ABSTRACT

Title of Dissertation: THE ACQUISITION OF ADDITIVE FOCUS PARTICLES: CHILDREN'S UNDERSTANDING OF THEIR PRESUPPOSITIONAL AND FOCUS-SENSITIVE NATURE

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Previous comprehension studies on the acquisition of additive particles report that children's understanding of the presuppositional nature of additive particles begins emerging around age 3 but children do not come to understand the focus-sensitive nature of additive particles until much later, possibly after preschool years. These studies, however, involve methodological confounds that could have affected children's performance, which might obscure our assessment of children's linguistic capacity. To better understand what children really know about additive particles, it is necessary that we examine whether previous studies underestimate/overestimate children's performance, because only then can we be confident that our assessment of children's linguistic capacity is accurate and precise.

In light of the above discussion, this dissertation devotes itself to exploring the acquisition of the English additive particles *also* and *too*, and their Japanese counterpart *mo* 'also/too'. The dissertation presents findings from four experimental studies, which were conducted with the aim of better understanding how English- and Japanese-acquiring preschoolers come to acquire the presuppositional and focus-sensitive nature of the respective particle(s) in their target language.

Experiment 1, Experiment 2, and Experiment 3 examine English- and Japanese-acquiring children's understanding of the presuppositional nature of additive particles by testing to see if they can differentiate sentences with *also*/*too*/*mo* from those without. The experiments were conducted using a novel task that was designed to test children's interpretation of sentences containing an additive particle in its naturally occurring context, without having to rely on truth-verification. The results from these experiments provide an important steppingstone for testing children's understanding of *too*' focus-sensitive nature in Experiment 4. Using a novel task that takes on the form of *Guess Who?* game, Experiment 4 examines children's understanding of the focus-sensitive nature of additive particles by testing to see if they are able to discern sentences containing a subject-associated *too* from sentences containing an object-associated *too*. Together, these experiments contribute novel findings to the acquisition literature.

In addition to the four experiments, the dissertation also presents a supplementary corpus study, which was conducted with the aim of examining whether any evidence for *too*'s presuppositional and focus-sensitive nature exists in child input. The results from the corpus study provide valuable insights about how children might come to acquire the meaning of additive particles.

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by

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Dedication

The dissertation is dedicated to my deceased grandfathers, Hirozo Kurokami and Kunio Masago.

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I would like to express my deepest gratitude to all of those people from the wonderfully supportive community that I was lucky enough to be a part of over the last 13 years in linguistics.

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Chapter 1

Introduction

This dissertation explores the acquisition of additive (focus) particles by preschool-aged children, investigating how their understanding of the meaning of additive particles develops throughout the course of language acquisition.

Within the linguistics literature, it is customary to identify three broad (sub-)classes of focus particles: exclusive particles like English *only*; scalar particles like English *even*; and additive particles like English *also* and *too* (König, 1991). The three classes of focus particles all express a contrastive discourse relation between the prejacent proposition and its alternatives invoked by focus, but the flavor of contrast varies across each class. In particular, additive particles express an additive contrast relation, giving rise to the additive meaning that (at least) one of the alternatives to the prejacent makes a true proposition (Krifka, 1998). The aim of the dissertation lies in elucidating when and how children come to figure out the meaning of additive particles, which happens to raise a number of issues for both children acquiring their native language and linguists studying language acquisition.

According to the semantics literature, there are three key properties that characterize additive particles (and the additive meaning they give rise to). As stated above, additive particles are a (sub-)class of focus particles, and so, they bear the property of being focus-sensitive: the content of the additive meaning depends on the placement of focus within a sentence (Rooth, 1985, 1992; König, 1991; Krifka, 1998; Beaver and Clark, 2008).

Specifically, additive particles make reference to the set of alternative propositions invoked by focus, whose exact content varies depending on the placement of focus within a sentence, scoping over the set of alternative propositions and indicating an additive contrast between the prejacent and its focus-invoked alternatives. Naturally, shifting the placement of focus within a sentence effectively varies the scope of an additive particle (or its *associate* as explained by Rooth, 1985, 1992), resulting in qualitatively different interpretations. The *also*-sentence given in (1) is thus ambiguous between (at least) two readings.

(1) Mickey *also* ate a banana.

While languages may vary with respect to how focus is marked within a sentence—Japanese, for example, is a language that heavily depends on syntax to mark focus—English is known to utilize prosodic emphasis as a way of marking the focused constituent.[1] If the sentence follows the default intonational pattern of English and the nuclear pitch accent falls on the object NP as shown in (2a), then *also* is interpreted as associating with the object NP.[2] This results in the additive meaning that Mickey ate something other than a banana.[3] Conversely, when the nuclear pitch accent falls on the subject NP as shown in (2b), then *also* is interpreted as associating with the subject NP, giving rise to the additive meaning that

[1] We will see more on this topic in Chapter 2 of this dissertation.

[2] The use of capital letter in linguistic examples indicates the placement of the nuclear pitch accent.

[3] Here, we only consider the case involving narrow focus, i.e., object-association. We will not consider the case involving wide focus, i.e., *focus projection*, where the nuclear pitch accent on the object NP is interpreted as marking association with the entire VP/sentence.

someone other than Mickey ate a banana. Speakers uttering (2a) and (2b) both assert that the prejacent proposition *Mickey ate a banana* is true.

(2) a. Mickey *also* ate a BANANA.

b. MICKEY *also* ate a banana.

Since the exact identity of the alternatives is not made explicit in these sentences, the relevant information must be inferred pragmatically, for instance from the preceding discourse. Relatedly, this additive meaning component that additive particles give rise to is known to behave anaphorically, requiring an antecedent that makes its actual content salient in the discourse (van der Sandt and Geurts, 2001; Kripke, 1990/2009). Hence, additive particles cannot be used in an 'out-of-the-blue' fashion, as doing so will result in an infelicitous utterance; instead, the particles should be accompanied by a preceding discourse within which the actual content of the additive meaning should be made salient by an antecedent. Sentence (3) illustrates this point for the object-association example in (2a).

(3) # (Mickey ate an apple and) Mickey *also* ate a BANANA.

Furthermore, the additive meaning component is thought to be presuppositional in nature (König, 1991; Krifka, 1998; Rullman, 2003; Abrusán, 2014; Szabolcsi, 2017). Crucially, the additive meanings in (2a) and (2b) survive even when they are embedded under logical operators like negation, supposition, and question, which are known to be entailment

canceling environments. This is illustrated in (4), where the object-association example in (2a) is embedded under respective operators.

(4) a. It is not the case that Mickey *also* ate a BANANA.

b. If Mickey *also* ate a BANANA, then Minnie would be upset.

c. Did Mickey *also* eat a BANANA?

The examples given in (4) all lack the original entailment that Mickey ate a banana, but they still carry the implication that Mickey ate something other than a banana (the additive meaning component). This projective behavior is a hallmark property of presuppositions.[4]

The intriguing properties that additive particles exhibit begs the question of how children figure out the meaning of the particles. In the outset, the acquisition of additive particles comprises a difficult challenge for children. Word-learning typically involves the process of identifying the connection between a linguistic form and its underlying meaning (Bloom, 2002; Golinkoff *et al*., 2000; Wojcik *et al*., 2022). That is, children must learn what each word in their target language means or refers to by tracking the conventional association between the word and the word's potential referent(s) as they hear the word get used in their input. This might not be too difficult for words like *Mickey*, *banana*, and *eat*, whose meanings all can have physical correlates in the actual world: children can observe what these words mean when they hear adults use them to talk about the physical object or action

[4] Note that not all things that project are presuppositions. See Tonhauser *et al.* (2013) for a more detailed discussion on the topic.

that the words' semantics refers to.[5] Though the process may not be instantaneous, children will eventually home in on the correct meaning and figure out that *Mickey* means 'Mickey', *banana* means 'banana', and *eat* means 'eat'. But what kind of evidence would allow children to observe that *also* means 'also'? Unlike in the cases of *Mickey*, *banana*, and *eat*, the meaning of *also* lacks a direct physical correlate: the word expresses an additive relationship between two discourse elements. To pick up on the additive meaning, children must keep track of multiple discourse relations and figure out which of those relations is intended by the speaker when she utters the sentence that contains *also*. The intended meaning might be salient thanks to its anaphoricity, but it is also going to be backgrounded as its truth is only presupposed. And the language specific cue for marking focus, which would be helpful for adults, is not going to help children until they have learned that *also* is focus-sensitive (and furthermore that English makes use of prosody to mark *also*'s scope). Figuring all these things out seems like a very tall task for children, and yet all English-acquiring children somehow learn that *also* means 'also'.

[5] This is not to say that the acquisition of words with more concrete referents do not face any problems. Language displays displacement over time and space, meaning you can talk about some past/future eating event or talk about a banana that is in the refrigerator while you are still in the living room. The world around us is also very complex, which might make identifying the referent of the words in the surrounding world difficult. How does a child know that of all things in the refrigerator, *banana* refers to the yellow, crescent-shaped fruit, especially when the fruit can appear in different forms once it is juiced or turned into banana chips? And *eat*, how do we know that the word does not refer to an object, possibly some food product or an eating utensil like a knife or a fork? We set aside these issues as they have been discussed extensively in the literature (Goodman, 1955; Quine, 1960; Kripke, 1982). After all, it still stands that words like *also* bring a different level of difficulty to word learning.

