender, yes/no.
- Adjective *in attributive position* agrees with DP in number, yes/no.
- Adjective *in attributive position* agrees with DP in definiteness, yes/no.
- Adjective *in attributive position* agrees with DP in case, yes/no.
- (-) Adjective *in attributive position* agrees with DP in person, yes/no).

B. Adjectives in predicative position

- Adjective *in predicative position* agrees with DP in gender, yes/no.
- Adjective *in predicative position* agrees with DP in number, yes/no.
- Adjective *in predicative position* agrees with DP in definiteness, yes/no.
- Adjective *in predicative position* agrees with DP in case, yes/no.
- (-) Adjective *in predicative position* agrees with DP in person, yes/no).

3 Learning:

- Language-specific inflection

³² We have not included all universals that are relevant in a broad sense, for example, the universal that would tell the child that a linguistic class of Adjectives exists. There are other relevant more general universals, but in this diagram we've focussed on universals that relate specifically to the phenomenon that's studied.

Once the child has identified nouns, adjectives, NPs, APs and DP, the universals in (1) will help the child learn this phenomenon by alerting it to the possibility of adjective-noun agreement. The parameters in (2) tell the child to investigate first of all, whether or not there is adjective-noun agreement (2.1). If this is the case, the child should consider (2.2) whether agreement is head-driven (an overt marker of agreement appears on the adjective) or dependent-driven (an overt marker of agreement appears on the noun). If agreement is found to be head-driven, UG helps the child by specifying that it should consider specifically **whether or not** the adjective agrees with the DP depending on its syntactic configuration and in gender, number, case, person and definiteness (2.3).³³ In order to do all this the child needs to learn, in a process of “real learning”, precisely **in what way** adjective agrees with DP with regard to gender, number, definiteness, person and case. UG cannot provide knowledge of endings or inflections, because these are language-specific. Once the child has found out what the system is, it can fix these parameters at their appropriate value (i.e. appropriate to the language which the child is born into).

Following current accounts of parameter setting, we assume that there is no default setting of these parameters, but children are free to choose either value of any parameter.³⁴ In section 1.3 it was discussed that children from an early age on correctly make a difference between adjectives in attributive and predicative position in their productions: predicative adjectives take their bare form (which is adult-like), but attributive adjectives consequently have a schwa ending (which is not adult-like). Thus the acquisition data suggests that children early on, in a learning stage we dub Stage 1, set parameter 2.1A to “yes” and 2.2A to “head-driven”, for they seem to have an idea that there is some system of adjective-noun agreement. We also assume the child has correctly set the parameters in 2.3B to “no”, but has mis-set all parameters in 2.3A to “no”, because it has no evidence that it is otherwise: definiteness or plurality *on their own* do not influence the inflection of the adjective, and tokens of bare adjectives in attributive DPs are comparatively low.³⁵ Finally, the rules they have learnt are represented under 3.

³³ Adjective agreement with the person features of noun were put between brackets, because this type of agreement is notoriously absent from head-driven agreement.

³⁴ Hypothetically, there are two possibilities: either the parameters in (2) are set in a default setting or they are not fixed at all (cf. Meisel 1995:15). Thornton (2008:137) mentions that ‘on current accounts of parameter setting, the null hypothesis is that children are free to choose either value of any parameter that is part of Universal Grammar.’ If we would assume a default setting, however, it should be that there is no adjective-noun agreement, because that is the more parsimonious account.

³⁵ Recent work in the Principles and Parameters-paradigm uses analyses in terms of setting, mis-setting and re-setting of parameters. For example, Thornton (2008:109-110): “some children may initially mis-set the why-

Stage 1

1. Universals:

- Linguistic elements may agree with other linguistic elements, in which one or both item(s) carry markers of that agreement.
- Adjectives and DPs may agree in the features of gender, number, definiteness, case, person.
- Rules of agreement may differ according to the syntactic configuration of adjective and noun relative to one another.

2. Parameters:

2.1 There is adjective-noun agreement.

2.2 Adjective-noun agreement is head-driven.

2.3 The agreement is of the following type:

A. Adjectives in attributive position

- Adjective *in attributive position* agrees with DP in gender: no.
- Adjective *in attributive position* agrees with DP in number: no.
- Adjective *in attributive position* agrees with DP in definiteness: no.
- Adjective *in attributive position* agrees with DP in case: no.
- (-) Adjective *in attributive position* agrees with DP in person: no.)

B. Adjectives in predicative position

- Adjective *in predicative position* agrees with DP in gender: no.
- Adjective *in predicative position* agrees with DP in number: no.
- Adjective *in predicative position* agrees with DP in definiteness: no.
- Adjective *in predicative position* agrees with DP in case: no.
- (-) Adjective *in predicative position* agrees with DP in person: no.)

3. Learning

- Adjectives in attributive position end in schwa.

- Adjectives in predicative position have a bare ending.

Counterevidence occurs in the child's linguistic input (some attributive adjectives have a bare ending) but this does not immediately cause the child to reset parameters in 2.3A. At some point, though, the child realises that *indefinite, singular and neuter* DPs have an adjective with a bare

parameter ...[then follows] parameter-resetting, in response to a mismatch between input and the child's initial parameter value"; Hyams (2008: 194): "Parameter theory allows for the possibility that the child may go through a "stage" during which a particular parameter is "misset"; that is to say, it has a setting that is distinct from the value assumed in the adult language."

ending. This triggers resetting of the definiteness, number and gender parameters 2.3A to ‘yes’ and the rules under 3 to be revised.³⁶

Stage 2

1 Universals:

- Linguistic elements may agree with other linguistic elements, in which one or both item(s) carry over markers of that agreement.
- Adjectives and NPs may agree in features: gender, number, definiteness, case, person.
- Rules of agreement may differ according to the syntactic configuration of adjective and noun relative to one another.

2 Parameters:

2.1 There is adjective-noun agreement: yes

2.2 Adjective-noun agreement is head-driven

2.3 The agreement is of the following type:

A. Adjectives in attributive position

- Adjective *in attributive position* agrees with DP in gender: yes
- Adjective *in attributive position* agrees with DP in number: yes
- Adjective *in attributive position* agrees with DP in definiteness: yes
- Adjective *in attributive position* agrees with DP in case: no
- (-) Adjective *in attributive position* agrees with DP in person: no)

B. Adjectives in predicative position

- Adjective *in predicative position* agrees with DP in gender: no
- Adjective *in predicative position* agrees with DP in number: no
- Adjective *in predicative position* agrees with DP in definiteness: no
- Adjective *in predicative position* agrees with DP in case: no
- (-) Adjective *in attributive position* agrees with DP in person: no)

(3) Learning

- Adjectives in attributive position end in schwa, except in sg, neuter and indefinite DPS, which have a bare ending.
- Adjectives in predicative position have a bare ending.

³⁶ The theory itself makes no precise predictions about the quantity and quality of evidence that is needed to trigger resetting parameters (cf. Meisel 1995:20 for a discussion).

In this scenario we predict a sharp transition: we expect a rapid development from being clueless and not being productive with the rule to knowing the rule correctly. This is the case, because the realisation that the parameters were misset only happens when the child realises how the system *does* work. Once the mis-set parameters are acknowledged and reset, we expect a quick transition to an adult-like grammar. This view was represented in Table 1 in the introduction.³⁷

We are aware that there are also views within UG that make room for gradual learning. Thornton (2008:143) mentions the statistical learning approach by Yang (2002); the gradual learning algorithm (Boersma 1997; 1998) is another. It is also possible that this rule is not learnt with the aid of any innate principles and parameters at all, but is a case of “real learning”.³⁸ Various versions of ‘generativist views’ make such different predictions, that it is impossible to treat them in a monolithic way. In this thesis, we will assume the parameter-setting view that was set out in this section. Should the experimental results point to a gradual, piecemeal learning process, the data can be interpreted in three ways. One option is that Tomasello is right about his view of language acquisition. Another possibility is that Tomasello is wrong and UG does exist, but the parameter-setting account is not right and we should prefer analyses that formalize gradual learning. A third alternative is that UG does exist and the parameter-setting account is also correct, but UG does not apply to morphology. The second and third account raise questions of parsimoniousness: if a non-innateness account (like Tomasello’s) predicts the same as an innateness account, is not the more parsimonious model (i.e. Tomasello) to be preferred? We will return to this in the general conclusion.

1.5 Testing Tomasello’s predictions by means of the ER

As was explained in the General Introduction, each of the two experiments in the present study consisted of a pretest and a main test. The pretest, which consisted of four elicited imitations/productions of DPs with high frequent nouns and adjectives, tested the children on their knowledge of the ER. The aim of the pretest was to divide children into three different learning stages: the Clueless (who have not begun to learn the ER), the Learners, and the Experts (who answer all trials concerning the ER correctly). The Learner population was

³⁷ Our view is similar to that of Thornton (2008:141), who argues, in an analysis of a different linguistic phenomenon: ‘The parameter setting account expects a rapid transition to the adult grammar, once the child acknowledges the mis-set parameter and change is initiated. In the absence of other variables, ideally, the relevant property associated with the parameter should change rapidly from 0% to 100%.’

³⁸ Indeed, Hyams (2008) has argued that *some* processes of morphological acquisition in *some* languages belong to the linguistic core (i.e. parameter-setting) and other processes belong to the periphery (i.e. real learning).

defined as those who sometimes applied the ER in obligatory contexts but at other times did not: in other words, they sometimes got it right, and sometimes got it wrong.

The aim of the main test was to examine whether children in different learning stages would apply the ER productively to a novel DP (in this case, one containing a nonce adjective). Tomasello's views were interpreted as predicting that at least a significant subset of Learners, and perhaps of some of the Experts, would not use the ER productively, because they were in the IBC learning stage or were only just beginning to form a more abstract representation of this rule (cf. Table 1). It was conjectured that Learners in the IBC stage are a subset of the total groups of Learners, and perhaps of the Experts.

1.6 Summary

The first goal of this chapter was to provide a deeper insight into Tomasello's view of language acquisition. Various experiments were discussed, which according to Tomasello testify to the existence of a gradual and piecemeal learning process. Furthermore, the facts concerning Dutch grammatical gender and the ER were laid out in detail. Finally, the experimental hypothesis of the two experiments in the present study was established. Now we have a suitable background to move on to the experimental data in the next two chapters.

2. The first experiment

2.1 Introduction

This chapter presents the first experiment that was carried out to test Tomasello's predictions regarding the productivity of children in various stages of acquiring the ER.

2.2 Participants

78 Dutch-speaking pre-school and primary school children participated in this study.³⁹ The age range was between 4;1 and 7;11 years old (average age 6;3 years). There were 42 boys and 36 girls.⁴⁰ The subjects were all pupils of two primary schools in Dordrecht, a city 30 kilometers to the south of Rotterdam, in the Western part of the Netherlands ('Randstad').

2.3 Design

2.3.1 General

The children were tested on a pretest and a main test, which were run successively in the same session. Both the pretest and main test used the "picture-story guessing game" paradigm. This is a version of the Truth Value Judgment task in which a puppet makes guesses about pictures he cannot see while the child, who can see the pictures, judges the correctness of the puppet's guesses. Judging the correctness of the puppet's guesses was the child's 'official' task.

The data for this study consisted of elicited imitations triggered by clarification questions. These were posed by the puppet before he attempted to make a statement for the children to judge. The child was prompted to answer these questions. Elicited imitation is a valid means of testing grammatical knowledge: a large body of research shows that in order for a child to imitate a structure, this structure must be generated by the child's grammatical competence (e.g. Bloom, Hood and Lightbown 1974). Moreover, the task was not a standard imitation task. The puppet's questions were deliberately designed to overload working memory: the puppet would propose two or sometimes three solutions and then conclude with an additional comment about how confused he was ('Wait a minute, was it X? Or was it Y? Or Z?')

³⁹ Two additional children participated but were excluded for failing to master the experimental task.

⁴⁰ Eight children were successive bilinguals: three had Surinam Dutch and the Surinam Creole Sranan Tongo as their first mother tongues. The LA1 of the other five bilinguals was Czech, Turkish, French, Arabic or Filipino, respectively. Only the two Surinam children ended up in the target group of the study, i.e. among the learners.

I'm really lost!'). Since the question was too long to keep in working memory, and there was the additional task of having to choose between the alternatives, the child was forced to reconstruct the correct answer by looking at the picture. This procedure eliminated the possibility of parroting and ensured that the child actually parsed the structure. The various alternatives offered in the puppet's clarification questions served another purpose: they encouraged the child to respond using a full DP, which was the most natural response. That is, the clarification questions discouraged laconic responses. As we will see, in fact this strategy did not work as well as hoped, but it did yield some useful data.

The format of the experiment, elicited imitation embedded in a truth value judgment task, was chosen to make the whole procedure more natural. By means of this design, attention was drawn to the pictures, to the story and to the puppet, but not to the target utterance. It was quite plausible for the puppet to ask clarification questions, for he could not see the pictures. Moreover, there are additional advantages to having a puppet in the experiment, as is well documented in child language acquisition studies (cf. McDaniel, McKee and Smith Cairns 1996, chapter 4). Among other things, the child feels less as if he/she is being tested, for it is rather the puppet's abilities that are under investigation. Furthermore, the child can communicate with the puppet, instead of with the experimenter directly. Finally, the presence of the puppet introduced a humorous element into this experiment, for the puppet was obviously quite slow in understanding, to the amusement of many of the children.

There were two sets of materials of the pretest and the main test. The necessity for a double set of materials arose mainly out of the choice of method (testing with nonce adjectives). This being a pilot study, it was uncertain whether children would pick up the meaning of a novel adjective in just one session, when there of necessity had been only limited attention to this nonce adjective. As a control for possible unforeseen phonological factors, two different nonce adjectives were made up, each with quite different meanings. It was crucial that the subjects would have acquired the nonce word by the end of the pretest, for this study had a design in which there was only one main test trial. Thus, the subjects only got one opportunity to show knowledge of the ER with a novel adjective. The advantage of that was that with only one trial there is no possibility of learning effects (carry-over effects).

2.3.2 Design of pretest

The goal of the pretest was to divide the children into different learning stages. Each subject received four different trials of the pretest experimental condition, each occurring in a different picture-story. The first group, which was dubbed ‘Clueless children’, apparently had not begun to learn the ER: this group scored 0% correct. The second group of children, the ‘Experts’, scored 100% correct on the pretest and was evidently in a relatively advanced stage of acquiring this rule. The children this study focuses on mostly were those whose average performance on the four trials of the pretest condition was greater than 0% but less than 100%: these are called the ‘Learners’ from now on. The pretest had one between-subject independent variable: age. An independent variable that was left to vary freely was gender. The dependent variable was the ability to provide correct adjectival inflection with high-frequent neuter nouns. Henceforward the pretest experimental trials will be referred to as the ER Pretest Condition (**EPC**) 1,2,3 and 4.

2.3.3 Design of test

The ability of subjects in different learning stages, but in particular the Learners’ and Experts’ ability to correctly apply the ER to a DP containing a novel adjective-noun combination was investigated in the main test. In order to ensure the novelty of the combination, a between-subjects design was used whereby the subjects were divided into two groups, each of which was taught a different nonce adjective. The elicited imitation in the main test was a DP containing one of these nonce adjectives. The two nonce adjectives were quite different from one another morphologically and semantically. There was one monosyllabic adjective (“zork”, a special colour indicated in the pictures with a multicoloured glitter-glue) and one bisyllabic adjective (“magoet”, which we defined as referring to individuals in the possession of strong magical powers). Both nonce adjectives are phonotactically grammatical in Dutch. In addition, the iambic structure of the bisyllabic “magoet” sounds natural in Dutch. The independent variables of gender and age were left to vary freely. The dependent variable was the adult-like inflection of a nonce adjective with a known singular neuter noun preceded by the indefinite article. Henceforward, the main test experimental trial will be referred to as the Singular Test Condition (**STC**). Furthermore, during the test it was checked whether children know the meaning of the nonce adjective in their materials set. This experimental trial will be referred to as the Adjective Test Condition (**ATC**).

2.4 Procedure

The procedure was as follows: on the first day of testing, two experimenters (both native speakers of Dutch) introduced themselves and the puppet during a group session. The experimenters explained that the puppet thought he was a very good guesser, which was established by means of a game. The children were invited to each come and play a guessing game with the puppet individually.

In the individual session, one of the experimenters, the storyteller, was sitting on one end of the table with the child. The storyteller read stories to the child, while showing pictures of the key moments in the story. The story and the pictures were printed on opposite pages of a large book. The other experimenter spoke for and manipulated the puppet and sat on the other end of the table. This experimenter was also responsible for noting the child's responses on an answer sheet that had been prepared beforehand. The answer sheet also contained the puppet's lines.

At certain points in the story, the storyteller invited the puppet to make a guess about the pictures, which, crucially, the puppet alone could not see. The child's official task was to tell the puppet whether his guesses were correct or not. In addition to these invited guesses, several times the puppet spontaneously interrupted the story with clarification questions about characters or events. The fact that he could not see the pictures made his interruptions (as well as his frequent incorrect guesses) natural. The child was invited to 'help' the puppet in these cases and answer his questions. These elicited imitations were the actual experimental targets (**EPC 1-4**). In all cases in which a reaction from the child was expected, the storyteller avoided eye contact with the child, to avoid any involuntary priming of the correct answer.

2.5 Materials

As was mentioned above, there were two sets of materials, consisting of four different short stories per set. The stories were about various topics of interest to children, like the circus, a new bicycle, princes catching a nasty troll, etc.

2.5.1 Warm-up

The warm-up session of this experiment was very brief. The story teller explained to the child that the puppet was going to make guesses and that he/she should say whether these were correct or not. In addition, it was explained that if a particular story was difficult for the puppet to understand (because he could not see the pictures) the child was allowed to help the puppet by answering any questions he had.

2.5.2 Pretest

The pretest consisted of three stories. As was explained, its goal was to divide children into three different groups, each consisting of children at a certain developmental stage in the LA1 of ER. In addition, the meaning of the two nonce adjectives was taught in the pretest.

Each set of materials included four trials of **EPC**, all involving an elicited imitation task. The nouns that were used were all diminutives. In materials set one, *paardje* ‘little horse’ (two trials), *mandje* ‘little basket’ and *mutje* ‘little cap’ were used; materials set two had *mandje* ‘little basket’, *paardje* ‘little horse’, *zadeltje* ‘little seat’ and *shirtje* ‘little shirt’. As was explained above, these elicited imitations were triggered by clarification questions posed by the puppet. For example, in one trial of **EPC** the picture-story revolved around princes and their pets. The picture used for this is shown in Figure 1 (the actual picture was in color).



Figure 1: picture used in trial of EPC

The storyteller identified each of the princes by name and mentioned what kind of pets each had, concluding with the smallest prince, who had a little horse with yellow dots. At this point the puppet interrupted with a clarification question. The text of this part of the experiment was as follows:

storyteller: *En kleine Mark had een klein paardje met gele stippen.*
and little Mark had a small horse-dim.⁴¹ with yellow dots
'And little Mark had a little horse with yellow dots.'

puppet: *Wacht even. Was dat nu⁴² een klein paardje*
wait briefly was that now a small horse-dim.
'Wait a minute ... was that a small horse'

met gele stippen of een geel paardje met kleine stippen?
with yellow dots or a yellow horse-dim. with small dots
'with yellow dots or rather a yellow horse with small dots?'

Ik ben even⁴³ in de war.
I am briefly in the jumble
'I'm a bit confused.'

child (target): *een klein paardje met gele stippen*
a small horse-dim. with yellow dots
'a small horse with yellow dots'

The puppet's question was meant to elicit the response 'a small horse with yellow dots' from the child. As was explained in the first chapter, an answer in which the ER was used correctly was one in which the child said *een klein paardje* 'a small horse' with a bare adjective. This is because this DP is indefinite, singular and neuter: recall that all Dutch singular diminutives are of the neuter gender. However, if the child did not apply the ER, she would use the default form and say *een klein-e paardje* 'a small horse', with a schwa ending. If the child answered in a different format, for example *klein en geel* 'small and yellow' this was coded as avoidance. All four pretest items had this format,⁴⁴ using different adjectives and nouns. The nouns that were chosen were all highly frequent nouns in Dutch, which are among the first to appear in Dutch child language. The diminutive form of all these nouns, indicated in Dutch with the diminutive suffix {-je}

⁴¹ dim. means 'diminutive'.

⁴² *nu/nou* 'now' are discourse particles, in this case indicating uncertainty on the part of the speaker.

⁴³ *even* 'briefly' is a particle, which in this case serves to downplay the seriousness of the puppet's cluelessness.

⁴⁴ In some of the trials, an third alternative was added to the puppet's question, for example 'was it a green basket or a red basket ... or was it rather a green bucket?' As was explained in 2.3.1, this was done in an attempt to discourage laconic responses such as 'the green one' or 'green'.

(/jə/), was used in pretest and test. This was done to ensure knowledge of the neuter gender of the nouns that were used and to circumvent having to teach children the grammatical gender of the used nouns first.

The pretest also served to introduce the nonce adjectives “magoet” or “zork”, used in the two sets of materials, respectively. The nonce adjective was taught to the children once. For example, in materials set 1, the two-syllable nonce adjective “magoet” was introduced in the second story. The story-teller explained that one of the characters was *een magoete kikker* (‘a magoet frog’), and after the puppet had interrupted the story to ask what on earth a “magoet” frog was, the story-teller explained that “magoet” means having a lot of magical power, being able to cast strong magical spells. In that story, the “magoet” frog transformed a small carrot into a table full of food, exemplifying the meaning of the nonce word. A monosyllabic nonce adjective, “zork”, was used in the other set of materials. It had a different meaning: “zork” was defined as referring to a special colour, indicated in the pictures with a greenish glitter-glue.

2.5.3 The main test

The purpose of the main test was to see whether children in the three learning stages, but especially the Learners, applied the ER to a DP containing the nonce adjective they had just learned in the pretest. In the **STC**, a singular indefinite DP containing one of the nonce adjectives was elicited, using the same techniques as in the pretest. In addition, in the **ATC** it was checked whether the subjects really knew the meaning of the word “zork” or “magoet”.

2.5.3.1 Nonce adjective check

At the beginning of the main test (before **STC**) the **ATC** trial served to confirm that children remembered the meaning of the nonce adjective. The meaning of “magoet” having been established in the second picture story, this nonce adjective was re-introduced in the fourth picture-story revolving around *een magoet paardje* ‘a magoet horse’. The puppet interrupted this story right at the start, asking: ‘wait a minute ... what did that word mean again?’ and an explanation from the child was elicited. In the other materials set, checking subjects’ knowledge of the meaning of the nonce adjective “zork” proceeded in a very similar way.