Perhaps the learning problem is more nuanced, and the meaning of additive particles is acquired in a step-by-step manner. Due to their anaphoric nature, additive particles are almost always used with an antecedent that makes the content of its semantic contribution salient (Dudley, 2017). Figuring out that additive particles have an additive meaning might not be too difficult then if what they initially learn is a very general additivity along the line of 'something else happened in addition'. Children would then proceed to figure out their non-at-issue-ness and focus-sensitivity. Assuming that the basic understanding about the concept of common ground is in place for children by then, children could learn that the additive meaning expressed by *also* is presuppositional if they are able to recognize that the information pertaining to the additive meaning always consists of old information that has been established as part of the common ground at the time of utterance. Presumably, hearing *also* get used in projective contexts like (4) would help children catch on to this otherwise hard-to-detect discourse-status-based cue. By tracking the prejacent proposition and the additive meaning expressed by *also*-sentences that involve entailment canceling operators and evaluating their truth against the common ground, children can, in theory, figure out that the additive meaning concerns the non-at-issue content of a sentence based on the difference in the discourse status between the two. Hence, after having heard enough tokens of *also*-sentences that involve embedding like those given in (4), children should be able to figure out that the additive meaning is presuppositional and that it does not affect the at-issue content of a sentence. Once they've figured that out, then what remains is the focus-sensitive nature of the particles. Unfortunately, it is not all that clear what kind of evidence would help children figure out that additive particles are focus-sensitive. If there were cases in the input where focus actually disambiguated between two possible antecedents, then that would make

a great opportunity for children to pick up on the relevance of focus. However, such cases are probably rare in the input for the exact reason mentioned above: additive particles are anaphoric, meaning they are almost always used in the presence of an antecedent that makes the content of its additive contribution explicit. It is possible then that children do not pick up on the relevance of focus until very late. Alternatively, in languages like Japanese where focus-association is determined primarily by syntax, children might have an easier time figuring out the focus-sensitivity of additive particles: intuitively, syntax provides a more direct, reliable cue for what is being contrasted in the discourse, making the association between the particles and focus more salient.

So now that we have fleshed out a possible learning path for how children might acquire the meaning of additive particles, what do we know about the acquisition of additive particles by young children? Are children sensitive to the additive presupposition that these particles give rise to? Do they know that the content of this presupposition depends on the placement of focus? And what do we know about the timeline? At what age does children's understanding of these properties become adult-like? Thanks to Crain *et al.*'s (1994) seminal work on *only*, children's acquisition of focus particles has attracted considerable amount of scientific interest over the past 30 years, inspiring a number of experimental studies across a wide range of languages. However, majority of those studies are concerned with the acquisition of exclusive particles (e.g., Crain *et al*., 1994; Philip and Lynch, 2000; Gualmini *et al*., 2003; Paterson *et al*., 2003, 2006; Endo, 2004; Matsuoka *et al*., 2006; Notley *et al*., 2009; Zhou and Crain, 2010; Kim, 2011; Müller *et al*., 2011; Sano, 2011; Müller, 2012; among others); only a selected few are about the acquisition of additive particles (Hüttner *et al.*, 2004; Bergsma, 2006; Matsuoka *et al*., 2006; Berger and Höhle, 2012; Aravind, 2018;

An *et al*., 2020); and very few look at the acquisition of scalar particles (Kim, 2011; Gowda *et al*., 2020). Our current understanding of the acquisition of additive particles (and scalar particles) is thus quite limited and fragmentary, leaving us with a number of gaps to be filled. With that said, let's take a quick look at what those limited findings can tell us about the acquisition of additive particles.

Previous literature on children's comprehension of sentences containing an additive particle is divided on when children's understanding of the particles becomes adult-like. Whereas earlier studies on children's comprehension report that even 7-year-olds struggle to interpret sentences containing an additive particle in an adult-like way (Bergsma, 2006; Hüttner *et al.*, 2004; Matsuoka *et al.*, 2006), more recent studies find that children as young as age 3 have almost no difficulty doing so (Berger and Höhle, 2012; Aravind, 2018, An *et al*., 2020). However, the two sets of studies concern different questions about the particles: early studies that report children's difficulty with additive particles mainly concern the question of whether children understand the focus-sensitive nature of additive particles; the more recent studies that report children's adult-like interpretation of the particles on the other hand were concerned with children's understanding of the presuppositional nature of additive particles. Thus, a straightforward interpretation of these results would lead us to the conclusion that children's understanding of the presuppositional nature of additive particles emerges by around age 3, but their understanding about the focus-sensitive nature of these particles does not become adult-like until very late, possibly until after preschool age. This is despite children's early production of the particles, which is said to begin around their second birthday. These findings are in line with the learning path we fleshed out earlier, suggesting

that the acquisition of additive particles is a rather long developmental process, which does not become complete until possibly few years into grade-school years.

However, in these studies, there are methodological issues that might obscure our assessment of children's true competence of the particles. Early studies that examined children's understanding of the focus-sensitive nature of additive particles tested their comprehension in contexts where the presupposition was not supported, and thus, the use of additive particles was unnatural. This could lead to an underestimation of children's performance. The more recent studies that examined children's sensitivity to the additive presupposition, on the other hand, did not provide a reliable baseline, and so, it is not immediately obvious how much of children's success is due to their understanding of the additive presupposition. This could lead to an overestimation of children's performance. Therefore, to better understand what children really know about these particles, it's necessary that we examine whether previous studies underestimate/overestimate children's performance, because only then can we be confident that our assessment of children's linguistic capacity is accurate and precise.

In light of the above discussion, this dissertation investigates the acquisition and development of children's linguistic knowledge about additive particles by asking the following two questions:

(5) Do preschool-aged children know that additive particles trigger an additive presupposition and are they able to account for the contextual constraint the particles impose?

(6) Do preschool-aged children know about the language specific cue that are relevant to focus association and are they able to use that information to determine the scope/associate of additive particles?

To answer these questions, this dissertation devotes itself to the following three particles: English *also* and *too*, and Japanese *mo* 'also/too'. The dissertation will present four experiments that investigate children's interpretation of these particles, shedding light on the acquisition questions outlined above to better understand how children's knowledge of additive particles develops throughout the course of language acquisition. A cross-linguistic comparison between Japanese and English will provide us with an interesting insight on whether there is a difference to how easy/reliable prosodic information or syntax is for children in determining the focus structure of a sentence.[6] These questions are addressed separately, since the first question is a precursor of the second; children's ability to determine the scope of the particles can only be tested by probing to see if they are able to infer the intended presupposition. Hence, in order to ask the second question, we must first establish that children understand the presuppositional nature of additive particles.

Experiment 1, Experiment 2, and Experiment 3 all address the first question, investigating preschool-aged children's interpretation of sentences containing the additive particle *also*, *mo*, and *too*, respectively. Using a novel task, the three experiments examine children's sensitivity to the presupposition triggered by the additive particles. The task

[6] While this dissertation itself does not specifically address the issue, it takes an important step towards figuring out whether the difference in how focus is marked in a language have an effect on the acquisition of additive particles (or focus particles in general).

probes children's sensitivity to the additive presupposition in (question) comprehension by comparing their responses to sentences with an additive particle to those without. Experiment 1 and Experiment 2 find that English-acquiring 4-year-olds and Japanese-acquiring 5-year-olds are able to distinguish sentences with *also*/*mo* from those without, but with lower accuracy compared to adults. With a slight improvement to the task, Experiment 3 finds that English-acquiring 4-year-olds are able to distinguish sentences with and without *too* with adult-like accuracy. Collectively, these experiments show that preschool-aged children have a fairly good understanding that additive particles give rise to an (anaphoric) additive meaning that is presuppositional in nature, which provides an important steppingstone for conducting Experiment 4.

Experiment 4 addresses the second question, exploring children's understanding of the focus-sensitive nature of additive particles. Previous studies find that even 7-year-old children lack adult-like understanding of the focus-sensitive nature of additive particles. However, these studies tested children's comprehension in contexts where the presupposition was not supported and hence, their use was infelicitous. Using a novel task that takes on the form of a *Guess Who?* game, the experiment tests children's interpretation of sentences containing *too* with varying scope/associate (subject vs. object) in a context that supports the additive presupposition. The results from this experiment contribute novel findings to the literature, showing that though there are individual variations in their performance, some children around age 4 are able to distinguish *too*-sentences that vary in their placement of focus. This suggests that some 4-year-olds understand the focus-sensitive nature of *too*.

In addition to the four experimental studies, we also conduct a supplementary corpus study in which we examine how the English additive particle *too* is used by adults in child-

ambient speech. The aim of the corpus study lies in elucidating what kind of evidence (if any) is provided in child input and whether the actual input corroborates the learning path we hypothesized earlier in this chapter. Although the numbers are limited, we find that *too* does occur in a projective context (i.e., interrogatives), which should serve as evidence that *too* is presuppositional. Conversely, the results of the corpus study fail to provide any reliable evidence for *too*'s focus-sensitivity, which suggests that figuring out the focus-sensitive nature of *too* is difficult for children as we originally hypothesized (and as suggested by our results from Experiment 4).

The dissertation is organized as follows. Chapter 2 discusses the relevant theoretical background. Chapter 3 will provide a brief literature review of the acquisition work conducted on additive particles. Chapter 4 presents findings from Experiment 1, Experiment 2, and Experiment 3, followed by findings from Experiment 4 in Chapter 5. Chapter 6 presents findings from the supplementary corpus study. Chapter 7 concludes.

Chapter 2

Theoretical background

2.1 Focus and scope

Additive particles belong to the broad class of focus particles, constituting a sub-class whose members characteristically contribute an additive meaning to a sentence via their association with focus (König, 1991). Crucially, their interpretation relies on the placement of focus within a sentence as shown in the English example with *also* below.

(7) a. MICKEY *also* ate a banana.

b. Mickey *also* ate a BANANA.

The particle *also* typically occurs in the preverbal position, from which it associates with the constituent under focus. The two sentences in (7a) and (7b) contain the exact same words that occur in the exact same order, with only difference between the two being the placement of focus as indicated by the location of nuclear pitch accent (subject- vs. object-focus). Nonetheless, this subtle variation in intonation makes a clear difference in the additive meaning that *also* triggers, giving rise to qualitatively different interpretations: a speaker uttering (7a) presupposes that someone other than Mickey ate a banana while a speaker uttering (7b) presupposes that Mickey ate something other than a banana. Naturally,

these sentences require different discourse contexts to be uttered felicitously: (7a) should be uttered in a context in which someone else in addition to Mickey has eaten a banana; and (7b) in a context in which Mickey has eaten something else in addition to a banana.

According to Rooth (1985, 1992), focus evokes a set of (contextually salient) alternatives to the focused constituent and signals that those alternatives are being considered. The alternatives evoked by focus give rise to a set of alternative propositions. These alternative propositions become relevant for the interpretation of additive particles. To see how *also* interacts with focus, let us consider the examples given in (8) and (9). The nuclear pitch accent on *Mickey* in (8) and the nuclear pitch accent on *banana* in (9) each evoke some contextually salient alternatives to the focused constituents—who or what those alternatives actually are is determined by the discourse context in which these utterances are made. In this sense, additive particles (and focus particles in general) are highly dependent on context. Each of these alternatives invokes alternative propositions, which are constructed by replacing the focused element in the prejacent (particle-less) proposition with the contextually salient alternatives. Additive particles operate over the set of alternative propositions, inducing the additive presupposition that at least one of the alternative propositions is included in sentence meaning, which can be paraphrased as *Someone other than Mickey ate a banana* when the nuclear pitch accent is on the subject as in (8) or *Mickey ate something other than a banana* when the nuclear pitch accent is on the object as in (9).[7]

[7] Here we follow the standard analysis and assume that the additive presupposition is a type of existential statement. However, more recent studies have argued that the additive presupposition that additive particles trigger is not a simple existential statement but seem to have some anaphoric component to them. We will discuss this issue in the following sub-section, where we take a closer look at how additive particles are used in natural conversation.

Importantly, additive particles do not contribute to the at-issue content of a sentence, i.e., the at issue content of both (8) and (9) are that the prejacent proposition *Mickey ate a banana* is true.

(8) MICKEY *also* ate a banana.

Focused constituent:	Mickey
Alternatives to "Mickey":	Donald, Minnie, …
Prejacent proposition:	Mickey ate a banana
Alternative propositions:	Donald ate a banana, Minnie ate a banana, …
Additive presupposition:	at least one of the alternative propositions is true
	≈ Someone other than Mickey ate a banana

(9) Mickey *also* ate a BANANA.

Focused constituent:	banana
Alternatives to "banana":	apple, orange, …
Prejacent proposition:	Mickey ate a banana
Alternative propositions:	Mickey ate an apple, Mickey ate an orange, …
Additive presupposition:	at least one of the alternative propositions is true
	≈ Mickey ate something other than a banana

The additive particle *too* behaves similarly to *also* except that it typically occurs in sentence-final position as opposed to the preverbal position of *also*.

(10) a. MICKEY ate a banana, *too*.

b. Mickey ate a BANANA, *too*.

From this position, it can associate with both the subject NP and the object NP; again, which constituent the particle associates with is determined by the placement of focus, which is further implied by the location of nuclear pitch accent within the sentence. As was with *also*, if the nuclear pitch accent falls on the subject NP, then *too* is interpreted as associating with the subject as shown in (11). Conversely, if the nuclear pitch accent falls on the object NP, then *too* is interpreted as associating with the object as shown in (12).

(11) MICKEY ate a banana, *too*.

Focused constituent:	Mickey
Alternatives to "Mickey":	Donald, Minnie, …
Prejacent proposition:	Mickey ate a banana
Alternative propositions:	Donald ate a banana, Minnie ate a banana, …
Additive presupposition:	at least one of the alternative propositions is true
	≈ Someone other than Mickey ate a banana

(12) Mickey ate a BANANA, *too*.

Focused constituent:	banana
Alternatives to "banana":	apple, orange, …
Prejacent proposition:	Mickey ate a banana
Alternative propositions:	Mickey ate an apple, Mickey ate an orange, …
Additive presupposition:	at least one of the alternative propositions is true
	≈ Mickey ate something other than a banana

Parting away from English, Japanese also has a similar focus-sensitive expression, the discourse particle *mo*, whose inclusion in a sentence indicates an additive contrast between the focus element and its alternatives. In uttering a sentence like (13), which roughly corresponds to the English examples (8) and (11), a speaker implies that Mickey ate a banana and that someone else ate a banana in addition—who ate a banana varies depending on the context.

(13) Mikkii-*mo* banana-o tabe-ta yo.
Mickey-also banana-ACC eat-PAST PRT
'Mickey also ate a BANANA. / Mickey ate a BANANA, too.'

Crucially, the additive meaning that someone else in addition to Mickey ate a banana survives even when (13) is embedded under an entailment-canceling operator like question. An interrogator asking the question in (14) does not doubt that someone other than Mickey ate a banana; s/he takes the truth of the proposition for granted.

(14) Mikkii-*mo* banana-o tabe-ta ka na?
Mickey-also banana-ACC eat-PAST Q PRT
'Did MICKEY also eat a banana? / Did MICKEY eat a banana, too?'

Evidently, the semantic properties of the Japanese particle *mo* closely resemble those of the English additive particles *also* and *too*. However, *mo* and *also*/*too* crucially differ in how their associate is determined. Unlike in English where prosodic emphasis plays a crucial role in identifying which element is focused in a sentence (i.e., what the associate of the particle is), Japanese marks focus (and the associate of focus particles) via the syntactic position of the focus particles (Aoyagi, 1999). Specifically, focus particles in Japanese (typically) associate with the constituent they adjoin to. Hence, when the focus particle is adjoined to the subject DP like the additive particle *mo* in example (13), repeated as (15) below, then the particle is interpreted as associating with the subject. On the other hand, if the focus particle is adjoined to the object DP like in (16), then the particle is interpreted as associating with the object.[8]

[8] Again, we do not consider the possibility of focus projection taking place.

(15) Mikkii-*mo* banana-o tabe-ta yo.

Mickey-also banana-acc eat-past prt

'MICKEY also ate a banana.'

Focused constituent: Mickey

Alternatives to "Mickey": Donald, Minnie, …

Prejacent proposition: Mickey ate a banana

Alternative propositions: Donald ate a banana, Minnie ate a banana, …

Additive presupposition: at least one of the alternative propositions is true

≈ Someone other than Mickey ate a banana

(16) Mikkii-ga banana-*mo* tabe-ta yo.

Mickey-nom banana-also eat-past prt

'Mickey also ate a BANANA.'

Focused constituent: banana

Alternatives to "Mickey": apple, orange, …

Prejacent proposition: Mickey ate a banana

Alternative propositions: Mickey ate an apple, Mickey ate an orange, …

Additive presupposition: at least one of the alternative propositions is true

≈ Mickey ate something other than a banana

The subject-adjoined *mo* in (15) introduces a set of contextually salient alternatives to *Mickey*, members of which are used to replace the focused constituent in the prejacent proposition to construct alternative propositions. Like English *also*, *mo* operates over the set of alternative propositions, inducing the additive presupposition that someone other than

Mickey ate a banana. Conversely, the object-adjoined *mo* in (16) introduces a set of contextually salient alternatives to *banana*, resulting in the presupposition that Mickey ate something other than a banana.

Since *also*, *too*, and *mo* all contribute a presuppositional meaning to a sentence, i.e., they are presupposition triggers, they typically require a context where their presupposition is satisfied, like any other presupposition triggering expressions would. However, it seems that the contextual constraint on the use of additive particles is more rigid than that of other presupposition triggers, like for example, possessive constructions, which we will see in more details in the next section.