2.5.3.2 The main test

Each set of materials contained one trial of the **STC**. In this trial, the imitation of an indefinite singular DP containing the nonce adjective was elicited. As was explained, the test was deliberately designed to include only one trial so as to eliminate any possibility of carry-over

effects. The **STC** occurred at the end of the fourth story. For example, in the first materials set, the storyteller showed a picture of and told the child about a troll holding a big club and a “magoet” horse.

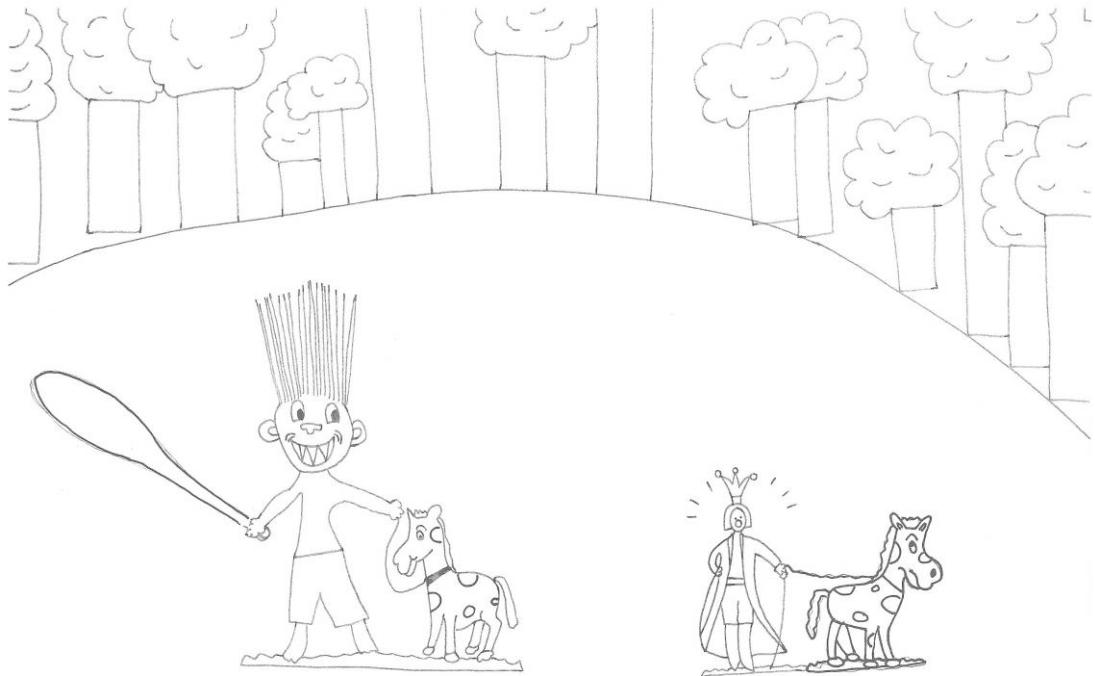


Figure 2: Picture used in STC

This troll (in the picture on the left) was being challenged by the little prince and his magoet horse (in the picture on the right) and in his turn the troll threatened his royal adversary:

storyteller: “I have a little surprise for you”, said the troll. And he drew from his sack a big club and a small horse. “With this big club I will squash you as flat as a penny,” said the troll. “And see this little horse? This horse is also magoet and I will use it to defeat yours.”

At this point, the puppet interrupted the story with a clarification question:

puppet: *Wacht even ... die trol. Had die nu een grote knots en een magoet paardje,*
wait briefly that troll had that now a big club and a magoet horse-dim
'Wait a minute. Did the troll have a big club and a magoet horse'

of was het nu een magoete knots en een groot paardje?
or was it now a magoet club and a big horse-dim
'or was it rather a magoet club and a big horse?

Ik weet het even niet meer.
I know it briefly not more.
'I've forgotten.'

child (target): *een grote knots en een magoet paardje*
 a big club and a magoet horse-dim
 'a big club and a magoet horse'

The puppet's question was designed to elicit from the child the response *een grote knots en een magoet paardje* 'a big club and a magoet horse' with a bare adjective. If the child did not apply the ER, it would respond *een magoet-e paardje* 'a magoet horse' with a schwa ending on the adjective. In the second materials set, the test was done with the adjective "zork" and the noun *shirtje* 'T-shirt' in a similar way. Note that the puppet modelled the correct response, however, as was argued in section 2.3.1, the experiment was designed so as to rule out parroting.

2.5.4 Filler items and support of the ER

Both sets of materials contained filler items (16 for the first set, and 14 for the second set). These filler items were attention-control items, consisting of guesses of the puppet about the story. The child had to decide whether these guesses were true or false. For the purpose of this study, the subjects' truth-value judgments about these guesses indicated general levels of attention.⁴⁵ Finally, both sets of stories contained subtle modelling or priming of the default and blocking rule for Dutch adjectival inflection. In each set of materials, there were 13 or 14 examples of the indefinite article + adjective + a singular common noun, and also 13 or 14 examples of the indefinite article + adjective + a singular neuter noun.

For example, one filler item of the story was introduced with the following picture and story and the child was asked to judge the puppet's guess:

⁴⁵ Some of these filler items were used as the test items in the experiments of others who helped me carry out this experiment.



Figure 3: Picture used in one of the filler items

story-teller: One of the circus animals is the clown of the circus. He had to make up his face. Meanwhile the tiger practiced his dances and the elephant practiced his ball tricks. Okay, Drakie. Guess what was happening here.

puppet: *Even kijken. Een mooi wit paardje, een dikke tijger, en een kleine olifant.* I know it already. The horse-dim makes him up.

Het paardje maakt hem op.
briefly look a pretty white horse-dim a fat tiger and a small
'Let's see. A good-looking white horse, a fat tiger, and a small'

'elephant. I know: The horse was putting make-up on him.'

child (target): (incorrect)⁴⁶

⁴⁶ The purpose of this puppet guess was to investigate the children's knowledge of the distribution of the Dutch personal pronoun *hem* 'him'. In this trial, the puppet used this pronoun as the object of *opmaken* 'to put make-up on someone', but it is adult-ungrammatical in the direct reflexive context of Figure 3 (the horse is putting make-up on himself). This attention control item was used as the test item in an (unpublished) experiment on Principles A and B.

2.6 Results

2.6.1 Dividing the subjects into groups on the basis of EPC

78 children participated in the pre-test. Three subjects were excluded for failing to give any response. The remaining 75 subjects were divided into three groups (Clueless children, Learners and Experts) on the basis of their performance on the **EPC**, as is shown in Table 2.

| Group | N | Percentage of children in group |
|--------------|----|---------------------------------|
| Clueless | 6 | 8% |
| Learners | 29 | 38% |
| Experts | 25 | 33% |
| Excluded | 15 | 20% |
| <i>Total</i> | 75 | 100% |

Table 2: Number and frequency of subjects in different learning stages

The 25 Experts each used ER correctly on all trials of the EPC. The six children of the Clueless group never did; apparently they had not begun to learn the adjective rule. Twenty-nine children produced a grammatical DP under EPC at least once but not on all trials. These children were classified as the Learners.

A policy regarding the frequent avoidance responses was needed for the purpose of calculating scores in the pretest. If a child produced the correct form (minus schwa) on three trials and gave an avoidance response for one trial, the score was computed as 3/3 : 100%. If there were two avoidance answers, the child was excluded from the study on the basis of insufficient data.⁴⁷ Also, if there were three avoidance answers and one trial in which ER was correctly applied, the child was excluded from the study on the basis of insufficient data. If there were three avoidance answers, and one trial in which ER was not applied, that child was considered Clueless. If there were four avoidance answers, the child was also considered Clueless.

Fifteen subjects were lost on the basis of these exclusion criteria. Obviously, these decisions influence the results. Arguably, subjects who avoided one out of four trials and performed correctly in the three other trials could also have been classified as Learners. Since this study focuses on the Learners mostly it was decided to adopt a strict inclusion criterion for the Learners Group. This decision probably reduced the number of children categorized as Learners. The low percentage of Clueless children may also in part be due to the exclusion criteria.

⁴⁷ However, if one of the other answers was correct and one incorrect, such a child was considered a Learner.

In the introduction, it was affirmed that this study can be considered a pseudo-longitudinal study. One of the aims was to duplicate the results of Weerman, Bisschop and Punt (2006), who found that there is a very long acquisition process of the ER. Table 3 shows that there are indeed children of each learning stage in each age group.

| Age | N | Clueless | Learners | Experts | Excluded |
|--------------|----------|-----------------|-----------------|----------------|-----------------|
| 4 | 9 | 2 (22%) | 3 (33%) | 2 (22%) | 2 (22%) |
| 5 | 22 | 1 (5%) | 7 (32%) | 9 (41%) | 5 (23%) |
| 6 | 24 | 1 (4%) | 13 (54%) | 8 (33,3%) | 1 (4%) |
| 7 | 21 | 2 (10%) | 6 (29%) | 6 (29%) | 7 (33%) |
| <i>Total</i> | 76 | 6 | 29 | 25 | 15 |

Table 3: Distribution according to age of experimental groups

The data in this experiment and in the next experiment will not be further analyzed on the basis of age. The number of trials in the two experiments described in this thesis was too low to yield any statistically solid data.⁴⁸

2.6.2 General

Table 4 compares a number of general characteristics for the group of all children and the learners. The average age of the sample as a whole was 6;3 whereas the average age of Learners was 6;5. The age range of the group of Learners was broad (4;10-7;7 years of age) and almost completely overlapping the age range of children who did the pretest (4;1-7;11). The columns FF% and FT% give the average percentage of true puppet guesses that were correctly judged as true (FT) and false guesses correctly judged as false (FF). These columns are general indicators of attention. We can see that the attention levels did not differ much between the groups and were around 80% for each group for the true and false condition. Finally, the column ‘ATC correct’ gives the percentage of children who understood the meaning of the nonsense word. This percentage appears a bit lower for learners (64%) than for all children (70%), but this is not a statistically relevant contrast.

| Group | # Boys | Average age | Age range | FF% | FT% | ATC correct |
|--------------|---------------|--------------------|------------------|------------|------------|--------------------|
| All children | 42 | 6;3 | 4;1 – 7;11 | 78% | 88% | 70% |
| Learners | 6 | 6;5 | 4;10 – 7;7 | 86% | 82% | 64% |

Table 4: General characteristics of different groups

⁴⁸ An attempt at such an analysis showed that indeed it was not possible to determine any clear tendencies in the data, which is probably due to the low number of trials.

2.6.3 Main test scores of each group

2.6.3.1 ATC

As Table 4 shows, 30% of the children and 36% percent of the Learners failed the nonce adjective test, i.e. they were unable to recall the meaning of *zork* or *magoet*. An analysis of subjects' answers under STC shows that a minority of these children (six) had actually acquired a different nonce adjective or interpreted it as a noun. Three subjects answer *een goet paardje* 'a "goet" horse'. Hence, they cut off the first syllable of the nonce adjective *magoet*. The second syllable of this word *goet* /gu:t/ is the phonetic equivalent of the highly common Dutch word *goed* 'good'. Thus these children may have interpreted the nonce adjective *magoet* as the adjective *goed* 'good'. One other child answered *magiet*, a non-existing Dutch word, as is shown in (21):

- (21) *een klein paard, een magiet*
 a small horse a "magiet"
 'a small horse, a "magiet"'

It is unclear whether *magiet* was intended as an adjective or as a noun. Furthermore, one child seemed to have interpreted *magoet* as a noun, as (22) shows:

- (22) *een grote magoet en een grote knots*
 a big "magoet" and a big club
 'a big magoet and a big club'

As regards *zork* one child produced *een short shirtje* 'a "short" T-shirt', but *short* is not an existing word in Dutch.

It seems possible that as many as one third of the learners may have not grasped the intended meaning (or syntactic category) of "zork" or "magoet". Perhaps these children should be excluded from the experiment. It would be interesting to analyse the data without those children who failed the ATC. However for reasons of time such an analysis was not carried out in this study.

2.6.3.2 STC

2.6.3.2.1 Performance on STC for the two materials sets

Next, the performance of each group on the test condition was computed. The responses were divided into three response categories: 1. correct 2. incorrect 3. avoid. Table 5 shows the performance of each group, both pooled and differentiated for set 1 (with adjective "magoet") and set 2 (with adjective "zork").

| Groups | Correct, -ə | | | Incorrect, +ə | | | Avoid | | |
|----------|-------------|-------|-----------|---------------|-------|----------|-------|-------|-----------|
| | set 1 | set 2 | pool ed | set 1 | set 2 | pool ed | set 1 | set 2 | pool ed |
| Clueless | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 4 | 6 |
| Learners | 7 | 11 | 18 | 0 | 0 | 0 | 5 | 6 | 11 |
| Experts | 7 | 9 | 16 | 0 | 1 | 1 | 7 | 2 | 9 |

Table 5: Performance on STC for the 2 materials sets

Out of 33 included subjects who received the first data set with nonce adjective “magoet”, 12 were categorized as Learners. Of these 12 children, seven produced the correct *een magoet paardje* ‘a magoet horse’, while five of the children gave an avoidance response. None of these children produced the ungrammatical *een magoet-e paardje* ‘a magoet horse’. 19 children had been categorized as Experts in the pretest. In this group, seven children produced the correct form, while another seven gave an avoidance response. None of these children produced the ungrammatical form *een magoet-e paardje*. Finally, two children were categorized as Clueless. Both children gave an avoidance response.

34 children were tested with the second data set containing the nonce adjective “zork”. 17 were categorized as Learners. 11 Learners produced the correct *een zork shirtje* ‘a zork T-shirt’ while six children gave an avoidance response. None of these children produced the ungrammatical *een zork-e shirtje*, with the schwa ending on the adjective. Furthermore, there were 12 Experts of whom nine produced the correct form, while two gave an avoidance response. One child produced the ungrammatical *een zork-e shirtje*. Finally, all Clueless children gave an avoidance response.

2.6.3.2.2 Effect of set, gender or school class

There was no significant effect on performance of materials set nor of gender or school class. With respect to the test trial, Kruskal-Wallis tests with H adjusted for ties show no significant group contrasts between set 1 and set 2 for the sample as a whole ($n = 76$, $p \leq 0.7429$) nor for the learners ($n = 37$, $p \leq 0.3566$), and also no significant effects of gender or school class, neither for the sample as a whole ($p \leq 0.5289$ and $p \leq 0.1105$, respectively), nor for the learners ($p \leq 0.2519$ and $p \leq 0.6900$, respectively). In short, the uncontrolled independent variables of set, gender, and school class had no noteworthy effect on performance in the test and can thus be ignored. The absence of any significant materials set effect also shows that the phonetic difference between “magoet” and “zork” had no effect on performance. With respect to the amount of correct responses in the pretest and the amount of avoidance, ANOVAs showed there to be no significant effects of set for the sample as a whole ($p \leq 0.0934$ and $p \leq 0.4880$,

respectively). With respect to the meaning of the nonce adjective, Kruskal-Wallis tests with adjusted H also showed no significant effect of set for the sample as a whole ($p \leq 0.7679$). In other words, the children in sets 1 and 2 did not differ significantly with respect to how often they showed knowledge of the adjective rule under the pretest, nor with respect to how often they avoided using the targeted form under the pretest, nor with respect to how well they understood the meaning of the nonce word. Thus, set 1 and set 2 can safely be pooled together in the interpretation of the results of this study.

2.6.3.2.3 Collapsing the two sets of materials

Table 6 below shows the results for STC again, but now the two materials sets have been collapsed. None of the children that had been categorized as Clueless gave the correct answer in the STC, but all 6 children avoided this trial. As for the Learners, the majority (18 children, or 62% of the group) were able to apply the ER productively in the STC. All 11 remaining children in this category (38%) avoided the STC. No children supplied the default form with a schwa ending. Finally, the Experts performed very similarly to the Learners. 16 or 64% of them applied the ER correctly to the novel DP in the STC. 36% or nine children avoided STC. One child used the default form of the adjective with a schwa ending.

| Groups | N | Correct, -ə | Incorrect, +ə | Avoid |
|---------------|----------|--------------------|----------------------|--------------|
| Clueless | 6 | 0 (0%) | 0 (0%) | 6 (100%) |
| Learners | 29 | 18 (62%) | 0 (0%) | 11 (38%) |
| Experts | 25 | 16 (64%) | 1 (4%) | 9 (36%) |
| <i>Total</i> | 60 | 34 (57%) | 1 (2%) | 26 (43%) |

Table 6: Performance on STC with the two materials sets collapsed

2.6.4 Child productions

The data was probed for evidence regarding two other matters. First of all, the question of whether children overgeneralized the ER was examined. Secondly, responses were scrutinized for any evidence of parroting.

2.6.4.1 Overgeneralizing the ER

Did any children overgeneralize ER? This was possible, since the target elicited imitations in EPC and STC typically contained an instance of the default adjective rule (AIR) and an instance of the ER. For example, (23) and (24) below were child target responses in two trials of the EPC. The instances of the default rule have been underlined:

- (23) *een wit paardje met een lange zwarte staart*
 a white horse-dim with a long black tail
 ‘a white horse with a long black tail’

- (24) *een grijze draak met een blauw shirtje*
 a grey dragon with a blue shirt-dim
 ‘a grey dragon with a blue shirt’

Since in Dutch *staart* ‘tail’ and *draak* ‘dragon’ are common gender nouns, the default (+schwa) form of the adjective applies, thus, *een lang-e zwarte-e staart* ‘a long black tail’ or *een grijz-e draak* ‘a grey dragon’. In section 1.3.3 it was argued that the adjective form plus schwa suffix is the default. The ER is a rule relevant only for a small subset of Dutch DPs and is acquired later. This means that one would not expect major overgeneralizing of the ER. This expectation was borne out: overgeneralizations of the non-default form were rare. Only two cases were attested. In the first case, a subject in the learner group described a white horse as having

- (25) *een wit vacht*
 a white fur
 ‘a white fur’

Since fur is a common gender noun, the correct form would have been

- (26) *een witte vacht*⁴⁹
 a white fur
 ‘a white fur’

In the other case, a child also in the learner group described a bicycle as

- (27) *een groen fiets*
 a green bicycle
 ‘a green bicycle’

Since *fiets* ‘bicycle’ is a common gender noun, again the default form of the adjective *groen-e* ‘green’ would have been correct. Note that both in the case of *fiets* ‘bicycle’ and in the case of *vacht* ‘fur’ the gender of these nouns in the mental grammar of these children was unknown, so we cannot be sure whether these are really overgeneralizations or correct applications of ER

⁴⁹ Doubling of the consonant before the schwa ending is an orthographic convention to indicate that the vowel /i/ is short.

based on a misperception of these nouns' grammatical gender. Thus, such overgeneralizations were virtually unattested in this study. This testifies to the asymmetry between the two rules and supports a view of the default status of the form with a schwa suffix. It was not investigated whether children overgeneralize the ER to plural cases. In a follow-up experiment, this would be a valuable addition.

2.6.4.2 No parroting, but parsing

In this subsection we consider whether any children might have parroted the puppet in the elicited imitation task. Although unlikely for theoretical reasons, this issue must be raised for completeness. In fact, many children produced forms in the pretest and test trials that deviated substantially from the forms in the puppet's questions. These responses constitute further support for the experimental prediction that the chosen design would overload working memory and in this way prevent any chance of parroting. What children said clearly showed that they had parsed the structure in the question and had generated their own answers, instead of parroting the puppet. Roughly, one can identify four main types of 'deviating' answers. Recall that the puppet usually asked about a DP consisting of two elements (an X with a Y) for example 'a small horse |with yellow dots' and both elements usually contained an attributive adjective. The division into types of deviating answers is based on these characteristics of the puppet's questions.

In a type 1 answer, the format of the puppet's question was adopted but with a small difference. For example, in (28b) a different attributive adjective was inserted, which had not been part of the original puppet's question, printed in (28a) below:

- (28a) *Wacht even. Dat huisdier van Mark, was dat een klein paardje*
wait briefly that pet of Mark was that a small horse-dim
'Wait a minute. Mark's pet, was it a small horse'

met gele stippen of een geel paardje met kleine stippen?
with yellow spots or a yellow horse with small spots
'with yellow spots, or a yellow horse with small spots?'

Ik kon het niet helemaal onthouden.
I could it not completely remember
'I don't quite remember.'

- (28b) *een blauw paardje met gele stippen*⁵⁰
 a blue horse with yellow dots
 ‘a blue horse with yellow dots’

In a type 2 answer, either the first or the second part was in the format of the puppet’s question, but the other part was periphrastic or contained a different lexeme, as illustrated in (29) and (30):

- (29) *Eerst heeft-ie ... een blauwe racht ... en gele stippen.*
 first has he a blue skin and yellow dots
 ‘First he has ... a blue skin ... and yellow dots.’
- (30) *Een lang paard met een witte huid en een lange zwarte staart.*
 a long horse with a white skin and a long black tail
 ‘A long horse with a white skin and a long black tail.’

A type 3 answer contained two parts but was periphrastic throughout or contained much different vocabulary, as in (31) and (32):

- (31) *Hij is paars en heeft iets van zork.*
 he is purple and has something of zork
 ‘It’s purple and zork-like.’
- (32) *Hij heeft een paars lijf en zijn shirtje is zork.*
 he has a purple body and his shirt-dim is zork
 ‘He has a purple body and his T-shirt is zork.’

Finally, a type 4 answer did not relate to the format or the vocabulary in the puppet’s question at all. This is exemplified in (33), a response to the question ‘Was it a purple dragon with a zork shirt, or a zork dragon with a purple shirt?’

- (33) *glitters*⁵¹
 glitters
 ‘glitters’

Another example of type 4 is (34), an answer to the question ‘Was it a white horse with a long black tail or a black horse with a long white tail, or a tiger with a long black tail?’:

⁵⁰ Indeed, many children reported that this was a blue horse rather than a small horse.

⁵¹ This obviously refers to the glitter-glue used to indicate the colour “zork”.

- (34) *Dat is lang en zwart ... en dun ... en wit.*
 That is long and black and thin and white
 ‘That is long ... and black ... and thin ... and white.’

These examples clearly demonstrate that there was no parroting in this experiment.