2.2 Contextual constraint on the use of additive particles

Presuppositions are backgrounded information whose truth is taken for granted by all speech participants. The information is not offered up as new, and so, it cannot be the main point of a sentence. Regardless, a speaker will commit to its truth and so uttering a sentence in a situation where its presupposition is not supported will result in awkwardness. Formally, presuppositions can be captured as a constraint on when a sentence can be uttered felicitously. Presuppositions belong to what Stalnaker (1974) calls the conversational COMMON GROUND, a set of propositions whose content has been mutually accepted as being true by all speech participants. A sentence that is associated with some presupposition can only be uttered felicitously if that presupposition is already established as part of the common ground; if not, the sentence will lack a truth-value, resulting in infelicity. One way to capture this would be to treat presuppositional sentences as partial functions, whose truth-value can only be determined in circumstances where their presupposition is true (Heim and Kratzer,

1998). Hence, presupposition triggering expressions like *also* and *too* (typically) require that the relevant information that makes their presupposition true be established as part of the common ground, before they are used; otherwise, the use of these particles would be infelicitous. We illustrate this point for *also* in the following example.

(17) A: What did Mickey eat for lunch?

a. B: # Mickey *also* ate a BANANA.

b. B: Mickey ate an APPLE, and he *also* ate a BANANA.

The fact that speaker A is asking the question in (17) is a clear indication that she is ignorant about what Mickey ate, which means that the relevant information that makes *also*'s presupposition in (17a) true (i.e., the information about what other thing(s) Mickey ate in addition to a banana) has yet to be included in the common ground. This is why (17a) is judged as infelicitous: speaker B is using *also* in a context where its presupposition is not yet satisfied. To make the use of *also* felicitous, the piece of information that is relevant for satisfying the truth of the additive presupposition should be established as part of the common ground before the particle is used, for example, by explicitly asserting the truth of the relevant information as shown in (17b).

The contrast in the felicity of *also*'s use across (17a) and (17b) demonstrates that additive particles should be used in a context where their presupposition is satisfied, which is expected given the contextual constraint presuppositions impose on a sentence. Nevertheless, we also know that often times presupposition triggers are used in a context where their presuppositional contribution is not yet satisfied at the time of utterance. This is illustrated in

the following example from Stalnaker (1974), which contains the possessive construction *my sister*.

(18) A: Are you going to lunch?

B: No, I have to pick up my sister.

(Stalnaker, 1974)

A possessive construction triggers the presupposition that the entity denoted by the expression exists. Hence, in uttering her response to speaker A's question, speaker B presupposes that she has a sister, and furthermore, assumes that her having a sister is previously known to speaker A. However, Stalnaker notes that speaker B's utterance does not result in infelicity even if speaker B was aware that her having a sister was not known to speaker A. For example, the two speakers could have met for the first time, in which case speaker A knows nothing about speaker B's family structure, and yet, speaker B's response in (19) would be perfectly felicitous in such situation. This is because speaker A can infer from speaker B's utterance that she has a sister and that she wants speaker A to believe this, based on which speaker A updates the common ground to include the relevant information, all under the assumption that speaker B is otherwise a cooperative speaker. This process by which the common ground is updated to include the relevant information that makes a presupposition true is called (global) ACCOMMODATION (Lewis, 1979; von Fintel, 2000, 2008; Roberts, 2015).

Given that accommodation is a possible strategy, it is reasonable to think that additive particles can also be used in contexts where the relevant information that satisfies the truth of

their presuppositional contribution is not yet established as part of the common ground; we could update the common ground to include the relevant information via accommodation. However, we've seen in example (17) from above that *also* requires a context in which their presuppositional contribution is satisfied. This does not change even if speaker A knew before asking her question that there were only two things Mickey could have eaten, e.g., an apple or a banana, which should in theory make the accommodation of additive presupposition quite easy. In fact, it has been observed in the literature that presupposition triggers vary with respect to the extent to which they can be used felicitously in a context where their presupposition has yet to be satisfied (von Fintel, 2000, 2008; Kripke, 1990/2009; Abrusán, 2014; Roberts, 2015). Moreover, it has been reported in the literature that using an additive particle will result in infelicity if the sentence containing the particle is uttered out of the blue without making the actual event that is to be contrasted with the prejacent explicit, suggesting that our previous paraphrase of the additive meaning was inaccurate after all. The following example from Abrusán (2014), which is a slightly modified version of Kripke's (1990/2009) *too*-example, illustrates this point.

(19) #SAM *also* had dinner in New York.

Additive presupposition: Someone other than Sam had dinner in New York

(Abrusán, 2014)

The standard assumption about additive presuppositions is that they are simple existential statements, in which a speaker presupposes the existence of an alternative proposition that holds in addition to the prejacent. However, if this was true and the additive

presupposition that *also* triggers was a simple existential statement like the paraphrase we give above in (20), then the presupposition should be trivially satisfied by virtue of what we know about the world: there are hundreds and thousands of people having dinner in New York at any given night. Kripke (1990/2009) therefore argues that some presuppositions have an anaphoric component to them, and thus, their interpretation relies on there being an antecedent—be it linguistic or not—in the immediate discourse context. Additive particles are one such class of presupposition triggers that require an antecedent that sufficiently highlights the actual event that makes its presuppositional contribution true, which we show in example (20) below.

(20) Mary had dinner in New York, and SAM *also* had dinner in New York.

Putting aside the precise details of the analysis on the locus of their anaphoricity, the above examples show that empirically, additive particles (and other presupposition triggers whose presuppositional contribution is highly resistant to accommodation) should be used with an antecedent that makes the content of their presupposition maximally salient, such that they are interpreted in their naturally occurring context. Relatedly, a recent experimental study by Göbel (2020) reveals a contrast in adults' acceptability judgements across different presupposition triggers when the triggers are used with minimal context and so the presupposition of the triggers had to be accommodated. Specifically, the author finds that adults judge *too* to be much less acceptable in such contexts compared to the presupposition

trigger *again*.[9] This becomes important when we discuss previous acquisition studies on additive particles as some of their results seem to be obscured by the unnatural use of the particles.

2.3 Summary

In this chapter, we discussed two key properties that characterize additive particles: (i) presuppositionality; and (ii) focus-sensitivity. To become competent at the target language she is trying to acquire, a child must learn that additive particles give rise to a presuppositional meaning and that the content of this presupposition is dependent on the placement of focus within a sentence, the latter further implying that the child must learn how focus is marked in the target language.

However, testing children's understanding of these properties is not an easy task. Presuppositions consist of backgrounded information whose truth is taken for granted by all speech participants. Hence, presuppositions must always be true and so their content cannot

[9] Göbel's test items contained minimal triplets like the following, where sentences containing different presupposition triggers (and their particle-less counterpart) were presented as an answer to a preceding question.

(i) Q: Who is having dinner in New York tomorrow?
   a. A1: Saul is having dinner in New York.
   b. A2: Saul is having dinner in New York again.
   c. A3: Saul is having dinner in New York too.

Using the particle-less frame sentence in (i-a) as a baseline, the author measured accommodation difficulty by comparing the difference in acceptability judgements for each trigger.

be directly asserted/denied or be called into question. This raises an issue for traditional methods like Truth-value judgement and Picture selection tasks, as these tasks rely on truth-verification as a way of measuring children's linguistic capacity and aren't designed for probing children's sensitivity to the presuppositional contribution of a sentence. Additionally, the anaphoric nature of the additive presupposition complicates the matter even more. In order to test children's understanding of the focus-sensitive nature of additive particles, the experimental context in which children's comprehension is investigated must provide some ambiguity. But the anaphoric component of the particle requires that the content of their presupposition be maximally salient in the contexts. Finding the right balance between the two is not an easy task.

Chapter 3

Background on the acquisition of additive particles

It has been observed cross-linguistically that children begin using additive particles at quite a young age. For example, Matsuoka *et al.* (2006) provide evidence from spontaneous speech corpora that Japanese-acquiring children begin using the additive particle *mo* in their speech by around their second birthday (1;6-2;3). Similar findings are reported across languages such as Cantonese, Dutch, French, and German, in which children already use additive particles in their speech from the beginning of multiword utterances (Nederstigt, 2001; Hulk, 2003; Lee, 2002; Gayraud, 2004). These findings indicate that additive particles are available in children's lexicon from very early stages of language acquisition. Furthermore, studies like Nederstigt (2003, 2006) and Lee (2002) provide evidence suggesting that children around this age have already mastered the complex interaction of the syntax, semantic, and prosodic properties of additive particles. Specifically, Nederstigt (2006) report that a German-acquiring child before age 3 uses prosodic emphasis in an adult-like way to mark the scope of *auch* 'also', varying the placement of the nuclear pitch accent relative to the syntactic position of its associate. For example, when *auch* takes scope over the subject NP, i.e., a constituent that precedes the particle, then the child will reliably use an

intonational pattern where the nuclear pitch accent is placed on the particle itself as shown in (21) and (22).[10]

(21) Großvater AUCH (1;10;29)
grandfather also
'Grandfather too.'

(22) ich AUCH bunten Sternenhimmel (2;02;10)
I also coloured starry-sky
'I (draw) a starry sky, too.'

Conversely, when the particle scopes over a non-subject, i.e., a constituent that succeeds the particle, then the child will use an intonational pattern where the nuclear pitch accent is placed within the domain of the scope as shown in (23) and (24).