2.6.4.3 Avoidance

In this section we consider the high levels of avoidance under STC (cf. Table 6). Avoidance is hard to interpret, as it may be due to different causes. Unfamiliarity with the meaning of the nonce adjective is a potential cause. The child may also have forgotten the phonological content of the nonce word. Furthermore, personality and/or discourse factors may play a role. For example, shyness may cause a child to be unwilling to use the novel word, such as was asked for in the STC. Finally, a lack of competence with the ER, resulting in deliberate avoidance of the construction that was asked is another possibility.

Before turning to the data, we will review this last option (lack of competence), which may need some clarification. In first and second language research, the technical term ‘avoidance’ (henceforward Avoidance with a capital A) refers to a deliberate strategy of both first and second language learners, in which a speaker intentionally avoids a linguistic item (a grammatical structure, a phoneme or a word) which she finds difficult, and deliberately uses an easier or more familiar item. For example in SLA, at the grammatical level an article (a/an, the) may be left out of the utterance when the student suspects an article is necessary, and yet chooses to avoid using one rather than running the risk of selecting the wrong one. At the phonemic level, a typical example of avoidance is not using words which contain difficult to pronounce phonemes such as /z/ for Koreans (Carey 2009).

Avoidance has been studied to considerable extent by SLA researchers (cf. Gass and Selinger 2001:119-120),⁵² but it has also been shown that it is a strategy of first language learners. Clark (2003:112) explains that ‘children often appear to be selective in which words they try to pronounce, and hence, which they try to avoid, during the early stages of language production. These differences seem to reflect preferences for some sounds, and even for some word shapes, over others.’ This has been shown, for example, in studies by Ferguson and Farwell (1975) and by Schwartz and Leonard (1982).⁵³ While there has been much debate about

⁵² Cf. Schachter 1974, Kleinmann 1977, Laufer and Elaissón (1993).

⁵³ Schwartz and Leonard (1982) examined a group of one-year-olds with small vocabularies to determine the consonantal inventories and syllable structures for each child’s current words. They then constructed a set of new words (unfamiliar forms), corresponding to unfamiliar referent-objects and -actions, for each child. Half of the

the causes for avoidance in second language research (cf. Gass and Selinger 119-120), in first language acquisition, avoidance seems -at least for a subset of learners- to relate to *unfamiliarity with or a lack of mastery* of the target utterance. For example, in a study by Schwartz and Leonard (1982) children avoided saying nonce words that contained consonants which they had not been using in their spontaneous utterances. It may be the case that a subset of what we labelled ‘avoidance’ in our experiment, has to do with deliberate Avoidance (i.e. the technical term) of a grammatical item the child is unfamiliar with.

Now, let us see if a clearer view of the causes of avoidance in our data can be obtained. What kinds of avoidance answers did children in our experiment give? Only one category “avoidance” was distinguished on the answer sheet, making it difficult to assess this category of answers later on. However, some of the experimenters recorded the child’s answer on the answer sheet. From this data, it was possible to gain an insight into the types of avoidance that were attested.

First of all, answers were given in which “zork” was used predicatively, not as an attributive adjective. Responding with an indefinite DP containing an attributive adjective was not pragmatically required. So, these avoidance answers were felicitous, albeit not what we hoped for, since the ER does not apply to predicative constructions. The issue is illustrated in (41) below:

- (41) *Hij heeft een paars lijf en zijn shirtje is zork.*
he has a purple body and his shirt-dim is zork
'He has a purple body and his shirt is zork.'

In (42) a DP with a common gender noun was used. Such a response, in which the child used the definite instead of the indefinite article, would also be felicitous since the shirt in question had already been mentioned in the discourse.

- (42) *Hij heeft een zorke lijf.*
he has a zork body
'He has a zork body.'

words contained consonants that the child used (dubbed ‘IN words’) and the half consonants that the child didn’t use (‘OUT words’). The experimenters then presented IN and OUT words equally frequently to each child in play sessions over several weeks and observed all the spontaneous productions the children made. The experimenters found that the children produced a significantly greater number of IN words during the play sessions, and they produced them more rapidly, than OUT words. At the same time, tests of comprehension showed no differences between IN versus OUT words (cf. Clark 2003:113).

Avoidance in cases like (41) and (42) may result from discourse or personality factors influencing the child's style of speech. In addition, some children, may have produced the predicative construction *het T-shirt is zork* 'the T-shirt is zork' because they were intentionally Avoiding the construction with an attributive adjective *het zorke T-shirt*, because they had not mastered that grammatical construction. The fact that some children who had formulated an answer containing an atttributive adjective in *all* trials of EPC, only produced a predicative construction under STC, may point to such intentional Avoidance. On the basis of the experimental results it is not possible to determine which proportion of the answers labelled as 'avoidance' in the experiment are due to what LA1 and SLA researchers call deliberate Avoidance, caused by a lack of mastery of the elicited construction; which part is due to discourse or personality factors, and which part to still other, unknown factors.⁵⁴

In a second type of avoidance, children refused to answer, sometimes stating their ignorance, as in (35), (36) and (37):

- (35) *Ik kan dat woord niet zeggen.*

I can that word not say

'I can't say that word.'

- (36) *Ik weet het allemaal niet meer zo goed.*

I know it all not anymore so well

'I don't remember all these things.'

- (37) (to puppet:) *Wat je als eerste zei.*

What you as first said

'The first thing you said.'

The third type of avoidance featured children who were describing, but not saying the nonce word, as in (38) and in (39), repeated from (33) above:

- (38) *Een paarse draak en ... een groen ... net als die glitters d'r op.*

A purple dragon and a green just like those glitters there on

'A purple dragon and ... a green ... just like those glitters on it.'

- (39) *glitters*

glitters

'glitters'

⁵⁴ The only thing one could do is to see whether children who failed the ATC avoided more.

In the fourth type of avoidance, children chose different adjectives than the nonce adjective, for example in (40) below:

- (40) *een knots en een kleine paardje ... en een kleine paardje*
 a club and a small horse-dim and a small horse-dim
 'a club and a small horse ... and a small horse'

There may be various causes of these three types of avoidance. First of all personality factors, such as shyness, may discourage the child from saying the novel word or from answering the question at all. A different potential cause is that the child does not remember the phonological content of the nonce word, or did not acquire the nonce word at all. A third factor may be deliberate Avoidance: children intentionally do not produce an attributive DP with the nonce adjective, because they are unsure about how the correct grammatical form. Finally, there may other, unknown factors.

Moreover, all four types of avoidance can be explained as problems with 'performance'. One could argue that the child has actually internalized an abstract version of the ER and has acquired the nonce adjective. The only reason why she cannot say it at the moment of the STC is that performance pressure is too high. The child needs to answer a question composed of multiple alternatives, which means choosing the correct alternative, then using a difficult rule of grammar and a newly acquired noun, all in an unfamiliar setting with unfamiliar experimenters. This is simply too much and does not say anything about her abstract knowledge, stored in U.G.⁵⁵

Although we identified various possible causes for the different types of avoidance answers, the data were insufficient to determine any causes with certainty. This will problematize the interpretation of the data, to which topic we turn presently.

⁵⁵ However, our response would be that the set-up of the test trials in this experiment was designed to approach a spontaneous conversation. The puppet's clarification questions were intermezzo's, and the child indeed had to answer them on the spot. But this is what using a language is about. It is exactly about saying new things sometimes in familiar and sometimes in unfamiliar situations. Using a language *is* performance. So if the child could not use the nonce adjective, could not apply the ER to a new situation, it means that her knowledge of it is not fully productive and that she has not fully acquired that rule at all.

2.7 Interpretation of the results

First of all, the general design of the experiment seemed successful. The experiment as a whole seemed interesting to the subjects. The general level of attention (measured in terms of performance on the attention control trials) was high, around 80% for all groups. Performance on the **ATC** was rather lower, with an average of 70% of correct answers, but only 64% for the learners.

It was hypothesized that at least a considerable number of subjects within the population of the ‘Learners’, and perhaps some of the ‘Experts’ would not be able to apply the ER to a novel situation, since they were in the IBC learning stage or were only just beginning to form a more abstract representation (Table 1). The interpretation of the data is unproblematic, *if* we put aside all the avoidance answers on the basis of inconclusiveness. There were 18 children in the targeted group of ‘Learners’ who did not avoid the test trial. *All* Learners obeyed the ER under STC, even though they did not always obey this rule in the pretest (with an average score of 63% correct). In addition, there were 17 Experts who did not avoid the test trial. 16 of them applied the ER productively, one used the default form (+schwa). In fact, this was the only child in the whole population of 75 who did produce the default form.

Although 35 children is not a large sample, it is striking that none of these children produced the default form of the adjective, which would have been adult-ungrammatical under the test condition. Recall that ER applies only to a certain category of words (namely adjectives), in combination with a subcategory of nouns (namely singular, neuter nouns in an indefinite DP). Neither the Learners nor the Experts appear to have acquired this very intricate rule merely as a pattern observed to hold only for a specific, finite set of *known* indefinite article-adjective-noun collocations. In other words these children’s knowledge as regards the ER cannot be characterized as consisting of ‘item-based constructions’; on the contrary, comparing the results of the experiments to Table 1, the results suggest rather strongly that the Learners and the Experts had fully acquired the ER with maximal generality. If we ignore avoidance, the experimental hypothesis was not supported by the data.

But if these children had acquired the ER with maximum generality, how can we explain their failure to apply the adjective rule some of the time under trials of the **EPC** control condition in the pretest? An explanation may be that they were unaware that the diminutive form of Dutch singular nouns is neuter. The problem is not that the subjects had not fully acquired the ER itself, for they performed perfectly in the test trial (*paard* ‘horse’ and *shirt* ‘T-shirt’ are inherently neuter nouns in Dutch), but they were unaware of the neutrality of singular diminutives. This is why they incorrectly applied the default rule sometimes in the EPC.

However, since it is unknown whether the children actually knew that diminutive singular nouns are neuter, there is no way to be sure. This must be regarded as an unforeseen flaw in the experimental design, for actually it would have been crucial to know for sure whether or not the subjects knew that singular diminutive nouns are neuter.

The problem with the analysis presented above is that we cannot simply ignore the large number of avoidance responses (all 6 Clueless children, 11 Learners, or 38% of them and 9 Experts, or 36% of them, avoided the STC). General levels of attention were high, children enjoyed the game, they answered questions in the correct format in the pretest. The fact that so many failed to produce an answer in the proper format, or failed to answer at all under STC, may be meaningful somehow. In section 2.6.4.3 various potential causes for avoidance were identified. Avoidance may be due to discourse or personality factors; to having forgotten the phonological content of the nonce word; to not having acquired the nonce word at all; to deliberate Avoidance of the target structure; or to yet other, unknown factors related to performance.

The reason *why* children avoided the STC matters: suppose that a considerable subset of children Avoided the target structure on purpose, it would mean that they had not acquired the ER with maximum generality. Such a finding would support Tomasello's hypothesis, or a version of UG in which gradual learning is formalised. Conversely, if most children avoided STC for discourse and/or personality factors we'd be wise to exclude them from the dataset, and end up with a stronger case for the UG hypothesis. However, as was explained the data do not permit a definite assessment of these causes. This means that unfortunately we cannot draw any definite conclusions at all from the data.

One final issue to discuss is: why did none of the children overgeneralize the default ending of the adjective (+schwa) in the STC? Previous experiments (cf. section 1.3) indicate that the adjective with a schwa ending has a default status. The form with a schwa suffix is overgeneralized regularly, while the bare form of the adjective is hardly ever overgeneralized. Indeed, this pattern was attested in the trials of EPC. Why the default form was not overgeneralized in the STC is difficult to say. A tentative explanation, based on a comparison of the two experiments, is presented in Chapter 4 *Discussions*.

2.8 Conclusion

2.8.1 General conclusion

In this experiment a group of children was divided into subgroups ('learning stages') based on how well they obeyed a sophisticated rule of adjective agreement in the adult grammar. The broad range of age for each of the learning stages confirm the lengthy acquisition trajectory which Weerman, Bisschop and Punt (2006) and Blom, Polisenska and Weerman (2008) describe. In the experimental task, these children were asked to apply this rule to a new situation involving a nonce adjective. It turned out that *all* children who did not avoid the question were able to apply the rule correctly to the nonce adjective, even though they were still making mistakes with known adjectives. However, over one-third of the subjects (Clueless, Learners and Experts) avoided the STC, and we do not know why. Because it is such a large group, we cannot simply exclude them, since this avoidance may be meaningful. For this reason is impossible to present any definite analysis of the data. Unfortunately, the conclusion of this experiment must be that there is no conclusion.

2.8.2 Design flaws and follow up

A number of flaws in the design were discovered after the experiment had been carried out. First of all, it had been assumed but not tested experimentally that the children knew that the grammatical gender of singular nouns with a diminutive suffix is neuter, as instances of this rule are highly frequent. This untested assumption in fact made it difficult to interpret the main test results definitely. The high levels of avoidance in the main test were another problem. Since a design in which there was only one trial of the main test condition was chosen, it was especially important that the child would not miss it, but a large percentage did. A follow-up experiment should start with a more elaborate and precise instruction of the experimental task to the children. Moreover, the recording of the avoidance answers should have been more precise. Furthermore, apparently more attention to the meaning of the nonce noun is needed in order for the children to remember. A more salient meaning might also be preferable. Finally, the noun "magoet" with stress on the second syllable turned out to be an unfortunate choice: a number of children seemed to have heard only the second syllable *goet* /gu:t/, which is the phonetic equivalent of the highly common Dutch word *goed* 'good'. The word *knots* 'club' used in the main test unexpectedly turned out to be unknown to many children, causing confusion and undoubtedly avoidance. A follow-up experiment was planned with an improved experimental design.

3. The second experiment

3.1 Introduction

The second experiment attempted to replicate the findings of experiment 1 with an improved design. The following modifications were adopted:

- The warm-up session was much more extensive than the warm-up in the first experiment. The aim was to reduce the percentage of avoidance responses by giving proper training of the right answer format.
- The experiment included more children than the first experiment, so that the results would be statistically stronger.
- Instead of using the diminutive form of nouns, inherently neuter nouns were used. Moreover, it was tested whether the subjects actually knew the gender of the four nouns used in the pretest and the main test.
- In this experiment, when asking clarification questions, the puppet never mentioned the correct alternative. Thus, the task in this experiment was elicited production instead of elicited imitation.⁵⁶
- A plural test condition was included to make sure that children had fully acquired the ER. In this plural condition the elicited production was a plural indefinite DP containing the nonce adjective which the children had just learnt, a situation in which the ER does not apply.
- Only one nonce adjective, “zork”, was used. The meaning of “zork” was changed to make it more salient and still flexible enough to be used in various story-contexts. “Zork” in this experiment was defined as referring to individuals who had the magical power of being able to let their legs grow as long as they wanted to.
- The nonce adjective was given a much more central place in the stories so as to ensure acquisition of its meaning by most children. “Zork” was introduced by the storyteller in the first story, and then explained again by the storyteller in the second story. In the fourth story, as in the previous experiment, it was checked whether children had indeed acquired the adjective.

⁵⁶ In the previous experiment it was shown (section 2.6.4.2), that the children’s answers in the enhanced elicited imitation task were very clearly productions, not imitations. However, an experimental design that precludes imitation because the correct alternative is simply not presented seemed to be even more secure.

- Instead of making one category for ‘avoidance’ the avoidance answers were categorized as “avoid” (which means, the nonce adjective is mentioned, but the format of the answer deviated from what it should be) or as “other” (which means all answers in which the nonce adjective was not mentioned and all non-answers).
- New stories with better drawings were designed with the aim of making the experiment still more interesting and fun for the children.

3.2 Participants

129 Dutch-speaking pre-school children participated in this study.⁵⁷ The children were between 4;2 and 7;11 years old (average age 5;6 years). There were 68 girls and 61 boys. Only one child was bilingual.⁵⁸ The children were enrolled in two different Dutch schools in Odijk, a village closed to Utrecht, in the central area of the Netherlands ('Randstad'). None of these children had participated in the previous experiment.

3.3 Design

The children were tested by means of an elicited production task, which like in the first experiment was controlled and consisted of a pretest and a main test, carried out in the same session. Like the previous experiment, this experiment used the ‘picture-story guessing game’ paradigm. One major difference with the previous experiment was that the correct alternative was never mentioned in the puppet’s questions; hence the task was elicited production, not elicited imitation. Moreover, in this experiment there was only one set of experimental materials, so only one nonce adjective was used.

3.3.1 Design of pretest

3.3.1.1 Design

The design of the pretest was very similar to that of experiment 1 and served to establish the learning stage of ER the experimental subjects were in. Each subject received four different trials of the pretest experimental condition, the EPC.

⁵⁷ Seven additional children participated but were excluded from the data set for a total lack of response to the task.

⁵⁸ This child did not end up in the learner population.

3.3.1.2 Assigning the children to groups

On the basis of the pretest the subjects were divided into three groups, representing their learning stage with regard to the ER. As in the previous experiment, a distinction was made between Clueless children (who had not begun to learn the ER), Learners (children who were in the process of learning the ER) and Experts (who were in a more advanced learning stage of the ER). In order to determine which group children were in, the pretest consisted of four trials of the EPC. In addition, unlike in experiment 1, there were four trials in which the correct answer to a puppet's question was a noun with its definitive article. This condition was dubbed the Gender Pretest Condition or GPC. The four trials of GPC focused on the same nouns that were used in the four trials of the EPC. Which learner category a subject belonged to was less easy to determine than in the previous experiment, because there was the additional variable of the noun gender. The following group inclusion criteria were settled upon:

Excluded

Various subjects were completely excluded from the study: some for failing to respond at all (7 subjects), others because we hardly had enough data to say anything sensible (28 children) or because their results were difficult to interpret (27 children). For a more extensive discussion of the children who had to be excluded, see Appendix 3.

Clueless

As in the previous experiment, children were classified as Clueless with regard to the ER if they incorrectly supplied schwa on three out of three or four out of four trials of EPC, but regardless of whether they identified the gender of the nouns as common or neuter under the GPC.

Of course, the perceived gender of these nouns mattered. If a child considered all four nouns to be of the common gender and she produced four DPs with the default form of the adjective (+schwa), the answers were in fact all grammatical, but there was no way to tell whether she had any knowledge of the ER. By contrast, if a child classified some nouns as neuter and then used the default, +schwa adjective form, this was direct evidence that the ER was *not* being used. In this study *all* children who incorrectly supplied schwa on three out of three or four out of four trials of the EPC were regarded as 'Clueless', because of a lack of evidence that they had begun to learn the adjective rule.

There was a lot of avoidance, which is why children who missed one set of answers were not excluded.⁵⁹ However, if two answers were missing, that child was excluded completely from further analysis for reason of inconclusiveness of the data – except if the data fulfilled the criteria of the Learner category (see below). Note that assigning children to the Excluded and Clueless category on the basis of these criteria probably deflated the number of Clueless children: a child whose grammatical competence was less developed was more likely to feel intimidated by the task and would avoid more, or say less, in general. Indeed, the category of Clueless children ended up with only four members, which was probably an underestimation of that group. However, because there was no way to be sure what is going on in these cases, it was decided to uniformly exclude subjects, as explained above, on the basis of the inconclusiveness of their data.

Learners

Children were classified as Learners of the ER when they gave at least one inconsistent response and one consistent response. In addition, at least one of these responses should feature the bare form of the adjective (minus schwa): otherwise there would be no evidence that the child had actually begun to learn the ER. A consistent response was defined as a grammatical one, given the choice of the definite article; an inconsistent response was ungrammatical given the choice of the definite article. For example, both sets of answers of type 1 and type 2 in (43) below were considered consistent responses. Conversely, both sets of answers of type 3 and type 4 below were considered inconsistent.

(43) Types of answer combinations in GPC and EPC:

Type 1, consistent: *de konijn* ‘the rabbit’ and *een grote* (adj. +schwa) *konijn* ‘a big rabbit’

Type 2, consistent: *het konijn* and *een groot* (bare adj.) *konijn*

Type 3, inconsistent: *het konijn* and *een grote konijn*

Type 4, inconsistent: *de konijn* and *een groot konijn*

Note that there is a difference between correct and consistent: an incorrect answer (*een grote konijn* ‘a big rabbit’) can be part of a consistent set and vice versa. Note also that the criteria set out here classified a subject who produced two consistent sets of answers of type 1 and two inconsistent sets of answers of type 3 as Clueless, because there was no evidence that this child had begun to learn the ER.

⁵⁹ For an analysis of these avoidance answers, see section 3.6.4.2.

Experts

Those children who gave four correct pairs of responses (not only consistent but also correct) out of four trials of EPC, or three correct responses out of three were dubbed Experts. That is, this group of children correctly considered the nouns neuter nouns *and* produced the bare form of the adjectives. These children thus only gave answers of Type 2 above.

3.3.2 Design of test

The ability of subjects in different learning stages, but in particular the Learners' and Experts' ability to correctly apply the ER to a DP containing a novel adjective-noun combination was investigated in the main test. In order to ensure the novelty of the combination, all children were taught a monosyllabic nonce adjective, "zork".⁶⁰ To minimize unexpected effects of the stories, a design was chosen in which there was only one test story. The independent variables of gender and age were left to vary freely. The dependent variables were productions elicited by a clarification question posed by the puppet. These productions were either an indefinite singular or an indefinite plural DP containing the nonce adjective "zork". The plural condition was added to this experiment to check whether the children had fully acquired the ER (since, of course, the ER applies only to singular indefinite, not plural indefinite DPs).

3.4 Procedure

The procedure was the same as in the first experiment.

3.5 Materials

The experiment consisted of a warm-up session, a pretest and a main test. There was only one set of materials. The stories were about various topics of interest to children, like riding on horseback, having a picnic, pet animals, an adventure in the forest with a dangerous bear etc.

3.5.1 Warm-up

In the warm-up session, the experimental task was taught to the children. This session was added to the experimental design of the previous experiment. At the beginning of the warm-up session, an illustration of a tiger and a monkey, a banana and a bunch of flowers was shown. The text of this part of the experiment was as follows:

⁶⁰ In the discussion to the previous chapter, we mentioned some problems with the other nonce adjective used in that experiment, "magoet". Because "zork" did not present any problems, and there were no significant differences in results between the two nonce adjectives, we decided to use only "zork" in this experiment.

storyteller: We are going to play a guessing game with pictures. (Child's name) and I are going to look at the pictures but (to the puppet) you are not, Drakie, and I will tell a story about what's happening on these pictures. Because the storylines are quite complicated, Drakie can also ask questions about what's happening on the pictures. And you (to the child) will answers these questions. I will show you the first time, how it works. On this picture, there are two animals.