[10] Placing the nuclear pitch accent on the particle itself is a common strategy for marking subject-association with *auch*. In fact, the same can be done with English *also*. (i-a) and (i-b) vary with regards to their placement of focus: in (i-a) the nuclear pitch accent falls on the subject, but in (i-b), it falls on the object.

(i) a. JOHN also ate a banana.
b. John ALSO ate a banana.

(i-a) and (i-b) basically share the same interpretation as one another: they both assert that Mickey ate a banana and presuppose that Mickey ate something else in addition.

(23) auch AUTOS (2;02,15)
also cars
'Cars too.'

(24) da muss auch LOEWE# sein und und (2;09,17)
there must also lion be and and
Max ist ein# ein ein Tiger
Max is a a a tiger
'There must also be (a) lion and Max is a tiger.'

Evidently, these studies suggest that children as young as age 3 have adult-like command of the particles, at least in production. Yet, despite their early mastery in production, studies on children's comprehension report that children's interpretation of additive particles do not become adult-like until much later (Hüttner *et al.*, 2004; Bergsma, 2006; Matsuoka *et al.*, 2006). The acquisition of additive particles seems to be an area in which the general observation that comprehension precedes production does not hold (cf., Hendriks and Koster, 2010).

So how is children's interpretation different from adults? Initial studies on children's interpretation of additive particles were mainly concerned with children's understanding of the focus-sensitive nature of the particles. Using Truth-value judgement tasks, Matsuoka *et al.* (2006) tested Japanese-acquiring children's interpretation of sentences containing either a subject- or an object-associated *mo*, their scope distinguished by the syntactic position of the particle as shown in (25). The aim of the study was to determine whether children could

assign correct scope to the particles and infer the intended presupposition from the syntactic position of the particle.

(25) a. Subject-associated *mo*

Hiyoko-san-*mo* taoru-o hoshi-mashi-ta

chick-PERS-*also* towel-ACC dry-POL-PAST

'The CHICK also dried a towel.'

b. Object-associated *mo*

Kaubooi-ga ushi-*mo* tukamae-mashi-ta

cowboy-NOM cow-*also* catch-POL-PAST

'The cowboy also caught a COW.'

In each trial, children listened to a context story, after which they were asked to judge whether or not a test sentence made a good description of that story. The stories were set up such that the intended presupposition, i.e., the presupposition that matches the scope of the particle as indicated by its syntactic position in the test sentence (e.g., *Someone other than the chick dried a towel* for (25a)), was never satisfied in the given context, but the unintended presupposition, i.e., the presupposition that is associated with the non-focused constituent (e.g., *The chick dried something other than a towel* for (25a)), always was (i.e., the context involved a false presupposition). The at-issue content of the test sentences was always satisfied. An adult-like interpretation should thus result in a rejection of the test sentences.[11]

[11] Or so they predict. It's actually not clear if rejecting a statement on the basis of false presupposition is the adult-like response as we will discuss later.

Conversely, if children were making scope-analysis errors and were miss-associating *mo* with the non-focused constituent, then they should always accept the test sentences as a valid description of the context stories. The authors found that very few children (eleven out of the fifty-seven children that were included in their data analysis) were able to consistently reject the test sentences; instead, the majority of the 4-, 5-, and 6-year-olds that were tested consistently accepted both sentence types as a valid description of the story. Matsuoka and colleagues took these results as evidence that children have difficulty assigning the correct scope to the particle. However, whether or not children are making what they call a scope-analysis error is unclear from their results. Unfortunately, the design of their task does not allow one to tease apart whether children's error involve misanalysis of the scope or children are simply ignoring the particles: if children were ignoring the particles/the additive presupposition and were just paying attention to the at-issue content of the sentence, then they would give the same response.

In fact, Bergsma (2006) suggest that ignoring the additive particle/presupposition is a possible strategy with children. Using a Picture selection task, Bergsma tested Dutch-acquiring 4-to-7-year-olds' understanding of the particle *ook*. Bergsma's experiment involved three types of test sentences. The first type consisted of sentences containing a pre-subject *ook*, which only allows the subject-associated interpretation like English *only*. The second and third type of test sentences involved *ook* in post-finite position (S V OOK O). Like the pre-verbal *also* in English, post-finite *ook* can associate with either a constituent that precedes it, i.e., the subject, or a constituent that succeeds it, i.e., the object, depending on where the nuclear pitch accent is placed (the particle itself vs. the object). This meant type two sentences and type three sentences were identical with regards to their word order,

making them ambiguous between subject- and object-associated readings of *ook*. Hence, children had to disambiguate the test sentences by figuring out the scope of the particles based on the placement of the nuclear pitch accent. The test sentences were presented with three different pictures, the first depicting a scene that matches the subject-associated interpretation, the second depicting a scene that matches the object-associated interpretation, and the last depicting a scene that matches the particle-less interpretation. The author found that about a third of the children that were tested consistently selected the third picture that matched the particle-less interpretation, though this type of error decreased as children grew older (eight out of the fifteen 4-year-olds, five out of the fifteen 5-year-olds, and one out of the fourteen 6-to-7-year-olds). This pattern suggests that these children are ignoring the particles, and so, they are selecting the picture that merely depicts the scene that is described by the at-issue content of the test sentences. As for the rest of the children, they were quite good at the unambiguous pre-subject *ook*, consistently selecting the expected picture about 80% of the times. However, for the two types of sentences containing post-finite *ook*, they were basically at chance, randomly picking from the three pictures for both subject- and object-associated *ook*.

Bergsma explains the different patterns of responses that children display by assuming the following. For the children that always selected the third picture, they are ignoring the additive presupposition as pointed out earlier. For the rest of the children, since they are quite good with pre-subject *ook*, they must know the presuppositional contribution of the particle. Hence, their difficulty with type two and type three sentences must be due to their inability to reliably use the prosodic information to disambiguate the scope of post-finite *ook*. Hüttner *et al.* (2004) also report children's tendency to ignore the particles. Using a Picture selection

task that follows the same basic setup as Bergsma (three pictures depicting subject-associate, object-associate, and particle-less interpretations), the authors tested German-acquiring children's interpretation of post-finite *auch* (S AUX AUCH O V), whose associate varied across subject and object depending on prosodic information (particle vs. object). Like the Dutch children, German children also displayed a similar behavior, where younger age group often—though not as much as in Bergma's study—selected a picture that merely depicts the particle-less interpretation. Again, this pattern of response suggests children are ignoring the particles. Interestingly, children in Hüttner *et al*.'s study displayed a bias for the subject-associated interpretation of *auch* as indicated by the fact that they performed better with subject-associated *auch* sentences (3-year-olds: 55.56% vs. 22.22%; 4-year-olds: 65.56% vs.37.78%; 5-to-7-year-olds: 62.73% vs. 48.18%). This kind of pattern was not reported by Bergsma. Regardless, these results suggest that children are having difficulty assigning the correct scope to the particle.

The results from these studies have been taken as evidence for how children's ability to comprehend sentences containing an additive particle develop throughout the course of language acquisition. The general claim is that children start off by ignoring the additive presupposition triggered by the particles, after which children go through a phase where they allow the particles to associate with a non-focused constituent, before finally converging to adult-like grammar (Hüttner *et al.*, 2004; Bergsma, 2006). This seems like a reasonable claim which aligns with the acquisition story we proposed in Chapter 1. Given the complex nature of the particles, it is not a surprise if their acquisition was delayed compared to other aspects of language. The question is when does the transition take place from one phase to the other. Eyeballing the results, it looks to be the case that children's understanding of the

presuppositional nature of the particles do not become adult-like until around age 6. This is suggested by some children's tendency to consistently select the picture corresponding to the particle-less interpretation of the test sentences in Bergsma's and Hüttner *et al.*'s studies. The same can be said about Japanese-acquiring children since Matsuoka *at al*.'s results cannot adjudicate between scope misanalysis and ignoring of the particles, it's likely that part of children's errors is of the latter type. As for the focus-sensitive nature of the particles, it is only in Matsuoka *et al*.'s study where the authors report any sign of children's understanding of the knowledge, with just barely under a fifth of the children that were tested showing adult-like performance. Neither Bergsma nor Hüttner *et al*. make reports about there being individuals who were able to consistently give an adult-like response. In this regards, Japanese and the other two languages are different. It could be that what's being reflected here is the difference between the two types of languages in terms of how the scope of the particle is marked. Again, Japanese is a language that mark association with focus through syntax, i.e., the syntactic position of the particle within a sentence, whereas Dutch and German are languages that mark focus-association through prosodic information. We know independently that children struggle to reliably use prosodic cue to disambiguate between different scope interpretations (Gualmini *et al*., 2003). It is of no surprise then if Dutch- and German-acquiring children struggled to reliably use the nuclear pitch accent to determine the scope of additive particles. What's unexpected is that we only see a fifth of the Japanese-acquiring children are able to consistently give an adult-like response. Recall that Dutch-acquiring children in Bergsma's study—excluding those that consistently selected the picture matching the particle-less interpretation—were very consistent at selecting the correct picture that matches the subject-associated interpretation when they were tested on sentences

containing a pre-subject *ook*. That is, children did not mis-analyze the scope if the sentence they are being tested on is unambiguous. As a matter of fact, the two types of test sentences in the Japanese experiment were also unambiguous: the subject-adjoined *mo* in (25a) is unambiguously interpreted as being associated with the subject; and the object-adjoined *mo* in (25b) is unambiguously interpreted as being associated with the object. In that sense, the two types of test sentences used in Matsuoka *et al*.'s study and the test sentences with pre-subject *ook* in Bergsma's study were alike. But then, why are the Japanese-acquiring children doing so much worse than how the Dutch-acquiring children did with pre-subject *ook*-sentences?