De een is een kleine tijger met een lange staart
the one is a small tiger with a long tail
'One of them is a small tiger with a long tail'

en de ander is een grote aap met een krulstaart.
and the other is a big monkey with a curl-tail
'and the other one is a big monkey with a curly tail.'

Er is ook een banaan en een bos bloemen.
there is also a banana and a bunch flowers
'And there's also a banana and a bunch of flowers.'

puppet: *Wacht even. Ik heb een vraag.*
wait briefly. I have a question
'Wait a minute. I have a question.'

Is het een grote tijger met een lange staart,
is it a big tiger with a long tail
'Is it a big tiger with a long tail,'

of een kleine tijger met een krulstaart?
or a small tiger with a curl-tail
'or a small tiger with a curly tail?'

storyteller: *Nee, een kleine tijger met een lange staart.*
no a small tiger with a long tail
'No, a small tiger with a long tail.'

This warm-up session went on for some minutes. The storyteller introduced more characters and their attributes and answered the various clarification questions posed by the puppet in the desired format, as in (44):

- (44) a ADJECTIVE DP with a ADJECTIVE DP.

3.5.2 The pretest

The pretest consisted of two stories. Like in the previous experiment, its goal was to select the group of Learners. In addition, the meaning of the nonce adjective was taught in the pretest.

There were four trials of EPC, all involving an elicited production task. The high-frequent neuter nouns that were used were: *het paard* ‘the horse’, *het konijn* ‘the rabbit’, *het ijje* ‘the icecream’, *het varken* ‘the pig’. As in the previous experiment, these trials were triggered by clarification questions posed by the puppet. Like before, the puppet’s question consisted of two (or three) alternatives. In experiment 1, the children had had to select the correct description from a set of alternatives. This was a sophisticated elicited imitation task, since the children were burdened with the additional task of choosing between alternatives. However, in this experiment, none of the alternatives proposed by the puppet was the correct one. For example, in one trial of EPC the picture-story revolved around the characters Tom and Piet and their pets. The picture used for this was a colored illustration of the boy Tom, a pig, two cats and the boy Piet, a rabbit and two turtles. Having discussed Tom, the storyteller identified Piet by name and mentioned what kind of pets he had. At this point the puppet interrupted with a clarification question. The text of this part of the experiment was as follows:

storyteller: *En Piet heeft een konijn dat heel groot is en ook twee kleine schildpadden.*

and Pete has a rabbit that very big is and also two small turtles

‘And Pete has a rabbit, which is quite big, and also two small turtles.’

puppet: *Wacht even, heeft Piet nou twee grote konijnen en één kleine schildpad?*

wait briefly, has Piet now two big rabbits and one small turtle?

‘Wait, did you say that Pete has two big rabbits and a small turtle?’

Of twee grote schildpadden en één klein konijn? Ik snap het niet.

or two big turtles and one small rabbit I understand it not

‘Or two big turtles and a small rabbit? I don’t get it.’

child (target): *Een groot konijn en twee kleine schildpadden.*

a big rabbit and two small turtles

‘A big rabbit and two small turtles.’

In this case, the targeted production was *een groot konijn* ‘a big rabbit’ with a bare adjective, a correct application of the ER because *konijn* ‘rabbit’ is a neuter noun. However, if the child did

not apply the ER, she would use the default form of the adjective and say *een grot-e⁶¹ konijn* ‘a big rabbit’, with a schwa ending. All four pretest items had this format, but featured various adjectives and nouns.

By means of another elicited production task, the subjects’ knowledge of the grammatical gender of the four nouns in the EPC was tested. For example, in one trial of the GPC, the two boys Toms and Piet were out for a walk with their pigs. The storyteller explained that one other pet was following them and pointed at the rabbit in the picture, who was indeed following the two boys. The puppet, who could not see the picture, asked for clarification. The text of this part of the experiment was as follows:

storyteller: They went for a walk. The boys took their pigs with them. But, look, another pet animal is joining them!

puppet: *Welk huisdier? Was het de grote zwarte cat?*
which pet was it the big black cat
‘Which pet? Was it the big black cat?’

child (target): *Nee, het konijn.*
no the rabbit
‘No, the rabbit.’

Note that the puppet’s clarification question ‘was it **the** big black cat?’ made an answer with a definite article ‘no, **the** rabbit’ felicitous, especially since this rabbit had been introduced in the story earlier. Two other trials of the **GPC** were similar but in one trial there was a reversal of the usual pattern of the puppet asking for clarification. In this story, which was about three characters eating icecream, the puppet pretended to be distracted by something, and the storyteller responded to that. The text of this part of the experiment was as follows:

storyteller: And Tom’s mother ate the last ice cream ... (puppet obviously not listening).
Drakie! ! Are you paying attention?? Tell me, what did Tom’s mother eat?

puppet: *Hub? Geen idee. De laatste banaan?*
what no idea the last banana
‘What? I don’t have a clue. The last banana?’

child (target): *Nee, het laatste ijse.*
no the last ice cream

⁶¹ The deletion of the second {o} in *groot* when a final {e} is added is an orthographical convention.

‘No, the last ice cream.’

Again, the definite article was felicitous in the targeted child’s answer, since ice cream had been introduced before.

Finally, the pretest also served to introduce the nonce adjective “zork”. “Zork” was defined as referring to a quality attributed to persons or animals that have a special magical power: they can let their legs grow as long as they want (more or less like the cartoon character *Inspector Gadget*). The nonce adjective was introduced in the first story, in which one of the horses proclaimed that he was “zork”. The puppet asked: ‘what on earth is “zork”?’. In the following part of the story the meaning of the adjective was demonstrated, for the “zork” horse grew his legs to rescue a baby bird from a high tree, which had fallen from its nest. In the second story, the adjective “zork” was used again. This time, the storyteller introduced a “zork” rabbit. The puppet wondered again: ‘what does “zork” mean?’ The storyteller explained the meaning of this word for the second time, and a story followed in which the “zork” rabbit grew his legs to cross a dangerous river. Thus, the adjective “zork” and its meaning played a more central part in the pretest than it had done in the previous experiment.

3.5.3 The main test

The purpose of the main test was to see whether children in the learner group applied the ER to a DP containing the nonce adjective they had just learned in the pretest. During the test, which consisted of the final two stories in the experiment, it was first determined whether the child knew the meaning of the word “zork”. The production of one singular indefinite and one plural indefinite DP containing “zork” was elicited next, using the same techniques as in the pretest. The test noun that was used was *konijn* ‘rabbit’.

3.5.3.1 Nonce adjective test

The third story in the experiment contained a test question to confirm that the subjects knew the meaning of “zork”, the Adjective Test Condition or **ATC**. This story revolved around two rabbits (called ‘Flippie’ and ‘Flappie’) carrying red hats. During a walk in the forest, these rabbits and their friend (called ‘Pim’) were threatened by an angry bear, who was hiding behind a rock and then jumped forward to catch the rabbits. The picture used for this was shown in Figure 4.

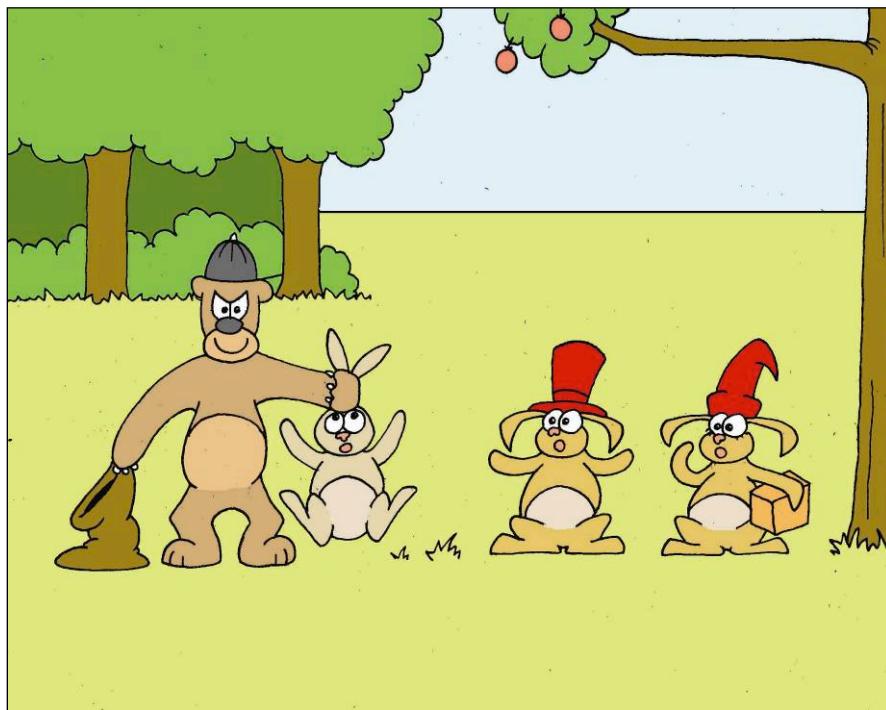


Figure 4: Picture used in trial of ATC

The text of this part of the experiment was as follows:

storyteller: The bear jumps forward and says: "Ha! I'm going to take you with me. He grabs Pim. "Nice hat," he said, "give it to me." And the bear put the black hat on his head. Then he placed Pim inside a bag. Then he wanted to catch Flippie and Flappie, but what he did not know was that Flippie and Flappie were zork.

puppet: "Zork" ... what was the meaning of that word again?

child (target): (that you can grow your legs)

3.5.3.2 The plural noun test (PTC)

The Plural Test Condition (henceforward the **PTC**) was elicited in the third story of the experiment, like the **ATC**. When threatened by the angry bear, the two brother rabbits Flippie and Flappie, being "zork", managed to escape into a tree by growing their legs. At this point, the plural test condition was elicited. The picture used for this is shown in Figure 5:

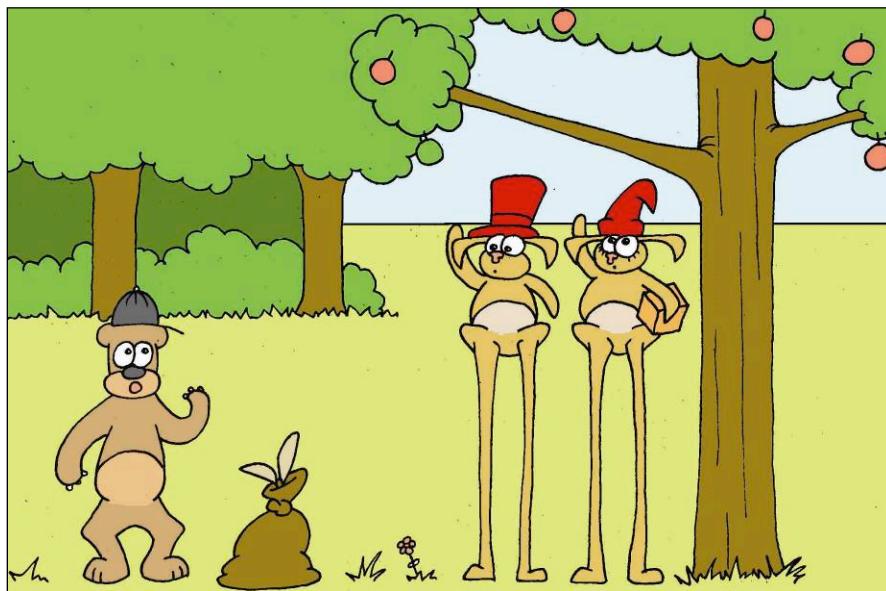


Figure 5: Picture used in APC

The text of this part of the experiment was as follows:

storyteller: Flippie and Flappie let their legs grow, so that they could climb up into the tree and escape. Just like that, they were up in the tree. And the bear, with on his head a black hat stood there, looking at them.

puppet: *Wacht even. Ik snap het niet meer! Wie klom er nu in de boom?*
wait briefly I get it not more who climbed there now into the tree
'Wait a minute, I'm lost! Who did you say climbed up into the tree?'

Een zorke beer met een rode hoed?
a zork bear with a red hat
'Was it a zork bear with a red hat?'

Oftwee rode konijnen met een zwarte hoed?
or two red rabbits with a black hat
'Or two red rabbits with black hats?'

child (target): *Twee zorke konijnen met een rode hoed.*
two zork rabbits with a red hat
'Two zork rabbits with red hats.'

The puppet's question was designed to elicit the response *twee zorke konijnen* 'two zork rabbits'. Since the ER does not apply to indefinite plural DPs, the correct form of the adjective is the form with a schwa ending, {-e} in the spelling. In an adult-ungrammatical overgeneralization of the ER, however, the child would produce *twee zork konijnen* 'two zork rabbits.'

3.5.3.3 The singular noun test (STC)

The Singular Test Condition (henceforward the **STC**) was elicited in the fourth story of the experiment, which revolved around a country threatened by a dangerous troll and a brave rabbit setting out to destroy this troll. A wise old man advised the hero rabbit to attack the troll by tickling him behind his ear. The pictures used for this are shown in Figures 6 and 7 (these were printed on the same page):

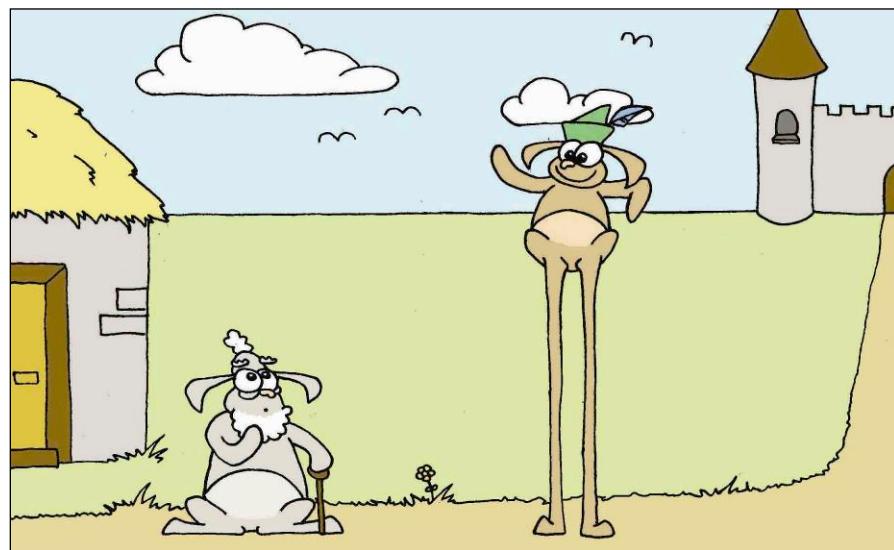


Figure 6: First picture used in STC

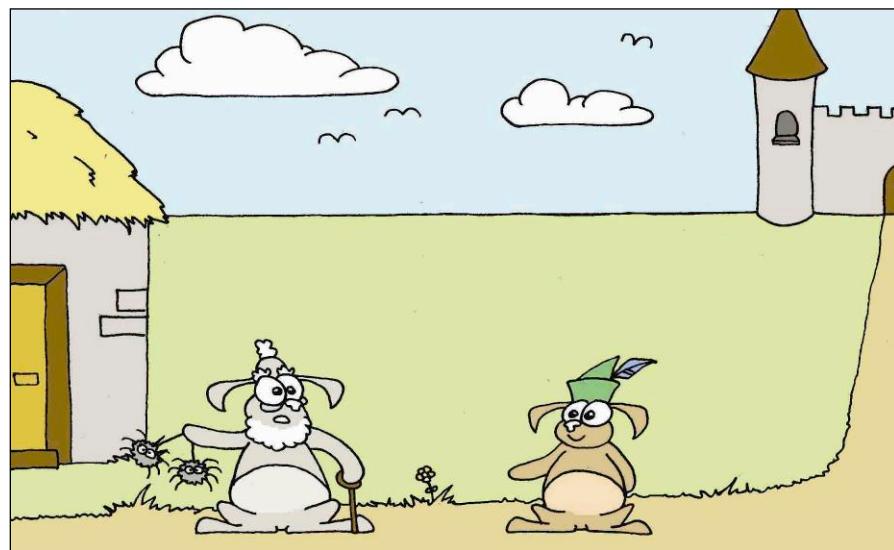


Figure 7: Second picture used in STC

The text of this part of the experiment was as follows:

storyteller: “There’s one thing I know”, says the old rabbit. “The troll has one weak spot: you must tickle him behind his ear. Only, the troll is rather tall, so that might be a problem.” “Oh not at all”, rabbit Jan says, “because I’m zork! Watch me!” And he let his legs grow very long ... and then he shrank. “That’s great!” said the old man. “And you know what? I’ll also give you these two hairy spiders. If you place these on the troll’s head, he’ll go crazy.”

puppet: *He, nu snap ik het niet meer hoor.*
hey now get I it not more hey
‘What? I don’t get it?’

Gaat het nu om twee zork spinnen en een heel hairy konijn?
goes it now around two zork spiders and a very hairy rabbit
‘Are we discussing two zork spiders and one hairy rabbit?’

Of om twee zorke konijnen en één harige spin?
or around two zork rabbits and one hairy spider
‘Or are there two zork rabbits and one hairy spider?’

child (target): *Een zork konijn en twee harige spinnen.*
one zork rabbit and two hairy spiders
‘One zork rabbit and two hairy spiders.’

The puppet’s question was designed to elicit the response *een zork konijn* ‘a zork rabbit’ with a bare adjective. If the child did not apply the ER, she would produce the adult-ungrammatical form *een zork-e konijn* with a schwa.

3.5.4 Filler items and support of the ER

The materials contained filler items (15 in total). Some of these were used as attention-control items, consisting of simple, straightforward guesses made by the puppet about the story. The child was expected to tell the puppet whether or not his guesses were correct.⁶² The subjects’ truth-value judgments about these guesses indicated general levels of attention. For example, one trial occurred in the story about the two rabbits and the angry bear. After the two “zork” rabbits had climbed into the tree, the bear had also climbed up, after which the rabbits climbed

⁶² Other filler items were used as the test items in the experiment of a colleague who helped me carry out this experiment. Cf. Van der Ziel (2008).

down again and the bear found himself alone up in the tree. The storyteller explained what happened next. The pictures used for this are shown in Figures 8 and 9 (these were printed on the same page):



Figure 8: Picture used in attention control trial

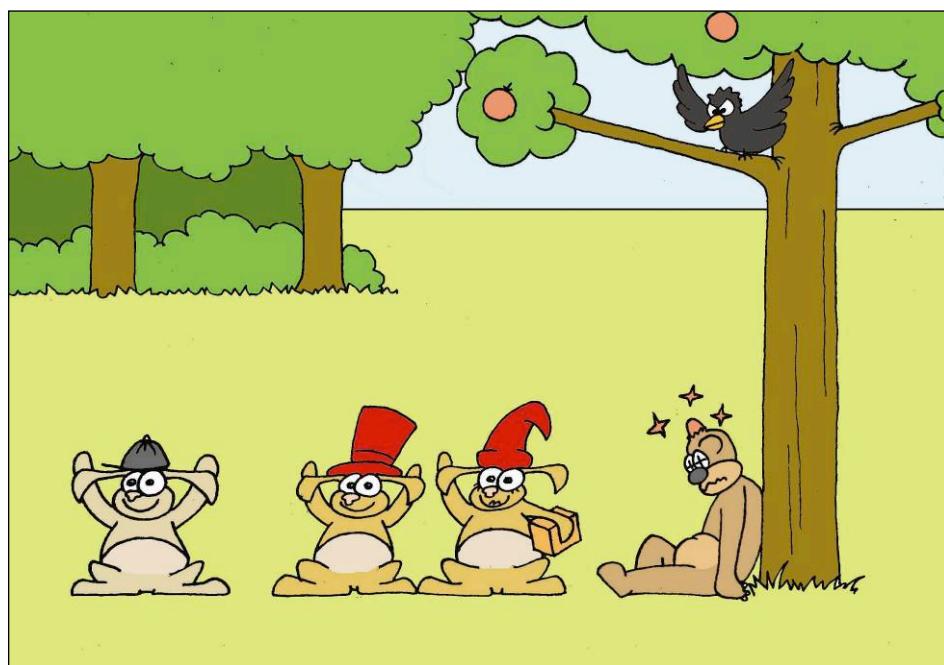


Figure 9: Picture used in attention control trial

The text of this part of the experiment was as follows (the actual test was in Dutch):

- storyteller: But look, there's a bird flying towards them! He pecked with his beak at the bear's fingers and then something happened. (to puppet:) Drakie, what do you think that happened?
- puppet: The bear fell out of the tree.
- child (target): (true)

3.6 Results

3.6.1 Dividing the subjects into groups

129 children participated in the pretest. These children were divided into three groups (Clueless, Learner and Experts) on the basis of their performance in the pretest trials and according to the criteria as they were set out in the experimental design section. The results are shown in Table 7.

| Group | N | Percentage |
|--------------|----------|-------------------|
| Clueless | 4 | 3.1% |
| Learners | 40 | 31.0% |
| Experts | 23 | 17.8% |
| Excluded | 62 | 48.1% |
| <i>Total</i> | 129 | 100.0% |

Table 7: Frequency analysis of learning stages of subjects

The 23 Experts each used ER correctly on all trials of the EPC. The four children of the Clueless group never did; apparently they had not begun to learn the adjective rule. Forty children produced a grammatical DP under EPC at least once but not on all trials. These children were classified as the Learners. Almost half of the children, 62 subjects, were excluded from the experiment: some for failing to respond at all (7 subjects), others because we hardly had enough data to say anything sensible at all (28 children) or because their results were difficult to interpret (27 children). For a more extensive discussion of the excluded children, see Appendix 3.

Note that the group frequencies might not be representative of the actual distribution of the children in the dataset. Recall from the experimental design section that inclusion in the category 'Learner' only demanded two sets of answers, and so this group might be larger simply because the inclusion criteria were less stringent. By contrast, the category 'Clueless' is deflated, because the category 'Excluded' might contain many children who are, in fact, Clueless.