Perhaps, there is more going on in these studies that can't be accounted for just by appealing to children's knowledge. That is, we might be seeing some task effects that are skewing children's performance. The argument is two-fold. The first argument concerns the presuppositional nature of the additive meaning triggered by the particles. Additive particles status as a presupposition trigger is well accepted: they contribute to the non-at-issue content of a sentence, not its at-issue content, placing a contextual constraint on when the sentence containing the particles can be uttered felicitously. Crucially, false presupposition does not make the sentence false but makes it infelicitous. Yet, these studies employed Truth-value judgement and Picture selection tasks—two tasks that rely on truth-verification as a way of assessing children's interpretation of a sentence—to test children's comprehension of additive particles. This results in a mismatch between what needs to be tested (i.e., children's ability to reason based on the presuppositional content of a sentence) and what is actually being tested (i.e., children's ability to reason based on the truth conditional content of a sentence). The truth-value-oriented nature of the tasks could lead children to downgrade the

relevance of the additive presupposition in completing the tasks, as presuppositions do not affect the truth of a sentence, in which case children's poor performance would not be an accurate representation of their competence. That is, children could be fully aware of the additive presupposition triggered by the additive particles and could have computed the correct presupposition intended in the test sentences based on the relevant cues that determine the scope of the particles, and still judge a sentence to be acceptable based solely on its asserted content. Crucially, all of the non-adult-like responses that children provided in these studies are compatible with the view that children are ignoring the additive particle in the test sentences since sentences with and without an additive particle bear the exact same at-issue meaning. In fact, Hornby (1974) and Kim (2008) report that even adults sometime struggle to reject test sentences on the basis of false presupposition, when they are tested using tasks that rely on truth-verification. Given that even adults would sometime struggle to "successfully" complete such tasks, it's likely that adopting similar tasks to test children's interpretation of sentences containing an additive particle would also lead to similar errors, but potentially of a greater magnitude, resulting in an underestimation of children's performance.

The second argument in favor of the purported view that children's difficulty with additive particles in previous studies is a task effect comes from the unnaturalness of the discourse context in which children had to interpret the test sentences. Recall that additive particles (or focus particles in general) make reference to a set of implicit information, whose actual content must be inferred from the discourse context in which their host sentence is uttered. This makes the discourse context in which the test sentences are presented a crucial part of the experimental design when testing children on their interpretation of additive

particles, because without sufficient context, children will have a hard time inferring the information that is necessary for the adult-like interpretation of sentences containing an additive particle. Furthermore, we've already discussed in Chapter 2 of this paper that additive particles have an anaphoric component to them, making their presuppositional contribution highly resistant to accommodation. Accordingly, additive particles should be used in a discourse context in which the actual event that satisfies the additive presupposition is made maximally salient in the preceding discourse by for example explicitly mentioning the truth of event that satisfies the additive presupposition. Despite the need for contextual support, these studies presented their test sentences in an unnatural, "out-of-the-blue" manner, isolated from any preceding discourse. Clearly, this would make the inferential process more difficult for children. It's possible then that children's comprehension was impaired by the fact that these studies did not provide appropriate supporting context.

Taken together, the issues outlined above raise the question as to whether or not results obtained from Truth-value judgment and Picture selection tasks can be used as a reference point for making any conclusions about how children's understanding of additive particles develop, and the answer seems to be no. It's likely that testing children's comprehension of additive particles using tasks that rely on truth-verification without providing any contextual support would impose extra demand on children's cognitive ability, in which case using the obtained results as a reference point for how children's linguistic knowledge develop could result in an underestimation of their true capacity.

In light of the above argument, Berger and Höhle (2012) show that German-acquiring preschoolers' interpretation of sentences containing an additive particle becomes adult-like when they are tested using a task that is free of the issues outlined above. Using a Rewarding

game task, Berger and Höhle tested German-acquiring 3- and 4-year-olds's comprehension of *auch* in a natural context. Their design had two advantages over the earlier studies: (i) their task allowed them to probe children's sensitivity to the additive presupposition without relying on truth-verification; and (ii) test sentences were presented as part of a larger discourse which made the content of the presupposed event maximally salient.

In their task children were informed to reward the puppet only when it completed two tasks. As the puppet made its attempt at completing the two tasks, it would disappear behind a puppet theater, and so, children were not able to see whether it succeeded at completing both tasks; instead, children had to infer the outcome based on how the puppet responds to an experimenter's supposition. (26) and (27) are English translations of their utterances. Like children, the experimenter was ignorant about what had happened behind the puppet theater, and so when the puppet reappeared from behind the puppet theater, the experimenter expressed her supposition about the outcome by uttering (26). The puppet responded to the experimenter's supposition by uttering (27), with or without the additive particle *also* (or *auch* in the original material).

(26) Experimenter: Oh, there is the lion again! I'll ask him what he did:
Lion! You've surely eaten the banana!

(27) Puppet: Guess what! I've (also) eaten the APPLE!

German is a language that utilizes prosodic emphasis to indicate the placement of focus within a sentence. The use of prosodic emphasis in (27), thus, indicates that the object NP is under focus. Without the additive particle, the most natural interpretation of the nuclear pitch

accent on the object NP *apple* would be contrastive focus, in which case the puppet's response to the experimenter's supposition should be understood as corrective, implicating that he did not eat a banana. Therefore, if the puppet's response to the experimenter did not contain an additive particle, then children should not give him a reward. Conversely, if the puppet responded to the experimenter by uttering (27) with the additive particle, then the experimenter's supposition should be understood as being true, because the inclusion of additive particle indicates additive contrast. Specifically, the puppet's utterance presupposes that he ate something else in addition to the apple, which in the given context must be banana. Therefore, if children are able to consider the additive presupposition triggered by additive particles and account for the contextual constraint the presupposition imposes on the discourse, then they are expected to give more reward after hearing (27) with the additive particle. And Berger and Höhle's results show that this expectation is borne out. The German-acquiring children that were tested gave significantly more rewards after sentences with *auch* than sentences without *auch*, displaying at-ceiling, adult-like performance after *auch*-sentences. These results suggest that German-acquiring children are able to consider the additive presupposition triggered by *auch* and the contextual constraint it imposes on the discourse, and presumably, that children acquiring other languages can do the same for additive particles in those languages as well. In fact, results from Aravind (2018) and An *et al*. (2020) suggest that this is the case. Using tasks that utilize enriched discourse contexts, these studies tested English-acquiring preschoolers' interpretation of *too* and Mandarin-acquiring preschoolers' interpretation of *ye*. Subsequently, these studies show that when the test sentences are presented with an enriched context that sufficiently highlights the intended presupposition in the experimental context and the task does not rely on the rejection of test

sentences, then children have very little problem considering and accounting for the additive presupposition triggered by these particles.

That said, Berger and Höhle's design involves a potential confound, which makes one hesitant about taking their results at face value. In their task, children displayed a non-adult-like tendency to reward the puppet even after sentences without *auch* (63.64% for the 3-year-olds; 38.18% for the 4-year-olds), a condition in which adults almost never gave a reward (4.93%). Hence, it is not immediately obvious how accurately Berger and Höhle's results represent children's competence, as their adult-like, at-ceiling performance with *auch*-sentences might be conflated by their natural tendency to give a reward.[12] That is, we do not know how much of the children's overall success is due to their understanding of *auch*'s presupposition. A similar point can be made about Aravind (2018) and An *et al*. (2020). These studies did not provide a reliable baseline to which children's comprehension of sentences containing *too* and *ye* can be compared. Their control conditions used different contexts than the critical test conditions, and so, how much contribution children's understanding of additive particles make to their overall success in the task is also unclear. If we take their results at face value, then we could end up overestimating children's knowledge. Therefore, further investigation is necessary to better understand when children's understanding of the presuppositional nature of additive particles become adult-like.

[12] In fact, Berger and Höhle acknowledged this possibility themselves, and so, they ran another condition where they used sentences containing an object-associated *nur* 'only' as critical test items. Their results show that children's bias to reward the puppet can be undone by using *nur* but the possibility still remains that children's adult-like, at-ceiling performance with *auch* is elevated by their natural tendency to give a reward.

Furthermore, the recent studies on children's interpretation of additive particles were focused solely on the presuppositional nature of the particles, putting aside the question of whether or not children understand the focus-sensitive nature of these particles. Thus, we know very little about children's understanding of the focus-sensitive nature of additive particles; in fact, all we know is that some Japanese children are able to use the syntax to determine the scope of *mo*, while Dutch and German children are very bad at using prosodic information to determine the scope of *ook*/*auch*. However, we know independently from Szendrői *et al*. (2018) that preschool children aged 3 to 6 have an adult-like understanding of prosodically marked focus. In their study, the authors examined English-, French-, and German-acquiring children's sensitivity to prosodic information, testing to see if they can use that information to determine which part of the sentence, i.e., subject or object, is being contrasted with its alternatives. Specifically, they tested to see whether there is any difference in how children respond to false statements that varied in the placement of focus (e.g., *the HEDGEHOG has a hammer!* vs. *the hedgehog has a HAMMER!*). Children were presented with an image depicting three animals each holding different items (e.g., a hedgehog holding a bottle, a bird holding a hammer, and a tiger holding a shovel). Having seen the image the day before, the experimenter will not look at the image herself, but instead, try to remember what is depicted in the image. She will make a comment about the image, which was sometimes correct and sometimes wrong. Children were invited to correct the experimenter when she made a wrong statement. The results of their experiment reveal that in general, children are as good as the adults at differentiating subject-focus from object-focus; they gave more subject-corrections (e.g., *No, the BIRDIE has a hammer!*) when they hear wrong statements with the nuclear pitch accent placed on the subject; and they gave more object-

corrections (*No, the hedgehog has a BOTTLE!*) when they hear wrong statements with the nuclear pitch accent placed on the object. These results suggest that children around this age are able to use prosodic information as an indication of which part of the sentence is under focus and hence being contrasted with its alternatives. Considering that children's understanding of contrastive focus is closely related to their understanding of the interaction between additive particles and focus, their results provide another reason to be cautious about how we should interpret the previous findings on children's understanding of the focus-sensitive nature of additive particles.

To summarize our discussion up to now, previous studies report mixed findings on when children's interpretation of additive particles become adult-like. Whereas some studies report that their interpretation of sentences containing an additive particle does not become adult-like until school age, other studies have shown that children as young as age 3 are able to interpret sentences containing an additive particle in an adult-like way. The former group of studies was mainly concerned with children's understanding of the focus-sensitive nature of the particles, and so, their primary focus was to examine whether children could use the language specific cues to determine the scope of the particles, which they determined based on children's ability to correctly discern sentences containing a subject-associated particle from those containing an object-associated particles. However, the design of these studies made it difficult to tease apart whether children's inability to discern the two sentence types stems from their understanding of the focus-sensitive nature of the particles or from their ignoring of the particles. Crucially, the tasks employed in these studies involved methodological flaws that could lead to latter type of errors. Thus, using the results from these studies as reference point to estimate children's linguistic knowledge could lead to an

underestimation of their true capacity. Conversely, the group of studies that consist of more recent work was concerned with children's understanding of the presuppositional nature of the particles. They examined children's sensitivity to the additive presupposition by comparing their responses to sentences containing an additive particle to those without. The studies, however, did not provide a reliable baseline to which children's performance should be compared. For example, in Berger and Höhle's study, children displayed a tendency to reward a puppet (i.e., their target response) even when they heard a sentence that lacks an additive particle, a condition that adults almost never gave a reward. It's possible then that children's at-ceiling performance in the particle-condition is elevated by this bias, in which case assessing children's competence based on their results would lead to an overestimation of children's true competence. Therefore, it is necessary that we re-examine children's understanding of the presuppositional and focus-sensitive nature of the additive particles to have a better estimate of when children's knowledge becomes adult-like, all in the light of better understanding how children's understanding of the additive particles develop. The remainder of the dissertation is devoted to re-investigating what preschool-aged children know about additive particles.

Chapter 4

Testing the additive presupposition

This chapter presents three experiments that explore children's understanding of the presuppositional nature of additive particles. The experiments investigate children's interpretation of sentences containing an object-associated particle to test their ability to account for the contextual constraint that additive particles impose on their host sentence through their presuppositional contribution. Experiment 1 and Experiment 2 use the exact same task and materials to investigate English-acquiring 4-year-olds' interpretation of sentences containing object-associated *also* and Japanese-acquiring 5-year-olds' interpretation of sentences containing object-associated *mo*. Using a slightly modified version of the task, Experiment 3 investigates English-acquiring 4-year-olds' interpretation of sentences containing object-associated *too*.

4.1 Methodology

As we mentioned earlier, additive particles are presupposition triggers. The particles contribute an additive presupposition to sentence meaning, through which they effectively partition the meaning of a sentence into what is asserted/at-issue and what is presupposed (König, 1991).

(28) Mickey also ate a BANANA

At-issue content: Mickey ate a banana

Presupposed content: Mickey ate something other than a banana

Crucially, additive particles do not contribute to the at-issue, asserted content of a sentence; the sentence in (28) carries the same assertion as its particle-less counterpart *Mickey ate a BANANA*. Accordingly, when we investigate children's interpretation of additive particles, it's important that we probe specifically for children's sensitivity to the additive presupposition. To do this, we must be wary of the behavioral difference the two types of meaning display.

The asserted, at-issue content is the main point of a sentence, relating to its truth-conditional meaning. What is asserted in a sentence can be directly denied or be called into question. Presupposed content of a sentence, on the other hand, is backgrounded information, whose truth is taken for granted by all speech participants. It is not the main point of a sentence, and its truth has already been accepted by all relevant speakers. Therefore, its content cannot be directly denied or be called into question. Early studies on the acquisition of additive particles did not consider this difference between what is at-issue and what is presupposed. As a result, they went on to test children's interpretation of sentences containing an additive particle using truth-value oriented tasks like Truth-value judgement and Picture-selection. Specifically, they tested to see if children can detect the anomaly and reject the test sentences on the basis of false presupposition, when the additive presupposition is not satisfied in the experimental context. Such tasks, however, can lead to an underestimation of children's understanding of the particles because the additive

presupposition can be overshadowed by the truth-value-oriented nature of the task, resulting in children's ignoring of the particles. Therefore, a task that is aimed at testing children's sensitivity to the additive presupposition should not rely on truth-verification as the primary measure for assessing children's comprehension. More recent studies on children's interpretation of additive particles addressed the above issue by using tasks that rely on indirect measures, i.e., tasks that do not rely on asking whether a sentence is true/false. For example, in their study with German-acquiring children's interpretation of *auch*, Berger and Höhle (2012) employed a Rewarding game task, through which they tested to see if children could interpret sentences containing *auch* in an additive way rather than corrective. However, the tasks used in recent studies did not provide a reliable baseline to which children's performance should be compared, and so, it's possible that their results overestimate children's performance. To assess children's sensitivity to the additive presupposition without the worry of overestimating children's performance, we designed a novel task, which probes children's sensitivity to the additive presupposition by testing to see whether children can use the relevant information to restrict the range of appropriate answers to a *wh*-question.

What counts as an appropriate answer to a *wh*-question is (partially) determined by the at-issue content of the question, which can be obtained by replacing the *wh*-word with a variable. For example, an appropriate answer to the question *Who ate a banana?* must consist of an individual that satisfies the open proposition *x ate a banana* in the relevant discourse context. Hence, in a context where Mickey ate an apple and a banana, Minnie ate an apple, and Donald ate a banana, Minnie does not count as an appropriate answer to the question, because she does not make the open proposition true. Crucially, inserting an additive particle to the *wh*-question allows us to further constrain its range of appropriate answers. An

appropriate answer to the question *Who also ate a banana?* must satisfy both its at-issue content of the meaning *x ate a banana* and its presuppositional meaning *x ate something other than a banana*. Precisely, in the above context, Mickey is the only individual that counts as an appropriate answer to the question; Donald is no longer a good answer because he only satisfies the at-issue meaning and not the presuppositional meaning. The method adopted in the experiments discussed in this chapter relies on this exact process of using the additive presupposition to restrict the range of appropriate answers to a *wh*-question to probe children's sensitivity to the additive presupposition triggered by *also*, *too*, and *mo*.

4.2 Experiment 1

Experiment 1 investigates English-acquiring 4-year-olds' interpretation of sentences containing an object-associated *also* to test children's sensitivity to *also*'s presupposition.

4.2.1 Participants

Thirty-five monolingual English-acquiring children (age 4;0-4;11, mean age 4;6) were recruited for the experiment. Three children were excluded from the data analysis as they failed to complete the experiment, leaving us with thirty-two children to analyze. In addition, twenty-eight adult native speakers of English participated as a control group in the experiment. The participants were randomly assigned to one of two conditions: ALSO or NO-ALSO; and had their results compared across the two conditions. The number of participants analyzed was the same across two conditions for children (n = 16 for each condition) but

different for adults (n = 16 for ALSO and n = 12 for NO-ALSO). Adults and children were tested using the exact same task.

4.2.2 Materials and design

Two types of subject *wh*-questions were constructed as test sentences: subject *wh*-questions with a preverbal *also*, as in (29a); and subject *wh*-questions without *also*, as in (29b). For both sentence types, the nuclear pitch accent was placed on the object NP, and so, the only difference between the two types were whether or not they contained *also*.

(29) a. Now, who also ate a BANANA?

b. Now, who ate a BANANA?