Table 8 shows the distribution of children of various ages among the learning stages. This table confirms again that there is a lengthy acquisition trajectory for the ER: there are children of each learning stage in each age group.

| Age | N | Excluded | Clueless | Learners | Experts |
|------------|----------|-----------------|-----------------|-----------------|----------------|
| 4 | 38 | 25 (64%) | 1 (3%) | 8 (21%) | 5 (13%) |
| 5 | 52 | 25 (46%) | 1 (2%) | 18 (33%) | 10 (19%) |
| 6 | 31 | 11 (34%) | 1 (3%) | 14 (44%) | 6 (19%) |
| 7 | 1 | 0 (0%) | 0 (0%) | 0 (0%) | 1 (100%) |

Table 8: % children in various groups, all children

3.6.2 General

Table 9 compares a number of characteristics for the group of all children and the Learners. The average age of Learners was 5;7 which was very close to the average age of the sample as a whole. The age range of Learners was broad and almost completely overlapping the age range of all children. The columns FT% and FF% give the average percentage of true puppet guesses that were correctly judged as true (FT) and false guesses correctly judged as false (FF). These columns are general indicators of attention. We see that the attention levels were quite high, with an average of 89% for true guesses and 97% for false guesses.

| Group | # Boys | Average age | Age range | FT% | FF% |
|--------------|---------------|--------------------|------------------|------------|------------|
| All children | 31 | 5;6 | 4;2-7;11 | 89% | 97% |
| Learners | 14 | 5;7 | 4;4-6;6 | 90% | 96% |

Table 9: Various results for different groups.

3.6.3 Main test scores of each group

3.6.3.1 ATC

Table 10 shows the performance of the different groups in the nonce adjective meaning condition. 95% of all children remembered the meaning of the nonce adjective. This percentage was lower for the Learners: 91% of these subjects knew the meaning of “zork”.

| Group | % who knows meaning of “zork” |
|--------------|--------------------------------------|
| Clueless | 100% |
| Learner | 91% |
| Experts | 100% |
| <i>Total</i> | 95% |

Table 10: Knowledge of meaning of nonce adjective.

Moreover, an analysis of answers in STC/PTC shows that a minority of subjects (9 children) had actually acquired a different nonce adjective or interpreted it as a noun. Table 11 gives an overview of these responses, also including the child’s answer under ATC.

| ID | Learner group | Interpretation as | ATC | Production in STC or PTC | Production in other test condition (PTC or STC) |
|----|---------------|---------------------|----------|--|---|
| 1. | learner | adjective | knows | <i>een zorks konijn</i> a zorks rabbit 'a zorks rabbit' | <i>twee zork konijntjes</i> two zork rabbits-dim 'two zork rabbits' |
| 2. | learner | adjective | knows | <i>een zork- ig konijn</i> a zork-like rabbit 'a zorky rabbit' | <i>twee zorke konijnen</i> two zork rabbits 'two zork rabbits' |
| 3. | learner | adjective | knows | <i>een slorge konijn</i> a slorge rabbit 'a slorg rabbit' | other. |
| 4. | excluded | adjective? noun? | knows | <i>een oud konijn, een zork</i> an old rabbit a zork 'an old rabbit, a zork' | <i>Twee konijnen die lief zijn</i> two rabbits who sweet are 'two rabbits who are sweet' <i>en een beer die gemeen is.</i> and a bear who mean is 'and a bear which is mean' |
| 5. | learner | noun | knows | <i>twee lieve zorks</i> two sweet zork-s ⁶³ 'two sweet zorks' | <i>Eén zork konijn</i> one zork rabbit 'one zork rabbit' |
| 6. | learner | noun | knows | <i>Een zork en twee spinnen</i> one zork and two spiders 'one zork and two spiders' | <i>De beer is gemeen en de</i> The bear is mean and the 'The bear is mean and the' <i>konijnen waren zork.</i> rabbits were zork 'rabbits were zork.' |
| 7. | excluded | noun | clueless | <i>twee zorro's</i> two zorro's 'two zorro's' | other |
| 8. | excluded | personal name | knows | <i>een konijn die zork heette</i> one rabbit that zork named 'one rabbit that was called zork' | <i>een konijn die zork heette</i> one rabbit that zork named 'one rabbit that was called zork' |
| 9. | excluded | noun | knows | <i>een konijn die zork heeft</i> one rabbit who zork has 'one rabbit who has zork' | other |

Table 11: Deviating interpretations of nonce adjective.

This table shows that some children had acquired a slightly different adjective like *zorks* (no. 1), *zorkig* (no. 2) or *slorge* (no. 3). Others had acquired it as a noun *zork* (no. 5,6 & 9), or even *zorro's* (no. 7), or as a personal name (no. 8). Most of these children were in the learner category. Nevertheless, all but one of these children actually knew the meaning of the nonce adjective when asked, except for the child who said *twee zorro's* 'two zorro's.⁶⁴ Moreover, in most cases the

⁶³ /-s/ is the correct plural suffix of a hypothetical Dutch noun *zorro*.

⁶⁴ This, however, was the only child who did not know the meaning of the nonce adjective and yet produced an answer with (a modified version of) *zork* in it under STC. One other child, who did not know the meaning of *zork*, did answer correctly *twee zorke konijnen* 'two zork rabbits' under PTC. The remaining children who had failed ATC did not include *zork* in their answers under PTC and STC at all.

application of the nonce adjective was actually correct in the other test condition, as table 9 shows.

3.6.3.2 Main test scores

The performance of each group on the two test conditions (the STC and PTC) was computed. The responses were divided into four response categories: 1. *zork*; 2. *zorke*; 3. avoid and 4. other. In the previous experiment, there had been one rest category ‘other’. However, in this experiment, two separate categories ‘avoid’ and ‘other’ were distinguished in order to get a clearer view of the responses. An avoidance response was considered as one in which the child did include (some version of) “zork”, but avoided the desired answering format. Such a child may have answered something like in (45) to (47):

- (45) *een konijn die zork is*

a rabbit who zork is

‘a rabbit who is zork’

- (46) *een konijntje, een zorke*

a rabbit-dim a zork

‘a rabbit, a zork (one)’

- (47) *een zorke*

a zork

‘a zork one’.

Category ‘other’ included all other answers (or non-answers), in which “zork” was not mentioned at all. For example, many children answered something like (48):

- (48) *twee lieve konijnen*

two sweet rabbits

‘two sweet rabbits’

3.6.3.2.1 STC

Table 12 shows the performance of the different groups in the singular test condition. Since the ER applies to the elicited singular indefinite DP, the correct form was *zork*, the bare, schwa-less form of the adjective.

| Group | N | Correct,-ə | Incorrect,+ə | Avoid | Other |
|--------------|----------|-------------------|---------------------|--------------|--------------|
| Clueless | 4 | 0 (0%) | 2 (50%) | 1 (25%) | 1 (25%) |
| Learners | 40 | 14 (35%) | 6 (15%) | 7 (18%) | 13 (32%) |
| Experts | 23 | 14 (61%) | 3 (13%) | 1 (4%) | 5 (22%) |
| <i>Total</i> | 67 | 28 (42%) | 11 (16%) | 9 (13%) | 19 (28%) |

Table 12: Performance in STC 'een zork(e) konijn'.

The small group of 4 Clueless children produced the incorrect, default form of the adjective (two subjects), avoided the proper format (one subject) or gave an answer not involving “zork” (one subject). Among the 40 Learners, 14 or 35% produced the correct, bare form of the adjective, *zork*; six learners (15%) produced the incorrect form *zorke*. Seven Learners avoided the correct format, but did include “zork” in their answer (28%) and 13 children gave an answer that did not contain “zork” or did not say anything at all (32%). Finally, 14 out of 23 Experts (61%) produced the correct *zork*, while only three (13%) produced the default form *zorke*. One child avoided the proper format (4%), and still five children did not include “zork” in their response (22%). If all children are considered together, a small minority, 28 or 42% of them gave the correct answer. A minority, 11 children (16%) produced the incorrect default form of the adjective. Nine subjects avoided the proper answer format. Almost a third did not include “zork” in their answer.

3.6.3.2.2 PTC

Table 13 shows the performance of the different groups in the plural test condition. Since the ER does not apply to the elicited plural indefinite DP, the correct form was *zorke*, the default form of the adjective ending in schwa.

| Group | N | Correct, +ə | Incorrect, -ə | Avoid | Other |
|--------------|----------|--------------------|----------------------|--------------|--------------|
| Clueless | 4 | 2 (50%) | 0 (0%) | 1 (25%) | 1 (25%) |
| Learners | 40 | 13 (33%) | 1 (3%) | 10 (25%) | 16 (40%) |
| Experts | 23 | 14 (61%) | 1 (4%) | 2 (9%) | 6 (26%) |
| <i>Total</i> | 67 | 29 (43%) | 2 (3%) | 13 (19%) | 23 (34%) |

Table 13: Performance in PTC 'zork(e) konijnen'.

There were four Clueless children, two of which produced the correct form *zorke*. One child avoided the proper format; one child gave a different answer. Among the 40 Learners, 13 produced *zorke* (33%). 1 Learner (3%) produced the incorrect form *zork*. 10 Learners avoided the proper format, but did include “zork” in their answer (25%). 16 children gave an answer that did not contain “zork” or did not say anything at all (40% of all children). In the group of Experts, 15 out of 23 children produced the correct *zorke* (61%), while 1 subject said *zork* (4%). Two children avoided the proper format, but did include “zork” in their answer (9%) and 6

others did not include “zork” in their response (26%). If we consider all children together, 29 children, 43% of the total, produced the correct form. A small minority, 2 children or 3% replied with the incorrect form. 13 children avoided the proper format (19%). A third of all children, 23 children or 34% gave an answer that did not include “zork”.

3.6.3.2.3 Effects of perceived gender of *konijn* ‘rabbit’

Some children thought that *konijn* ‘rabbit’ is a common gender noun. A critic might object that this obscures the results, because these children’s responses in the **STC** and **PTC** ought to be interpreted in the opposite way. Suppose these children were taken out of the dataset. How would that influence the results? Table 14 shows performance in the **STC** and table 15 shows performance in the **PTC**.

| Group | N | Correct, -ə | Incorrect,+ə | Avoid | Other |
|--------------|----------|--------------------|---------------------|--------------|--------------|
| Clueless | 1 | 0 (0%) | 1 (100%) | 0 (0%) | 0 (0%) |
| Learners | 25 | 8 (32%) | 4 (16%) | 6 (24%) | 7 (28%) |
| Expert | 23 | 14 (61%) | 3 (13%) | 1 (43%) | 5 (22%) |
| <i>Total</i> | 49 | 22 (45%) | 8 (16%) | 7 (14%) | 12 (24%) |

Table 14: Performance in STC, minus *de konijn* children

| Group | N | Correct, +ə | Incorrect, -ə | Avoid | Other |
|--------------|----------|--------------------|----------------------|--------------|--------------|
| Clueless | 1 | 1 (100%) | 0 (0%) | 0 (0%) | 0 (100%) |
| Learners | 25 | 9 (36%) | 1 (4%) | 7 (28%) | 8 (32%) |
| Experts | 23 | 14 (61%) | 1 (4%) | 2 (8%) | 6 (26%) |
| <i>Total</i> | 49 | 24 (49%) | 2 (4%) | 9 (18%) | 14 (29%) |

Table 15: Performance in PTC, minus *de konijn* children

Tables 14 and 15 show that there are still twice as much children who say *een zork konijn* as children who produce *een zorke konijn*. In the plural condition, the reply *zork konijnen* is still rare and outweighed by far by the response *zorke konijnen*. For both the **STC** and the **PTC**, there is still a considerable amount of children who do not include “zork” in their answers. Thus, leaving the children who think *konijn* is a common gender noun out of the dataset, the results are slightly weaker, but they still point in the same direction.

3.6.4 Child productions

The data was examined on two other matters. First of all, it was investigated whether children overgeneralized the ER to plural cases. Secondly, avoidance answers were considered in more detail.

3.6.4.1 Overgeneralization of the ER

First, it was checked whether children overgeneralized the ER to the plural. The results of the PTC show that overgeneralization of the ER to the plural case of the nonce adjective is very rare: it occurred only in two cases. Moreover, no other (spontaneous) overgeneralizations of the ER to the plural were attested in the children's answers. As regards overgeneralizations of the ER to singular, common gender DPs: since the previous experiment showed that such overgeneralizations were very rare indeed, this was not tested in the present experiment.

3.6.4.2 Avoidance

In this section we consider the high levels of avoidance under ATC and PTC. Like in the previous experiment, there seemed to be at least four types of avoidance. First of all, there were cases, like (49) and (50), in which an answer with a predicative adjective instead of the attributive adjective was given.

- (49) *Twee konijnen zijn zork en beer is gewoon.*

two rabbits are zork and bear is normal

'Two rabbits are zork and bear is normal.'

- (50) *De ene konijn was zork.*

the one rabbit was zork

'One rabbit was zork.'

In a second type of avoidance, as in (51), children did not want to answer at all.

- (51) *Ik vind het een beetje moeilijk.*

I find it a little difficult

'I think it's a bit difficult.'

The third type of avoidance featured children who were describing, but not saying the nonce word, as in (52):

- (52) *een langpoot*

a long-leg

'a longleg'

Other children gave answers in which the nonce adjective was substituted for a different adjective fitted into the context. This is the case, for example in (53)-(56):

- (53) *twee blonde konijnen met een rode hoed*
two blond rabbits with a red hats
'two blond rabbits with red hats'
- (54) *twee gele konijnen*
two yellow rabbits
'two yellow rabbits'
- (55) *twee blije konijnen*
two happy rabbits
'two happy rabbits'
- (56) *één bruine haas met een groene hoed en een beige meneer met een witte baard*
one brown hare with a green hat and a beige sir with a white beard
'one brown hare with a green hat and a beige sir with a white beard'

Answers of Type 1, in which "zork" was used, were categorized as 'avoid'. All answers in which the adjective "zork" was not used at all, i.e. Types 2-4, were categorized as 'other'. This categorization originated in an earlier idea that Type 1 avoidance was due to chance/discourse factors and Type 2-4 avoidance reflected an inability to apply the ER productively. However, the issue is much more complex than that. In the previous experiment (section 2.6.4.3) various causes for avoidance in the different answer types were explored, which apply here as well.⁶⁵ Again it is impossible to determine which cause or causes account for particular cases. Only the factor 'not having acquired the nonce adjective' seems relatively unimportant here: almost all children knew what "zork" meant. In the interpretation of the results section that follows, the 'avoid' responses and 'other' responses will be collapsed.

⁶⁵ These were: discourse factors, personality factors, performance, not having acquired the nonce adjective at all, having forgotten the phonological content of the nonce word, deliberate Avoidance of the target structure, and unknown other factors.

3.7 Interpretation of the results

In general, the design of the experiment was successful. The experiment as a whole seemed interesting to the subjects. The general level of attention (measured in terms of performance on the attention control trials) was very high, with an average of around 95% for all groups. Performance on the ATC was also quite high, above 90% for all groups. Gaining better results in teaching the children the meaning of the nonce adjective was one of the explicit aims of this experiment. Compared to the previous experiment, in which an average of 70% but only 64% of the learners had acquired the nonce adjective, subjects' performance has increased significantly. Children who had acquired a different word resembling "zork" were rare.

It was hypothesized that at least a considerable number of subjects within the population of the 'Learners', and perhaps some of the 'Experts' would not be able to apply the ER to a novel situation, since they were in the IBC learning stage or only just beginning to form a more abstract representation. This prediction was borne out. In the STC, 14 Learners or 35% produced the correct form of the adjective, but 6 Learners or 15% produced the incorrect form and 40% avoided. Out of the 23 Experts, 61% produced the correct form: one can see that this group's performance is better than that of the Learners. However, even in this group there are three incorrect answers and six avoidance answers. Finally, none of the four Clueless children produced a grammatical construction (with two incorrect and two avoidance answers).

Like in the previous experiment, the high levels of avoidance are disturbing. We do not know what causes individual cases, and yet we can not ignore this group, because it may well be meaningful. However, this time a clear pattern does emerge, which is meaningful even if we do not know how to deal with the avoidance cases. In all learning stages, there was a significant amount of children who could not productively apply the ER to a novel situation: 15% of Learners, and 16% of the total. Instead, they applied the AIR. This was true even for some of the Experts, that is, those children who scored perfectly in the pretest – perhaps these 'Experts' were actually 'Learners'. The results are not *very* strong, but they do support the experimental hypothesis (IBC hypothesis, see Table 1) that for any grammatical rule there is an extended acquisition trajectory and that it takes some for children to develop abstract, general knowledge of that rule. The opposite view, that a small number of examples suffices to acquire a rule to maximal generality, finds no support. As was explained in section 1.4, these findings may support Tomasello's hypothesis, and argue against a parameter-setting account of UG. It is also possible that UG does not apply to morphology, which makes Tomasello right about morphology, but not necessarily about other domains of LA1. Moreover, these finding may be

support to different views of UG, which incorporate the possibility of gradual learning, but which we did not consider in this thesis.

The PTC shows that children do not overgeneralize the bare form of the adjective to the plural. Only one Learner and one Expert did this, making up only 3% of the entire tested population. This may be considered indirect support that the adjective plus schwa is indeed the default rule. Finally, the broad range of age for each of the learning stages confirm the lengthy acquisition trajectory which Blom, Polisenska and Weerman (2008) describe.

3.8 Conclusion

3.8.1 General conclusion

In this experiment a group of children was again divided into subgroups ('learning stages') based on how well they obeyed a sophisticated rule of adjective agreement in the adult grammar, the so-called Dutch Adjective Rule (ER). The broad range of age for each of the learning stages confirms the lengthy acquisition trajectory which Weerman, Bisschop and Punt (2006) and Blom, Polisenska and Weerman (2008) describe, and which was confirmed in the first experiment. In the experimental task, these children were asked to apply the ER to two new situations involving a nonce adjective in a singular and plural DP. The PTC shows that children do not overgeneralize the bare form of the adjective of the plural, confirming studies on the acquisition of the ER (see chapter 1). Again, over one-third of the subjects (Clueless, Learners and Experts) avoided the STC, and we do not know why, or how to interpret these answers: avoidance remains a problem.

However, even apart from the avoidance answers this experiment yields clear, if not very strong results. A significant subset, 15% of the Learners and 16% of the Experts, did not apply the ER to the novel situation, but applied the AIR instead. This data supports the prediction made in the experimental hypothesis and may point to a gradual and piecemeal learning process for the ER.

This raises interesting issues. We may conclude that Tomasello is right, at least about the acquisition of this grammatical-morphological rule. Suppose we infer that the same kind of learning process applies in other domains as well (as previous work, described in Chapter 1, implies). Then we need to suppose that UG does not exist. The alternative is that Tomasello is right about morphology and morphological rules need to be learnt, but UG does not apply to

morphology (cf. *Chapter 1*, note 10; section 1.4). The question then become why the ER would *not* be a rule in UG, and what view of UG we should take.⁶⁶

3.8.2 Design flaws and follow up.

Most of the design flaws in the previous experiment were successfully repaired. However, one thing did not work and this is to reduce the high number of avoidance answers. There were still many children who gave a response in a different format from the format in which the question had been asked. The problem was that some such answers (Type 1) were equally or almost as felicitous as the answer in the ‘correct’ format. The children had been prepared in a warm-up session, suggesting them how to answers the question, but there had been no explicit instruction and evidently the warm-up missed its goal. This is definitely an issue to be improved in a follow-up. Furthermore, the design only included four trials of the EPC and one trial of the STC and PTC each, in order to prevent carry-over effects. However, such a design made the experiment vulnerable: the child had only a few chances to give a response, in the case of the STC and PTC she had only one chance to show whether or not she could apply the ER productively. In a follow-up design it might be wise to consider having multiple trials and to try and circumvent the potential problem of a carry-over effect in a different way.

⁶⁶ As was pointed out before (Ch. 1, n. 10) at some later point it would be very interesting to include the study by van Wijk (2006) into this discussion. Van Wijk studied the acquisition of Dutch plurality and found that Pinker’s *Words-and-Rules* theory does not explain her data. She proposes a different model in terms of an OT analysis.

4. Discussions

In this chapter, the results of the two experiments are compared and combined in a general discussion. An evaluation is presented of the improvements of the first experiment's design in the second experiment. A blueprint for a third follow-up experiment is given as well.

4.1 Comparative discussion of the two experiments

In the introduction it was established that the design aimed at being natural and at drawing attention to the guesses, the stories and the puppet, but not to the pretest and main test trials. Indeed, the fact that many children were amused or even irritated at the puppet's confusion shows that even the older children participated in the game when they 'helped the puppet'; instead of feeling they were being tested. Thus, the design in both experiments turned out to succeed in its goal of distracting the subjects from the real test. It was also appropriate to an age range of four to almost eight years of age. Only one or two children refused to cooperate and help the puppet. However, the wish to have an experiment in which the test trials were like spontaneous utterances had a large backdrop: it was impossible to control the answer format. This resulted in high levels of avoidance in both experiments.

The first experiment featured an enhanced version of the elicited imitation task. Rather than being able to parrot the puppet, the puppet suggested two or three alternatives for what was on the pictures ("was it X? Was it Y? Or was it rather Z? I'm confused!"). These questions were deliberately designed to overload working memory and to force the child to parse the question and then form its own answer. Indeed, many quite original child responses very clearly show that there was no question that they had parroted the puppet. However, the second experiment used the method of elicited production, because in that way parroting was impossible in any case. Indeed, as we will discuss below, the elicited imitation task might have caused some avoidance.

In the first experiment, the general levels of attention (around 80%) and the knowledge of the nonce adjective (between 64% and 70%) were somewhat disappointing and the second experiment aimed at improving these numbers. With general attention levels and knowledge of

the nonce adjective above 90% this aim succeeded. The better drawings – and perhaps better stories and the experience the experimenters had gained with regard to playing the puppet – helped to increase the general levels of attention. With regard to the nonce adjective, a shorter (monosyllabic) adjective with a highly salient meaning was chosen the second time. Whereas in the first experiment, the nonce adjective had featured in only one story of the pretest, in the second experiment this adjective appeared centrally in both stories of the pretest. Apparently, it was necessary to reinforce the meaning of a salient nonce adjective in order to make its acquisition within a 16-minute session feasible.

The second experiment featured a plural test condition to make sure that children had fully acquired the ER, and so did not overgeneralize it to the plural case. Indeed, none of the children did so. Based on the second experiment, it becomes possible to give a tentative explanation for the lack of overgeneralizations of the AIR in the first experiment. Given the default status of this rule, we would have expected such overgeneralizations. We suggest that the cause may lie in the difference between experimental tasks. The second experiment was an elicited production task, in which the correct answer was never presented; conversely, since the first experiment was an elicited imitation task, the children had heard the correct alternative. Perhaps hearing the correct answer made the child realize that a DP with the default allomorph of the adjective was not correct, although she was not able to apply the ER (as her knowledge was not yet productive). And so, if she could not give the correct answer in the STC, she avoided it. The same mechanism was reported in a study that tested the L1 acquisition of colours in English. In this study children were asked what they thought the colour of some greenish object was. Most children replied ‘green’. Subsequently, these children were taught that the colour of this object was actually ‘magaan’. Three weeks later, the same children were tested again. When asked what the colour of the same object was, most children replied that they did not know. Recall that when asked for the first time, most children had answered ‘green’. The conclusion of this study was that the children had forgotten the new name of the colour, but they did remember it had a different name than ‘green’. Thus, when asked, they did not reply ‘green’, but ‘I do not know’. Possibly, the same mechanism is at work in the responses of the STC in the first experiment. Because children had heard the correct alternative they realized that, for example, *een zorke_draakje* was not correct, but they were not able to produce the correct answer themselves (because in order to do so, they should have internalized this piece of grammar). This may be one of the reasons why they avoided this question.

One problem that was not solved in the second experiment concerned the high levels of avoidance in the pretest. Although a more extensive warm-up session was used in the second

experiment to suggest the proper format for answering to the children, many children did not use a DP with an attributive adjective in the STC/PTC or did not use the nonce word at all. Moreover, in the second experiment there was also avoidance of GPC, because the definite article was often not used. The second experiment included much more children than the first, but because of all the avoidance, we ended up with about the same amount of included children as in the first experiment. This was a highly undesirable result. A follow-up experiment should consist of explicit training on the desired answer format. However, the fact that this might have a negative impact on the intended ‘spontaneity’ in the design should be considered.

4.2 Blueprint of a follow-up experiment

The most important improvement of a follow-up experiment should be teaching children the format in which we want them to answer. Given children’s talent for learning and imitating, this should be possible. The nouns’ gender should be taught to the children first, so that no subjects will be lost because they think the noun is a common gender noun. Finally, it will be necessary to include more trials of the pretest and the test conditions and to balance the number of pretest and test trials. Increasing the number of trials will benefit the statistical power of the experiment. However, one would have to think about a way to prevent carry-over effects.

A possibility for the design of the follow-up experiment is an experiment spread out over four days. Day one is spent on warm-up: teaching the children the task and the desirable answer format. On days two to four, each day one set of stories is presented, each with two pretest trials and one test trial. This design circumvents the dangers of a carry-over effect while at the same time one nonce adjective still suffices. Introducing more than one nonce adjective in the course of one week may be too much for small children, especially if they do not encounter these words outside the context of the experiment. In general, the stories should be kept short. All in all, such a design may take up just as much time as the previous two experiments. Though this new experiment runs for four days with each child, fewer subjects will have to be tested, if properly taught.

General conclusion

In his handbook *Construction a Language: A Usage-Based Theory of Language Acquisition* (2003), and in other experimental studies (e.g. Tomasello 1992, 2004, 2008; Tomasello *et al.* 1997, 1998, 2007), Michael Tomasello has proposed an account of first language acquisition. In the eyes of Michael Tomasello, there is no UG (dedicated innate linguistic knowledge): a dual-mechanism approach to LA1 such as the generative Principles and Parameters framework does not explain the facts of LA1. Although children are born with strong domain-general talents helping them to acquire their mother tongue (intention-reading and pattern-finding skills), learning a language boils down to real learning. Vocabulary must be learnt, but grammatical rules as well. Adult linguistic knowledge should be characterized as a structured inventory of constructions, which can be more or less abstract. In order to attain an adult-like grammar, a child goes through various learning stage, one of which is the item-based construction (IBC) learning stage. In this stage a child memorizes specific examples of a rule, but she does not generalize across these examples or see them as instances of a more general rule. Indeed, these pieces of knowledge are isolated, unconnected, island-like. The process in which the representation of a rule gradually grows more abstract can take months, or even years.

The IBC hypothesis and the UG parameter-setting view both make distinct predictions about productivity. The latter account expects that once a child has heard a few instances of a particular rule she has acquired the rule with maximum generality and will be able to apply it productively to novel situations. By contrast, the IBC hypothesis holds that island-like knowledge is only gradually replaced by more abstract representations, and until that happens, the child will not be able to apply the rule productively. In this thesis the IBC hypothesis was tested by means of two experimental studies about a Dutch rule of adjective-noun agreement, the ER. This rule states that an attributive adjective in a DP that is singular, neuter and indefinite does not have a schwa suffix (contrary to the default allomorph for adjectives in attributive DPs, which do have a schwa suffix). Children between 4 and 7 were taught a nonce adjective and were asked to produce it in a situation in which the ER applied. A pretest had divided children into three learning stages: Clueless children, Learners and Masters. Tomasello's work was interpreted as predicting that there would be children in all three 'learning stages' of the ER; and secondly, that all Clueless children and a considerable number of the Learners and perhaps the Experts would not be able to productively apply the ER to the novel situation.

The design of the two experiments was similar, but in the second experiment some design flaws of the first experiment had been repaired. Moreover, the experimental conditions in the first experiment were elicited imitations and those in the second experiment were elicited productions. Both experiments used a version of the Truth Value Judgment task, which is the picture-story guessing game paradigm. However, both the pretest and the main test trials consisted of answers to clarification questions, in which the puppet typically asked about the colour or size of a main character or one of its attributes.

The results of the first experiment were not easy to interpret. The pretest resulted in a subdivision of the children in learning stages: 8% of the population of 75 children was Clueless, 38% was a Learner, 33% were Experts. The remaining children had to be excluded for insufficient data. In the category of Clueless children, all subjects avoided the STC. ‘Avoided’ means that they gave an answer in the wrong format, for example, by using a definite article instead of the indefinite article or a predicative adjective instead of an attributive adjective. The category ‘avoid’ also included children who did not use the nonce noun in their answer or who refused to answer at all. Furthermore, 62% of the learners applied the ER correctly in the STC, but all other children (38%) avoided this trial. None of them produced the default form of the adjective. The situation was similar with the Experts: 64% applied the ER correctly, 36% avoided this trial. Only one Expert supplied the default form.

If avoidance is ignored for reasons of inconclusiveness of the data, the UG hypothesis seems to be confirmed: all children, even those who did not always apply the ER correctly with known nouns, could productively apply it to novel situations. However, the avoidance levels were very high (an average of 40% of all children) and we cannot simply exclude these subjects. We cannot draw any definite conclusions about the causes of avoidance; but still it was shown that if avoidance could be determined to be due to some cause A, this would influence our analysis in a different way than if avoidance were due to another cause B. The interpretation of the data thus hinges on the interpretation of avoidance, but the data do not allow us to interpret the avoidance answers. For this reason, the first experiment ends without a conclusion.

The second experiment had clearer results. Again, the total population was spread out over the three learning stages: 3% was Clueless, 31% were Learners and 18% were Experts. Again the remaining children were excluded for inconclusiveness of the data. In the PTC, as was expected, an overgeneralization of ER was virtually unattested. In the STC, all Clueless children either gave the incorrect answer (50%) or avoided (50%). Among the Learners, 35% applied the ER, but 15% incorrectly applied the AIR and 50% avoided. With regard to the Experts, 42% gave the correct answer, but 16% incorrectly applied the AIR and another 41%

avoided the proper answer format. There were high levels of avoidance, which is impossible to interpret. However, this time clear results emerge even apart from these avoidance answers. The data shows that a significant subset of Clueless children, Learners and Experts was not able to apply the ER productively to a novel situation and hence they used the default rule, the AIR. Although this was a minority (16%) this points to a view of gradual and piecemeal learning, rather than instantaneous parameter setting. However, the conclusion of this experiment is disjunctive. If these results have implications for other domains of L1A, then Tomasello may be right and UG does not exist. Alternatively, UG may still exist, but rather we need to assume a different version of it, which keeps the possibility of gradual learning open. A third possibility is that Tomasello is right about morphology, but UG (either a parameter-setting view or a different version) does not apply to this rule of morphology. This opens up the discussion to the issue of how morphological rules should be represented in UG. Moreover, if we should conclude that Tomasello and UG make the same predictions (piecemeal, slow learning of grammatical rules), it is necessary to explain what we need innateness for, if it does not speed up the language acquisition process. In any case, this experiment has provided some clear data, which we can use as evidence in our consideration of any one of the theories mentioned above: Tomasello, parameter-setting, statistical/gradual learning.

These two experiments confirm the results of previous studies on the acquisition of Dutch grammatical gender and the ER, concerning the lengthy acquisition trajectory for both (Weerman, Bisschop and Punt 2006; Blom, Polisenska and Weerman 2008). Moreover, while an acquisition trajectory up until six years was predicted, in our experiment, even some seven-year-olds were in the Learner category. Furthermore, the results of the experiment confirm the default status of the adjective plus schwa. There were hardly any children who overgeneralized the bare form, either in common gender singular DPs or in plural DPs. By contrast, children overgeneralized the default form regularly.

It is time to conclude. This study aimed at testing Tomasello's predictions about children's productivity on a particular grammatical rule of Dutch. First the proficiency of all subjects was charted with regard to this rule and then it was tested whether children could apply it productively to a novel situation. The first experiment ended without a conclusion. In the second experiment, a significant number of Clueless children, Learners and Experts – 16% – was *not* able to apply the ER productively in a novel situation. These results confirm Tomasello's contention that the learning process takes time, though they do not *prove* his theory. In any case, we have seen that in the acquisition of grammatical morphology, abstractions are formed in a slow, piecemeal and gradual process. Only then does productivity begin.

Bibliography

- Abbot-Smith, K., E. Lieven and M. Tomasello. "What Children Do and Do Not Do With Ungrammatical Word Orders. *Cognitive Development* 16 (2001): 1-14.
- Abbot-Smith, K. and M. Tomasello. "Exemplar-Learning and Schematization in a Usage-Based Account of Syntactic Acquisition." *The Linguistic Review* 23 (2006): 275-290.
- Akhtar, N. and M. Tomasello. "Young Children's Productivity With Word Order and Verb Morphology." *Developmental Psychology* 33.6 (1997): 952-965.
- Akhtar, N. "Acquiring Basic Word Order: Evidence for Data-Driven Learning of Syntactic Structure." *Journal of Child Language* 26 (1999): 339-356.
- Blom, A. "Het Ondoorgrendelijk Bijvoeglijk Naamwoord." *Forum der Letteren* 35 (2008): 63-80.
- Blom, E., D. Polisenska & S. Unsworth. "The Acquisition of Grammatical Gender in Dutch." *Second Language Research* 24.3 (2008): 259-66.
- Blom, E., D. Polisenska & F. Weerman. "Articles, Adjectives and Age of Onset: the Acquisition of Dutch Grammatical Gender." *Second Language Research* 24.3 (2008): 279-332.
- Bloom, L., L. Hood and P. Lightbown. "Imitation in Language Development: If, When and Why." *Cognitive Psychology* 6 (1974): 380-420.
- Boersma, P. "How we learn variation, optionality, and probability." *Proceedings of the Institute of Phonetic Sciences of the University of Amsterdam* 21 (1997): 43-58.
- Boersma, P. *Functional phonology: Formalizing the interactions between articulatory and perceptual drives*. Doctoral dissertation. University of Amsterdam. LOT Dissertation Series online, 1998.
- Braine, M. "The ontogeny of English phrase structure." *Language* 39 (1963): 1-14.
- Braine, M. *Children's first word combinations*. Monographs of the Society for Research in Child Development 41.1 (1976).
- Brooks, P. and M. Tomasello. "Young Children Learn to Produce Passives with Nonce Verbs." *Developmental Science* 35.1 (1999): 29-44.
- Carey, M. "Interlanguage Phonology: Source of L2 Pronunciation 'Errors'?" In: R. Mannell, F. Cox and J. Harrington. *An Introduction to Phonetics and Phonology*. Macquarie University, 2009. [<http://clas.mq.edu.au/phonetics/index.html>, nov 2009].
- Chomsky, N. *Syntactic Structures*. Den Haag, 1957.
- Chomsky, N. *Lectures on Government and Binding*. Dordrecht, 1981.

- Chomsky, N. *The Minimalist Program*. Cambridge, Massachusetts, 1995.
- Clark, E. "Listen, Construct and Learn: *Constructing a Language: A Usage-Based Theory of Language Acquisition by Michael Tomasello.*" (review). *Nature* 425 (Oct. 2003): 769-70.
- Clark, E. *First Language Acquisition*. Cambridge, 2003.
- Deutsch, W. and F. Wijnen, F. "The Article's Noun and the Noun's Article: Explorations into the Representation and Access of Linguistic Gender in Dutch." *Linguistics* 23 (1985): 793-810.
- Miller, D. Gary. "On the History of Infinitive Complementation in Latin and Greek." *Journal of Indo-European Studies* 2 (1974): 223-246.
- Dittmar, M., K. Abbot-Smith, E. Lieven and M. Tomasello. "Young German Children's Early Syntactic Competence: a Preferential Looking Study." *Developmental Science* 11.4 (2008a): 575-582.
- Dittmar, M., K. Abbot-Smith, E. Lieven and M. Tomasello. "German Children's Comprehension of Word Order and Case Marking in Causative Sentences. *Child Development* 79.4 (2008b): 1152-1167.
- Donalson, B. *Dutch Reference Grammar*. Leiden, 1987.
- Dowty, D. "Thematic Proto-Roles and Argument Selection." *Language* 67.3 (1991): 547-619.
- Ferguson, C. & Farwell, C. "Words and sounds in early language acquisition. *Language* 51.2 (1975) 419-439.
- Fitch, W., M. Hauser and N. Chomsky. "The Evolution of the Language Faculty: Clarifications and Implications." *Cognition* 97 (2005): 179-210.
- Gass, S.M. and L. Selinker. *Second language acquisition*. Mahwah, New Jersey, 2001.
- Gertner, Y., C. Fisher and J. Eisengart. "Learning Words and Rules: Abstract Knowledge of Word Order in Early Sentence Comprehension. *Psychological Science* 17.8 (2006): 684-691.
- Hauser, M., N. Chomsky and W. Fitch. "The Faculty of Language: What Is It, Who Has It, and How Did It Evolve?" *Science* 298 (2002): 1569-1579.
- Hornstein, N., J. Nunes and K.K. Grohmann. *Understanding Minimalism*. Cambridge, 2005.
- Hyams, N. *Language acquisition and the theory of parameters*. Dordrecht, 1986.
- Hyams, N. "The acquisition of inflection: a parameter-setting approach." *Language Acquisition* 15.3 (2008): 192-209.
- Ingram, D. *First language acquisition: Method, description, and explanation*. New York, 1989.
- Kleinmann, H.H. "Avoidance Behaviour in Adult Second Language Acquisition." *Language Learning* 27.1 (1977): 93-107.

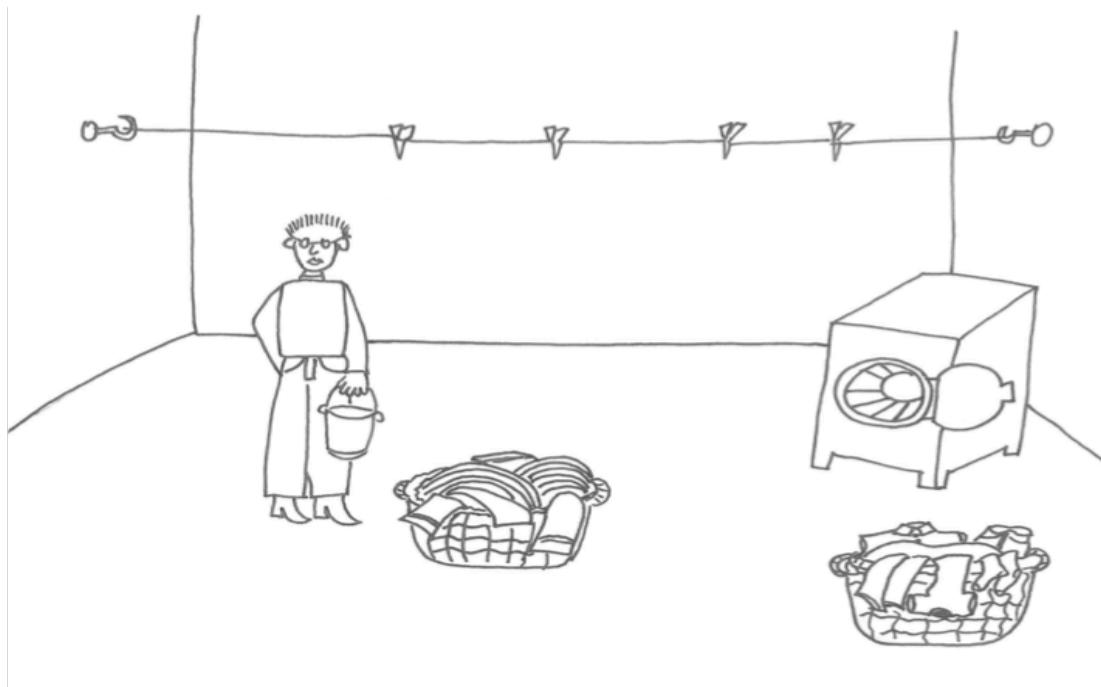
- Langacker, R. "Constructing a Language: A Usage-Based Theory of Language Acquisition By Michael Tomasello." Review. *Language* 81.3 (2005): 748-49.
- Laufer, B. and Eliasson, S. "What causes avoidance in L2 learning: L1-L2 difference, L1-L2 similarity, or L2 complexity? *Studies in Second Language Acquisition* 15 (1993): 33-48.
- Lieven, E., H. Behrens, J. Spears and M. Tomasello. "Early Syntactic Creativity: a Usage-Based Approach." *Journal of Child Language* 30 (2003): 333-370.
- Lieven, E., J. Pine and G. Baldwin. "Lexically-Based Learning and Early Grammatical Development." *Journal of Child Language* 24 (1997): 187-219.
- McDaniel, D., C. McKee and H. Smith Cairns. *Methods for assessing children's syntax*. Cambridge, Massachusetts, 1996.
- Meisel, J.M. "Parameters in Acquisition." In: P. Fletcher and B. Mac Whinney (eds.) *The handbook of child language*. Malden, 1995.
- Pizzuto, E. and M. Caselli. "The Acquisition of Italian Verb Morphology in a Cross-Linguistic Perspective. In Y. Levy, ed. *Other children, other languages: Issues in the theory of language acquisition*. Hillsdale, NJ, 1994.
- Radford, A. *Syntactic Theory and the Acquisition of English Syntax*. Oxford, 1990.
- Radford, A. "Towards a structure-building model of acquisition." In: H. Clahsen. *Generative Perspectives on Language Acquisition*. Amsterdam/Philadelphia, 1996.
- Pinker, S. and Prince, A. "Regular and irregular morphology and the psychological status of rules of grammar." In: S.B. Lima, R. L. Corrigan and G. K. Iverson. *The reality of linguistic rules*. Amsterdam, 1994.
- Pinker, S. 1999. *Words and rules: the ingredients of language*. New York, 1999.
- Savage, C., E. Lieven, A. Theakston and M. Tomasello. "Testing the Abstractness of Children's Representations: Lexical and Structural Priming of Syntactic Constructions in Young Children." *Developmental Science* 6.5 (2003): 557-567.
- Schachter, J. "An Error in Error Analysis." *Language learning* 24.2 (1974): 73-107.
- Schllichting, L. *Discovering syntax: An Empirical Study in Dutch Language Acquisition*. Dissertation. Nijmegen, 1996.
- Schwartz, R.G. and Leonard L.B. "Do children pick and choose? An examination of phonological selection and avoidance in early lexical acquisition. *Journal of child language* 9.2 (1982):319-36.
- Thornton, R. "Why continuity?" *Natural Language and Linguistic Theory* 26.1 (2008) :107-46.
- Tomasello, M. *First Verbs: A Case Study of Early Grammatical Development*. New York, 1992.
- Tomasello, M. *Constructing a Language: A Usage-Based Theory of Language Acquisition*.

- Cambridge, Massachusetts, 2003.
- Tomasello, M. "What Kind of Evidence Could Refute the UG Hypothesis?" *Studies in Language* 28 (2004): 642-44.
- Tomasello, M. *Origins of Human Communication*. Cambridge, Massachusetts, 2008.
- Tomasello, M. *Why we Cooperate*. Cambridge, Massachusetts, 2009.
- Tomasello, M., N. Akhtar, K. Dodson and L. Rekau. "Differential Productivity in Young Children's Use of Nouns and Verbs." *Journal of Child Language* 24 (1997): 373-87.
- Tomasello, M. and P. Brooks. "Young Children's Earliest Transitive and Intransitive Constructions." *Cognitive Linguistics* 9 (1998): 379-395.
- Tomasello, M., Carpenter, M., & Lizskowski, U., (2007). A New Look at Infant Pointing. *Child Development*, 78, 705-22
- Unsworth, S. "Age and Input in the Acquisition of Grammatical Gender in Dutch." *Second Language Research* 24.3 (2008): 365-395.
- Van der Ziel, M. *The Acquisition of the Weak Cross-Over Constraint. Evidence from Dutch Pre-School Children*. Unpublished master thesis. Utrecht, 2008.
- Weerman, F., J. Bisschop & L. Punt. "L1 and L2 Acquisition of Dutch Adjectival Flexion." ACLC working papers. Amsterdam, 2006. <http://home.hum.uva.nl/variflex/pps.htm>.
- Wijk, J. van. *The Acquisition of the Dutch Plural*. Utrecht, 2006.
- Wittek, A. and M. Tomasello. "German-speaking Children's Productivity With Syntactic Constructions and Case Morphology: Local Cues Act Locally." *First Language* 25.1 (2005): 103-125.
- Yang, C. *Knowledge and learning in natural language*. New York, 2002.

Appendix 1: Materials of the first experiment

(a) Materials set 1

EPC 1



storyteller: This is a story about a man named John.

Now he is in the attic because today he has to do the laundry. He's carrying a bucket. There's a green basket of dirty clothes on the ground that has to be washed, and also a red basket of dirty towels that has to be washed. There's also a book lying on the ground. And when the wash is done, it has to be hung up to dry.

puppet: *Wacht even. Liggen de vieze kleren in een groen mandje*
wait briefly lie the dirty clothes in a green basket-dim.
'Wait a minute, are the dirty clothes lying in a green basket'

of in een rood mandje ...
or in a red basket
'or in a red basket ...'

of was het nu een groene emmer?
or was it now a green bucket
'or was it rather a green bucket?'

child (target): *een groen mandje*
a green basket-dim
'a green basket'

EPC2



storyteller: This story is about 2 boy dwarves, Pim (left) and Arturius (right). They live in a big toadstool. Pim is wearing red clothes and a red hat with yellow dots (storyteller pointing) and Arturius is wearing blue clothes and a blue hat with white dots. The boys each have a pet beetle and...

puppet: *Wacht even. Al die kleuren, al die stippen. Arturius, hé?*
wait briefly all those clothes, all those dots Arturius, hey
'Wait a minute. All these clothes, all these dots. Arturius, what?'

Draagt hij nou een blauw mutsje met witte stippen
wears he now a blue hat-dim with white dots
'Is he wearing a blue hat with white spots'

of een wit mutsje met blauwe stippen of was het nou een blauwe pet?
or a white hat-dim with blue dots or was it now a blue cap
'or a white hat with blue dots, or was it a blue cap?'

Ik snap het niet meer.
I understand it not more.
'I don't remember.'

child (target): *een blauw mutsje met witte stippen*
a blue cap-dim with white dots
'a blue cap with white spots'

Introduction of the nonce adjective



- storyteller: So, I was talking about the dwarves' pets. Both have a pet beetle and Arturius also has a magoet frog.
- puppet: Stop. Magoet?? What in the world is a magoet frog?
- storyteller: Well, "magoet" means that something has extra strong magical power. A magoet frog can cast very strong magical spells.
- puppet: Fine. Fine. Please go on.

EPC 3



storyteller: This story is about a bunch of circus animals: a small elephant, a fat tiger, and a white horse with a long black tail. They are getting ready for the evening show.

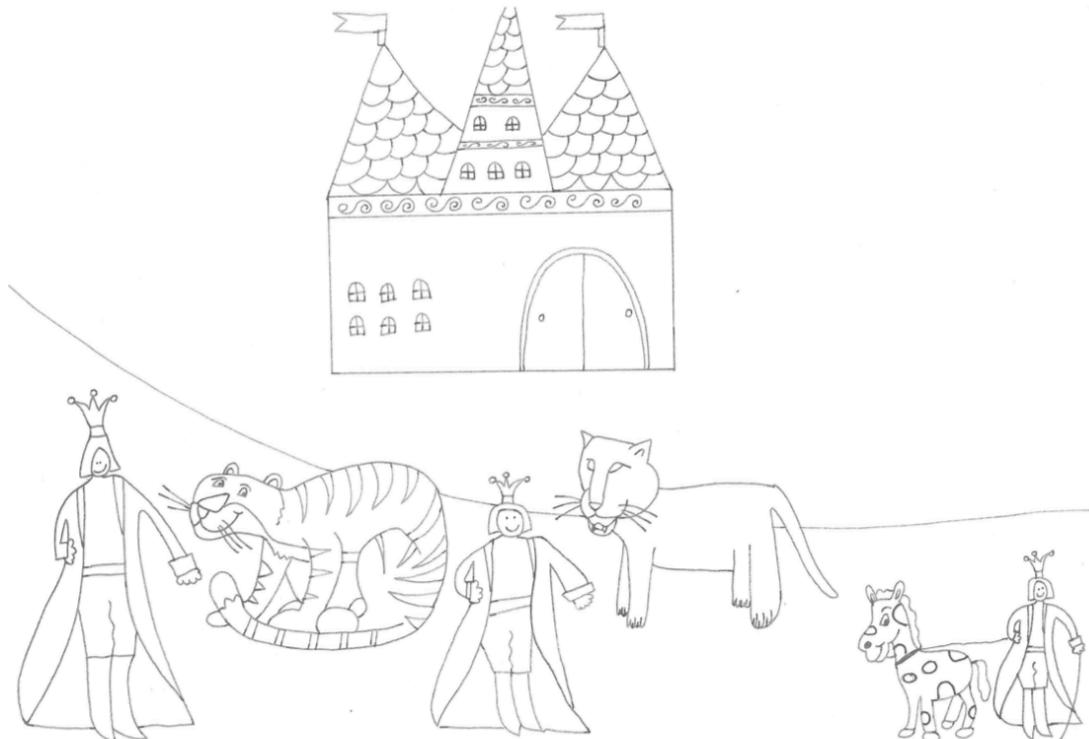
puppet: *Wacht even. Was het nu een wit paardje met een lange zwarte staart*
wait briefly was it now a white horse-dim with a long black tail
'Wait a minute. Was it a white horse with a long black tail'

of een zwart paardje met een lange witte staart
or a black horse-dim with a long white tail
'or a black horse with a long white tail'

of een tijger met een lange zwarte staart? Ik snap het echt niet meer.
or a tiger with a long black tail I understand it really not more
'or a tiger with a long black tail? I really don't understand.'

child (target): *een wit paardje met een lange zwarte staart*
a white horse-dim with a long black tail
'a white horse with a long black tail'

EPC 4



storyteller: This story is about three brothers who were princes. They lived in a beautiful palace. The oldest prince was named Koos, the second oldest Guus, and the youngest Mark. Each prince had an unusual pet. Koos had a fierce tiger, Guus a big panther, that also looked pretty dangerous, and little Mark had a little horse with yellow spots.

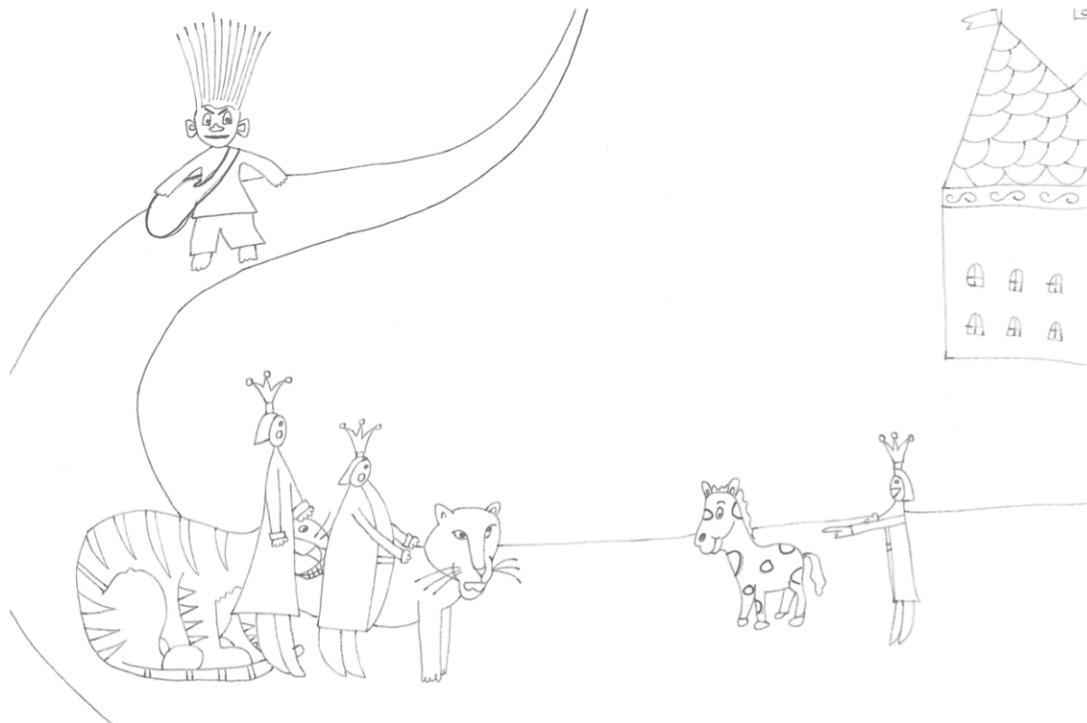
puppet: *Wacht even. Dat huisdier van Mark, was dat een klein paardje*
wait briefly that pet of Mark was that a small horse-dim
'Wait a minute. Mark's pet, was it a small horse'

met gele stippen of een geel paardje met kleine stippen?
with yellow spots or a yellow horse with small spots
'with yellow spots, or a yellow horse with small spots?'

Ik kon het niet helemaal onthouden.
I could it not completely remember
'I don't quite remember.'

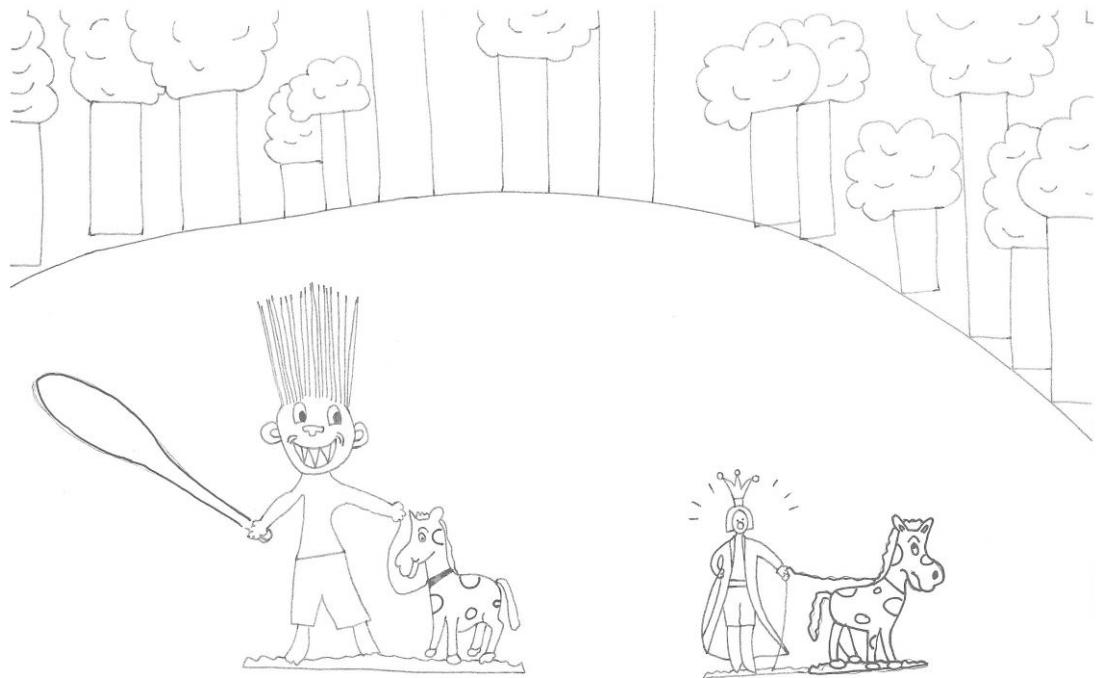
child (target): *een klein paardje met gele stippen*
a small horse-dim with yellow spots
'a small horse with yellow spots'

ATC



storyteller: Then little Mark said, "I may be small but I will catch the troll because I can use my horse. This horse, in fact, is magoet.
puppet: Wait a minute. Magoet? What does that word mean again?
child (target): (that you have magical power)

STC



storyteller: "I have a little surprise for you", said the trol. And he drew from his sack a big club and a small horse. "With this big club I will squash you as flat as a penny," said the troll. "And see this little horse? This horse is also magoet and I will use it to defeat yours."

puppet: *Wacht even. die trol ... had die nu een grote knots en een magoet paardje,*
wait briefly that troll had that now a big club and a magoet horse-dim
'Wait a minute. Did the troll have a big club and a magoet horse'

of was het nu een magoete knots en een groot paardje?
or was it now a magoet club and a big horse-dim
'or was it rather a magoet club and a big horse?

Ik weet het even niet meer.
I know it briefly not more.
'I've forgotten.'

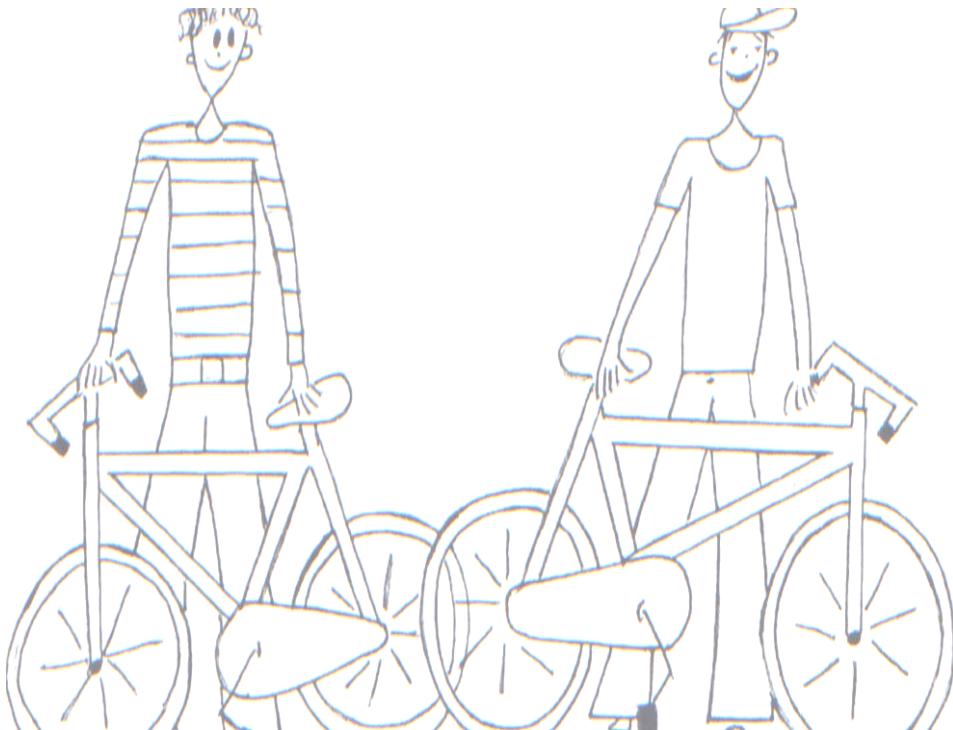
child (target): *een grote knots en een magoet paardje*
a big club and a magoet horse-dim
'a big club and a magoet horse'

(b) Materials set 2

EPC 1

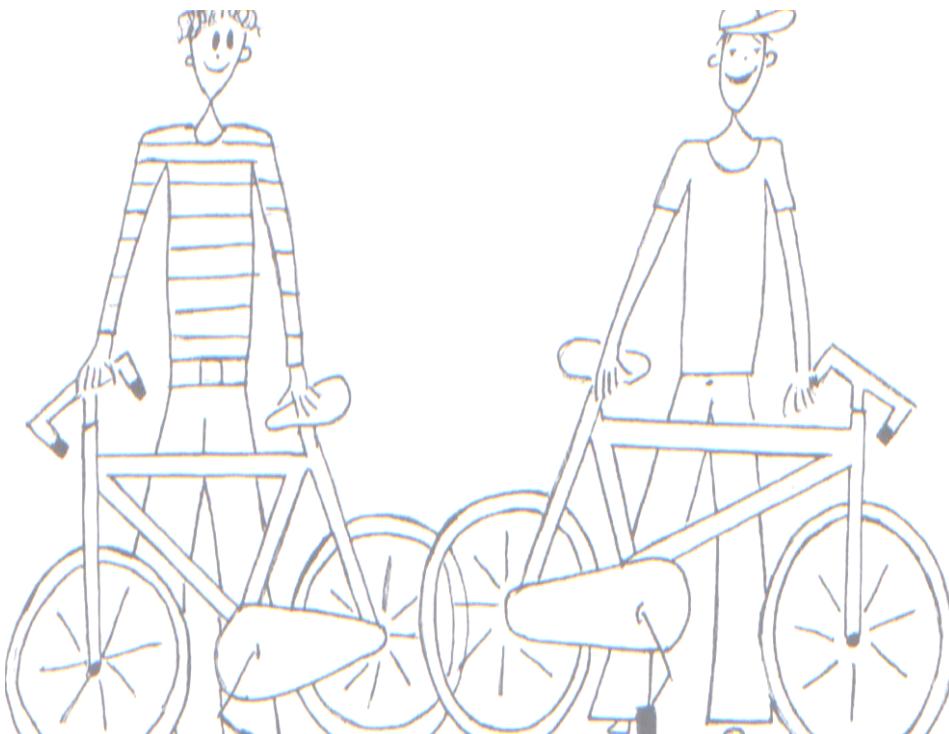
= EPC 1 in materials set 1

Introduction of the nonce adjective



- storyteller: This story is about two brothers, Pete (right) and Lorenzo (left). Pete is wearing a red cap and a red T-shirt and Lorenzo is wearing a striped jersey. They both have a nice new bike. Pete has a red bike, but the seat is a very unusual color. See that? Do you know what color that is? (to the child) Drakie, do you know perhaps what color that is? (showing picture to puppet).
- puppet: Sure, I know. We dragons call that “zork”.
- storyteller: “Zork”? What a strange name for a color!
- puppet: That is a very common color! I know a lot of “zork” dragons. My own sister is zork, for example, and my grandpa is also a zork dragon.
- storyteller: Oh, okay.

EPC 2



storyteller: Okay, so Pete has a red bike with a zork seat and Lorenzo has a green bike with a blue seat.

puppet: *Wacht eens. Al die kleuren! Piet heeft een rode fiets met een zork zadeltje,*
wait once all those colors Pete has a red bike with a zork seat-dim
'Wait a minute. All those colors! Pete has a red bike with a zork seat'

maar had Lorenzo nou een groene fiets met een blauw zadeltje
but had Lorenzo now a green bike with a blue seat-dim
'but did Lorenzo have a green bike with a blue seat'

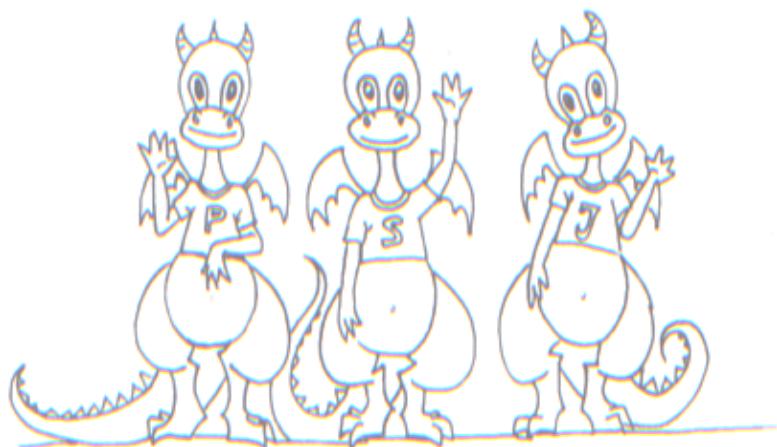
of een blauwe fiets met een groen zadeltje? Ik ben even in de war.
or a blue bike with a green seat-dim. I am briefly in the jumble
'or a blue bike with a green seat? I'm a bit confused.'

child (target): *een groene fiets met een blauw zadeltje*
a green bike with a blue seat-dim.
'a green bike with a blue seat'

EPC 3

= EPC 3 in materials set 1

EPC 4



storyteller: This story is about three dragon brothers, Grolp, Pez, and Zip. The brothers all had a different color. Grolp was grey with a blue shirt. And....

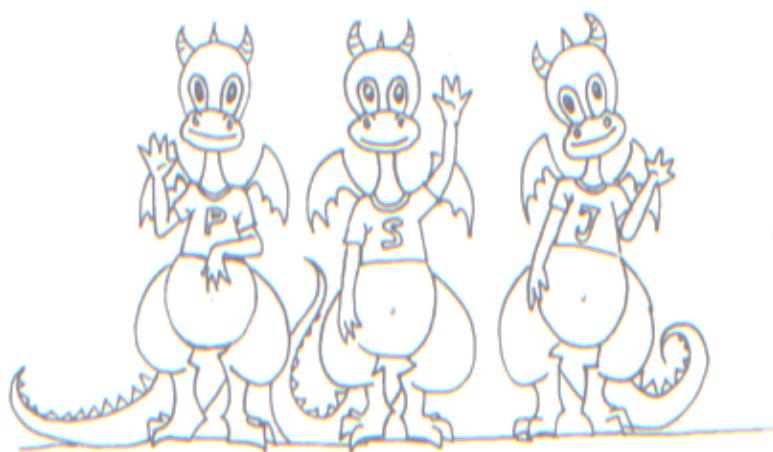
puppet: *Wacht even. Grolp was een grijze draak met een blauw shirtje*
wait briefly Grolp was a grey dragon with a blue shirt-dim
'Wait a minute. Was Grolp a grey dragon with a blue shirt'

of een blauwe draak met een grijs shirtje?
or a blue dragon with a grey shirt-dim
'or a blue dragon with a grey shirt?'

Ik kon het niet helemaal onthouden.
I could it not completely remember
'I couldn't remember everything.'

child (target): *een grijze draak met een blauw shirtje*
a grey dragon with a blue shirt-dim
'a grey dragon with a blue shirt'

ATC

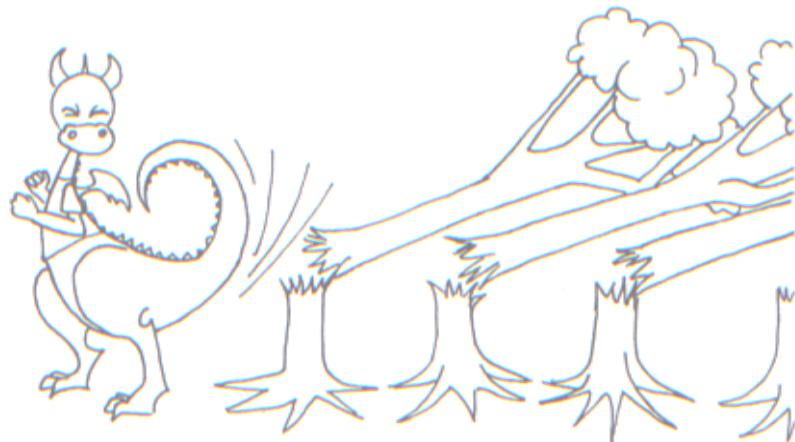


storyteller: So, Grolp was grey and Pez was purple and look! That color of his shirt! That is a zork shirt! And the third dragon Zip, he's all zork, a zork dragon with a red shirt.

puppet: I told you so! There are lots of zork dragons. But tell me, which dragon was all zork, Pez or Zip?

child (target): (child indicates Zip)

STC



storyteller: And then Pez knocked over 4 trees.

puppet: *Wacht even. Was Pez nou een paarse draak met een zork shirtje*
wait briefly was Pez now a purple dragon with a zork shirt-dim
'Wait a minute. Was Pez a purple dragon with a zork shirt'

of een zorke draak met een paars shirtje. Ik ben een beetje in de war.
or a zork dragon with a purple shirt-dim. I am a bit in the jumble
'or a zork dragon with a purple shirt? I'm a bit confused.'

child (target): *een paarse draak met een zork shirtje*
a purple dragon with a zork shirt-dim.
'a purple dragon with a zork shirt.'

Appendix 2: Materials of the second experiment

1. Warming up-session

(insert picture)

storyteller: We are going to play a guessing game with pictures. (child's name) and I are going to look at the pictures but (to the puppet) you are not, Drakie, and I will tell a story about what's happening on these pictures. Because the storylines are quite complicated, Drakie can also ask questions about what's happening on the pictures. And you (to the child) will answers these questions. I will shows you the first time, how it works. On this picture, there are two animals.

De een is een kleine tijger met een lange staart

The one is a small tiger with a long tail

'One of them is a small tiger with a long tail'

en de ander is een grote aap met een krulstaart.

and the other is a big monkey with a curl-tail

'and the other is a big monkey with a curly tail.'

Er is ook een banaan en een bos bloemen.

there is also a banana and a bunch flowers

'And there's also a banana and a bunch of flowers.'

puppet: *Wacht even. Ik heb een vraag.*

wait briefly I have a question

'Wait a minute. I have a question.'

Is het een grote tijger met een lange staart,

is it a big tiger with a long tail

'Is it a big tiger with a long tail,'

of een kleine tijger met een krulstaart?

or a small tiger with a curl-tail

'or a small tiger with a curly tail?'

storyteller: *Nee, het is een kleine tijger met een lange staart.*

no it is a small tiger with a long tail

'No, it is a small tiger with a long tail.'

EPC 1

storyteller: This story is about a bunch of horses.

Twee waren wit. Eén was grijs. Eén was bruin met witte vlekken.
two were white one was grey one was brown with white spots
'Two were white, one was grey, one was brown with white spots.'

En er waren ook een hond met bruine vlekken en een schaap.
and there were also a dog with brown spots and a sheep
'And there was also a dog with brown spots, and a sheep.'

puppet: *Wacht even, waren het nu twee bruine paarden met witte vlekken*
wait briefly were it now two brown horses with white spots
'Wait a minute. Did you say there were two brown horses with white spots'
en een hond met witte vlekken, of wat waren het dan?
and a dog with white spots or what were it then?
'and a dog with white spots, or what were they?'

child (target): *Eén bruin paard met witte vlekken en een hond met bruine vlekken.*
one brown horse with white spots and a dog with brown spots
'one brown horse with white spots and a dog with brown spots.'

EPC 2

storyteller: This story is about two boys, Tom and Piet. They have many pets.

Tom heeft een varken dat heel klein is
Tom has a pig that very small is
'Tom has a pig, which is very small,'

en ook twee grote katten, een witte en een zwarte.
and also two big cats a white and a black
'and also two big cats, a white one and a black one.'

puppet: *Wacht even, heeft Tom nou twee kleine varkens en één grote kat,*
wait briefly has Tom now two small pigs and a big cat
'Wait a minute, did you say that Tom has two small pigs and one big cat,'
of één kleine kat en twee grote varkens?
or one small cat and two big pigs
'or one small cat and two big pigs?'

child (target): *één klein varken en twee grote katten*
one small pig and two big cats
'one small pig and two big cats'

EPC 3

storyteller: *En Piet heeft een konijn dat heel groot is en ook twee kleine schildpadden.*
and Pete has a rabbit that very big is and also two small turtles
'And Pete has a rabbit, which is quite big, and also two small turtles.'

puppet: *Wacht even, heeft Piet nou twee grote konijnen en één kleine schildpad?*
wait briefly has Piet now two big rabbits and one small turtle
'Wait, did you say that Pete has two big rabbits and a small turtle?'

Of twee grote schildpadden en één klein konijn? Ik snap het niet.
or two big turtles and one small rabbit I understand it not
'Or two big turtles and a small rabbit? I don't get it.'

child (target): *een groot konijn en twee kleine schildpadden*
a big rabbit and two small turtles
'a big rabbit and two small turtles'

EPC 4

storyteller: The long walk made them hungry. Tom's mother has brought all kinds of delicious food: cake, bread, icecreams, carrots, bananas and candies. Tom's pig is very very hungry.

Eerst at hij twee grote bananen en één klein ijsje.
first ate he two big bananas and one small icecream-dim.
'First he ate two big bananas and one small icecream.'

puppet: *Wacht even. Wat at het varken van Tom?*
wait briefly what ate the pig of Tom
'Wait a minute. What did Tom's pig eat?'

Was het nu twee grote ijsjes en één kleine banaan?
was it now two big icecreams and a small banana
'Was it two big icecreams and a small banana?'

of één grote banaan en twee grote ijsjes
or one big banana and two big icecreams
'Or one big banana and two big icecreams?'

child (target): *twee grote bananen en één klein ijsje*
two big bananas and one small icecream-dim.
'two big bananas and one small icecream'

GPC 1

storyteller: *De hond, het schaap en het bruine paard waren aan het praten*
the dog the sheep and the brown horse were on it talking
'The dog, the sheep and the brown horse were talking'

toen plotseling een vogel op het hoofd van één van de dieren landde.
then suddenly a bird on the head of one of the animals landed
'when all of a sudden a bird landed on the head of one of the animals.'

puppet: *Wacht even. Op welk dier? Was 't de hond?*
wait briefly on which animal was it the dog
'Wait briefly. On which animal? Was it the dog?'

child (target): *Nee, het paard.*
no the horse
'No, the horse.'

GPC 2

storyteller: They went for a walk. The boys took their pigs with them. But, look, another pet animal is joining them!

puppet: *Welk huisdier? Was het de grote zwarte kat?*
which animal was it the big black cat
'Which animal? Was it the big black cat?'

child (target): *Nee, het konijn.*
no the rabbit
'No, the rabbit.'

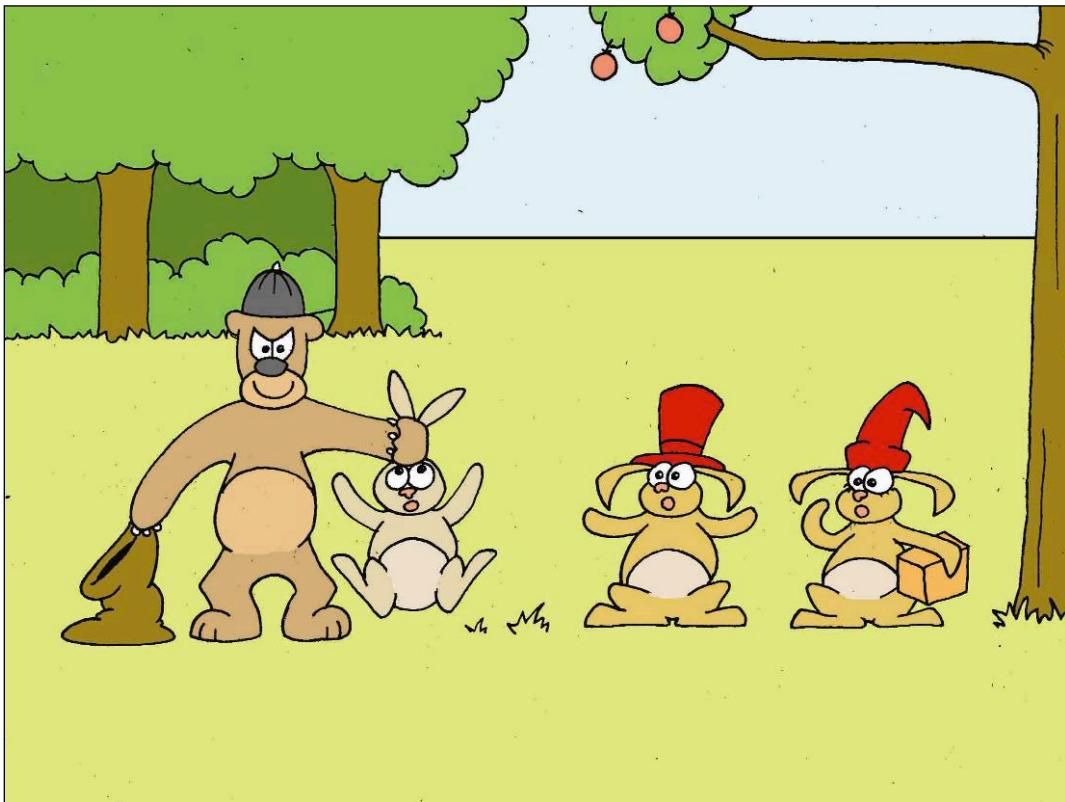
GPC 3

- storyteller: Tom's pig really wanted some cake, but the rabbit wanted that as well. So, the two of them were fighting about that. And then the rabbit decided to eat a few candies instead.
- puppet: *Wacht eens, wie at er nu taart? Het konijn?*
wait once who ate there now cake the rabbit
'Wait, who did you say ate cake? The rabbit?
- child: *Nee, het varken.*
no the pig
'No, the pig.'

GPC 4

- storyteller: And Tom's mother at the last icecream ... (puppet obviously not listening).
Drakie! ! Are you paying attention?? Tell me, what did Tom's mother eat?
- puppet: *Huh? Geen idee. De laatste banaan?*
what no idea the last banana
'What? I don't have a clue. The last banana?
- child (target): *Nee, het laatste ijje.*
no the last icecream
'No, the last icecream'

ATC

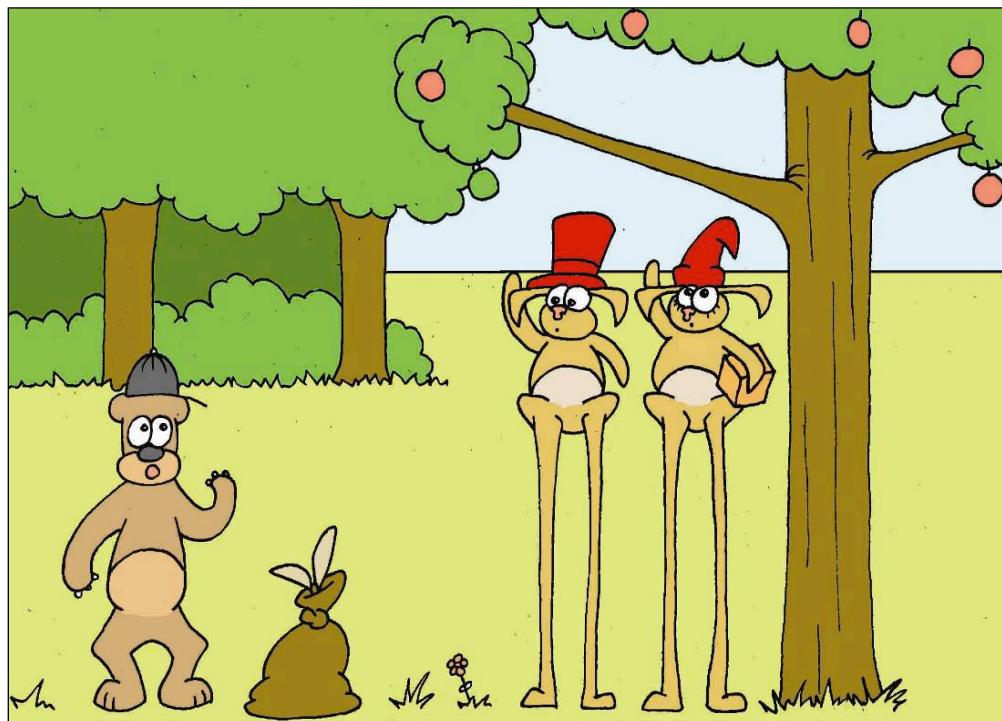


storyteller: The bear jumps forward and says: "Ha! I'm going to take you with me. He grabs Pim. "Nice hat," he said, "give it to me." And the bear put the black hat on his head. Then he placed Pim inside a bag. Then he wanted to catch Flippie and Flappie, but what he did not know was that Flippie and Flappie were zork.

puppet: "Zork"... what was the meaning of that word again?

child (target): (that you can grow your legs)

PTC



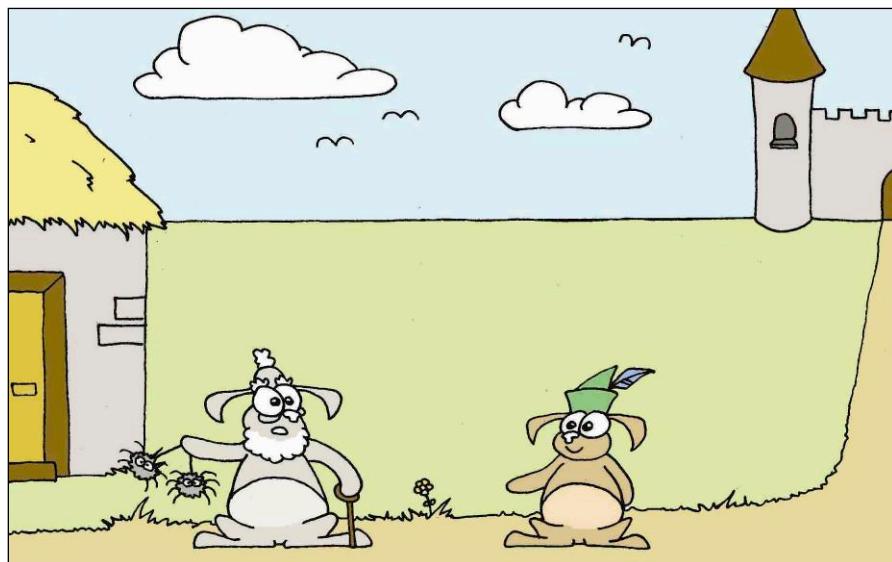
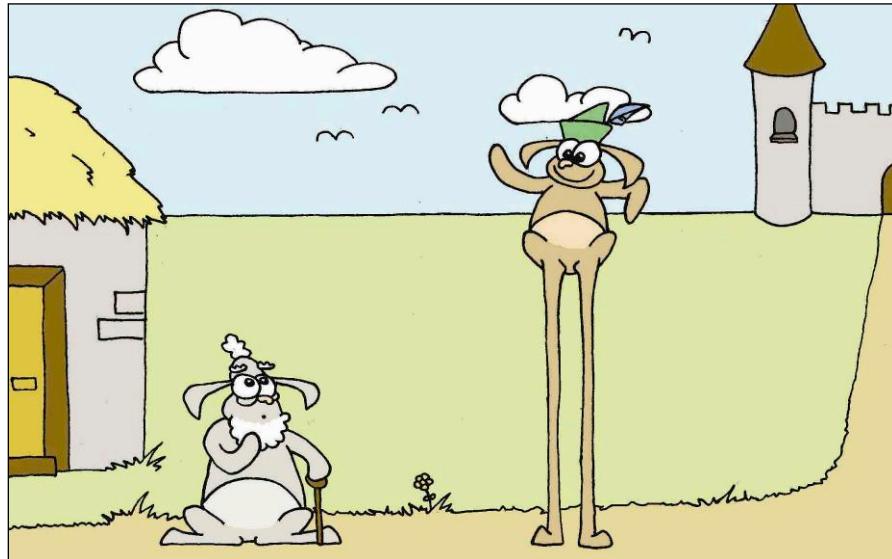
storyteller: Flippie and Flappie let their legs grow, so that they could climb up into the tree and escape. Just like that, they were up in the tree. And the bear, with on his head a black hat stood there, looking at them.

puppet: *Wacht even. Ik snap het niet meer! Wie klom er nu in de boom?*
wait briefly I get it not more who climbed there now into the tree
'Wait a minute, I'm lost! Who did you say climbed up into the tree?'

Een zorke beer met een rode hoed?
a zork bear with a red hat
'Was it a zork bear with a red hat?'

Of twee rode konijnen met een zwarte hoed?
or two red rabbits with a black hat
'Or two red rabbits with black hats?'

child (target): *twee zorke konijnen met een rode hoed*
two zork rabbits with a red hat
'two zork rabbits with red hats'



storyteller: “There’s one thing I know”, says the old rabbit. “The troll has one weak spot: you must tickle him behind his ear. Only... the troll is rather tall, so that might be a problem.” “Oh not at all”, rabbit Jan says, “because I’m zork! Watch me!” And he let his legs grow very long ... and then he shrank. “That’s great!” said the old man. “And you know what? I’ll also give you these two hairy spiders. If you place these on the troll’s head, he’ll go crazy.”

puppet: *He, nu snap ik het niet meer hoor.
hey now get I it not more hey
‘What? I don’t get it?’*

Gaat het nu om twee zork spinnen en een heel hairy konijn?
goes it now around two zork spiders and a very hairy rabbit
'Are we discussing two zork spiders and one hairy rabbit?'

Of om twee zorke konijnen en één harige spin?
or around two zork rabbits and one hairy spider
'Or are there two zork rabbits and one hairy spider?'

child (target): *een zork konijn en twee harige spinnen*
one zork rabbit and two hairy spiders
'one zork rabbit and two hairy spiders'

Appendix 3: Excluded subjects in the second experiment

As was mentioned in section 3.3.1.2 and section 3.6, almost half of the children in the second experiment, 62 subjects, were excluded from the experiment: some for failing to respond at all (seven subjects), others because we hardly had enough data to say anything sensible at all (28 children) or because their results were difficult to interpret (27 children). The first group, seven children who failed to respond at all, were excluded early in the experimental session. The second and third group merits further discussion.

First of all, a group of 28 children was excluded from the experiment because we hardly gathered any data on these children's learning stage in the ER at all. For example, consider the answers of two children in (60) and (61) below:

(60) Pretest answers of child no. 1

| | 1. Paard 'horse' | 2. Varken 'pig' | 3. Konijn 'rabbit' | 4. IJsje 'icecream' |
|------------|-------------------------|------------------------|---------------------------|----------------------------|
| GPC | Een paard | Het varken | - | - |
| EPC | Een bruine paard | Een kleine varken | Een groot konijn | - |

(61) Pretest answers of child no. 2

| | 1. Paard 'horse' | 2. Varken 'pig' | 3. Konijn 'rabbit' | 4. IJsje 'icecream' |
|------------|-------------------------|------------------------|---------------------------|----------------------------|
| GPC | Een paard | - | Een konijn | - |
| EPC | - | - | Een groot konijn | - |

In (60), note that there is actually only one set of answers complete: the GPC and the EPC for 2. *Varken*. This pair of answers indicates knowledge of the ER. One other answer, EPC 3 indicates knowledge of the ER, however, the perceived gender of *konijn* 'rabbit' is unclear. The answers on EPC 1 and EPC 4 do not give any relevant information. The answers of this child were interpreted as inconclusive, because there was too few data to work with. In (61), there were zero pairs of answers. There are only two answers for the GPC, and neither of these indicate the grammatical gender of the nouns. The one answer of the EPC, *een groot konijn* 'a big rabbit' implies some knowledge of the ER. However the data of this child was also considered inconclusive. In total, there were 28 children with response patterns more or less like (60) and (61) in which there was hardly any data to interpret. This is why all 28 children were excluded from the analysis altogether.

Secondly, there was a group of 27 children, that did give at least two or three sets of responses, whose learning stage was quite difficult to interpret. Consider, for example, (62) below:

(62) Pretest answers of child no. 3

| | 1. <i>Paard</i> ‘horse’ | 2. <i>Varken</i> ‘pig’ | 3. <i>Konijn</i> ‘rabbit’ | 4. <i>IJsje</i> ‘icecream’ |
|-----|-------------------------|------------------------|---------------------------|----------------------------|
| GPC | De paard | Varken | - | Het ijsje |
| EPC | De bruine paard | Een klein varken | Een groot konijn | Het kleine ijsje |

In this dataset, the answers to EPC 2 and 3 imply knowledge of the ER, for the bare adjective is used. However, since the perceived grammatical gender of the corresponding noun is unclear, it is not possible to know definitely what type of grammatical rule is at work here. In GPC&EPC 1, the noun is considered a common noun and the adjective gets its schwa suffix accordingly. This is a consistent pair, which does not tell us anything about the child’s knowledge of the ER. In GPC&EPC 4, the ER is not applied, while it should have been. What does this data tell us? That the child is a Learner, because adjective with the schwa ending and bare adjectives are produced? It was considered impossible to draw any definite conclusions from these answers.

Not all problems originate from a lack of data. Let us consider a second example, (63) below:

(63) Pretest answers of child no. 4

| | 1. <i>Paard</i> ‘horse’ | 2. <i>Varken</i> ‘pig’ | 3. <i>Konijn</i> ‘rabbit’ | 4. <i>IJsje</i> ‘icecream’ |
|-----|-------------------------|------------------------|---------------------------|----------------------------|
| GPC | De paard | Het varken | De konijn | Het ijsje |
| EPC | Een bruine paard | Een klein varken | Een grote konijn | Een klein ijsje |

This child has in fact produced four consistent sets of answers. The nouns in set 1 and 3 were classified as common gender nouns and correspondingly, the adjectives appeared with a schwa suffix. The other two nouns in set 2 and 4 were considered neuter nouns and the adjectives had the bare form in accordance with the ER. In fact, this child is an Expert. But Experts had been defined as those who gave three/three or four/four correct answers, not two/four. What about this child? One cannot see clearly that she is a Learner, because nothing goes wrong; but it is not clear that she is an Expert, because too few answers were correct. It was necessary to exclude this child for inconclusiveness of the data.

One final example, will be discussed, presented in (64) below:

(64) Pretest answers of child no. 5

| | 1. <i>Paard</i> ‘horse’ | 2. <i>Varken</i> ‘pig’ | 3. <i>Konijn</i> ‘rabbit’ | 4. <i>IJsje</i> ‘icecream’ |
|------------|--------------------------------|-------------------------------|----------------------------------|-----------------------------------|
| GPC | Paard | Het varken | Het konijn | Een ijsje |
| EPC | Een bruin paard | Een klein varken | Een groot konijn | Een klein ijsje |

In this case the intuition that this is an Expert is strong: all four EPC trials have a bare adjective. In addition, two of the four nouns are classified as neuter nouns. However, it had been appointed that an Expert produces three or four sets of correct answers, and so it was necessary to exclude this child from the data set as well. Three examples of children whose answers were difficult to interpret were presented in (62) to (64) but there were 24 other children for whom this was also the case, often with their own unique profile.