The pitch accent on the object indicates that *also* should be interpreted as taking scope over the object NP (i.e., it is object-associated). There is no subject-associated *also* in the test material because the aim of the study is to examine whether or not children understand the presuppositional nature of the particle and not to test association with focus, which is taken up in Experiment 4. Notably, *also* does not typically associate with a *wh*-phrase in English. To ask a question where the additive contrast is intended for the individuals that corresponds to the *wh*-word, the particle *else* is used as in *Who else ate a BANANA?*. Hence, in the adult grammar, the preverbal *also* in (29a) is unambiguously interpreted as being associated with the object. Each child only saw one type of test sentences: those with *also*, or those without *also* (between-subject design). There were 4 test sentences per condition.

Short context stories were created for these test sentences, in which three Disney characters, Mickey, Minnie, and Donald, each performed some action(s) (e.g., eating fruit). Each context initially presented the background information by introducing the objects that are involved in the action being performed by the three characters (e.g., apples and bananas). After that the critical information followed, describing in order which action(s) Mickey, Minnie, and Donald, each performed. All of the context stories followed the same setup, where one character performed one action (e.g., eats an apple), one character performed a different action (e.g., eats a banana), and one character performed both of those actions (e.g., eats an apple and a banana). The character that performed both actions (the "two-action" character) varied across stories.

The setup of the stories should lead to different patterns of responses across the two sentence types. For *wh*-questions without *also*, an answer that consists of any individuals that satisfy its at-issue content will make an appropriate answer. For *wh*-questions with *also*, their answers are more restricted because the presuppositional meaning places a further constraint. Thus, by comparing children's responses across two conditions, we are able to examine whether or not children are considering the additive presupposition in their interpretation of the questions.

To illustrate how our task works, let us walk through a sample trial of the experiment. The trial begins with a short story about Mickey, Minnie, and Donald, who each complete some task(s). A sample story is given in (30), which is presented with animated PowerPoint slides shown in Figure 1.

(30) ***Sample story***

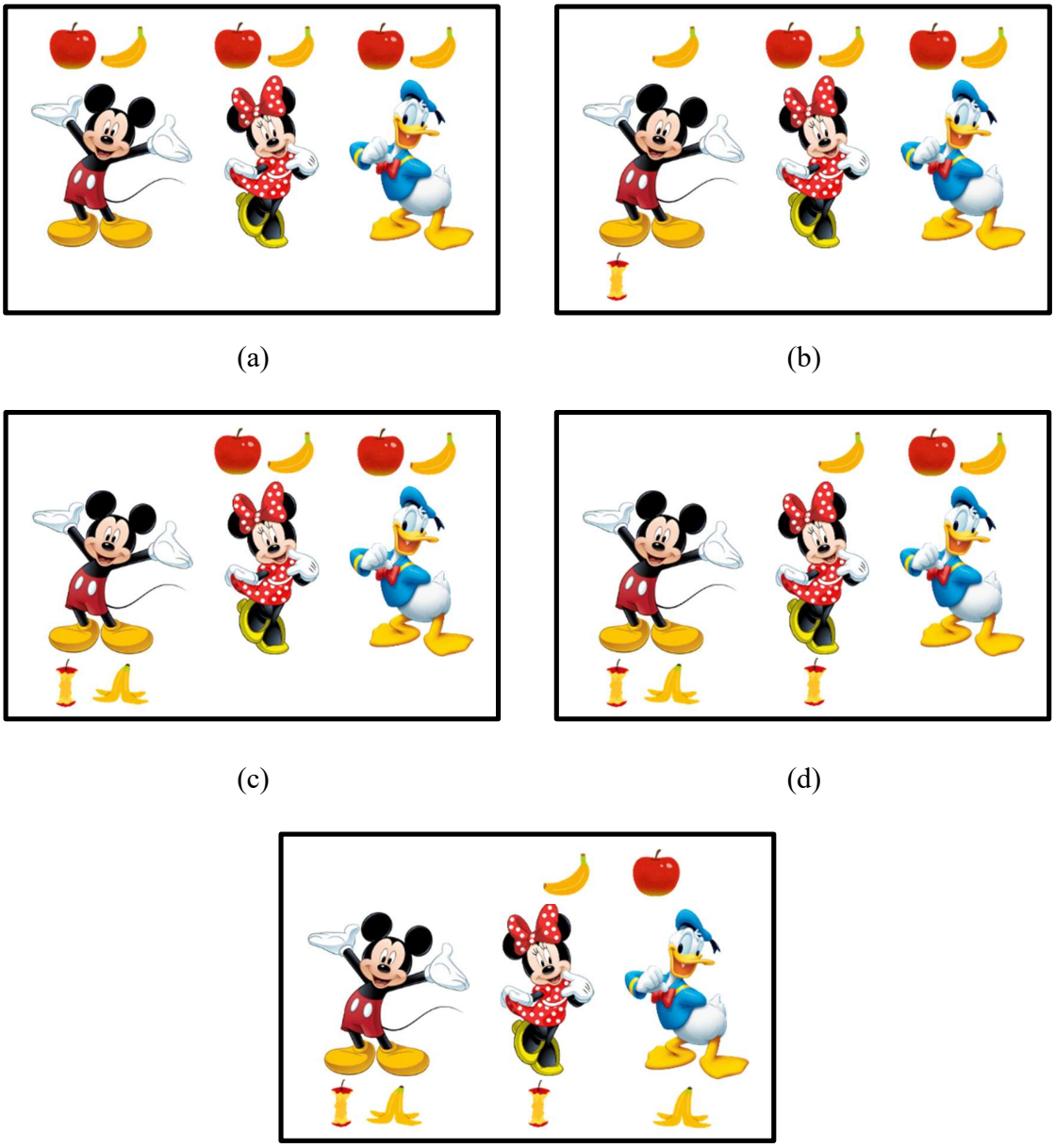
a. Mickey, Minnie, and Donald are going to eat fruit for breakfast. There are apples and bananas to eat.

b. Mickey says, “I just woke up so I’m not that hungry. I’ll just eat one fruit.” Look, Mickey eats an apple!

c. Mickey then says, “that was delicious. I’ll eat another fruit!” Look, Mickey eats a banana!

d. Minnie says, “eating too much fruit is not good for me. I’ll just eat one fruit.” Look, Minnie eats an apple!

e. Donald says, “I ate a lot for dinner yesterday, so I’m not hungry. I’ll just eat one fruit.” Look, Donald eats a banana!



(a) (b)

(c) (d)

(e)

Figure 1. Animated PowerPoint slides that accompanied the story in (30)

There are two banana eaters in the sample story, Mickey and Donald. Of the two banana eaters, Mickey ate an additional fruit, namely an apple. At the end of the story, an experimenter asks an on-screen puppet named Charlie a question like in (31), to test his

understanding of the story. This question serves as a prompt for setting up the necessary context that makes the use of an additive particle natural.

(31) Who ate the most fruit in this story?

Charlie first responds to the experimenter's question by giving a recount of the story like (32).

(32) Well let's see. There were apples and bananas to eat. Donald didn't eat an apple, but Mickey and Minnie did.

However, being a forgetful chimpanzee, Charlie cannot remember some of the details and asks an incidental *wh*-question like (33) or (34) to solicit help. This incidental question happens to be our test question, which consists of the *wh*-question with or without *also* (between-subject manipulation).

(33) Now, who ate a BANANA?

(34) Now, who *also* ate a BANANA?

An answer to the *also*-less-question (33), interpreted as *which x are such that x ate a banana*, can be any individual who satisfies the at-issue content of the question *x ate a banana*, which would be Mickey and Donald in the given context. Hence, *Mickey*, *Donald*, and *Mickey and Donald*, are all appropriate answers to the question. That said, the way in

which the *wh*-question is presented should make the maximally correct answer (i.e., *Mickey and Donald)* the most preferred. The purported goal of the task for children is to help the puppet answer the experimenter's question (e.g., *Who ate the most fruit?*). To accomplish this, the puppet goes on to give a recount of everything that happened until right before he asked his incidental *wh*-question, because he couldn't remember the rest of the story. Intuitively, the most natural way to answer his question would be to mirror his recount and give the maximally correct answer. The *also*-question in (34), on the other hand, has a more restricted set of answers as *also*'s presupposition places an additional constraint on what counts as an appropriate answer to the question. Specifically, the answer to the question must satisfy both the at-issue content of the question *x ate a banana* and the presuppositional content of the question *x ate something other than a banana*. Given the above context, Mickey is the only character that satisfies this condition. Therefore, in a context where there are multiple banana eaters but only one of them ate something other than a banana, the two questions yield different responses.

Recall that additive particles require an antecedent that makes the content of the additive presupposition maximally salient. Hence, asking the question in (34) without any linguistic antecedent would result in a conversational breakdown. For this reason, the *wh*-questions were embedded in larger discourses like above, presented incidentally as part of the puppet's response to the experimenter's original question. In his recount of the story, Charlie explicitly states that Mickey and Minnie ate an apple. Therefore, by the time Charlie asks the incidental *wh*-question containing *also*, the necessary information that makes the presupposed content true is already established as backgrounded information. This allows us

to test children's interpretation of *also* in a context that satisfies its presupposition, i.e., in its naturally occurring context.

All utterances by Charlie were prerecorded by a native speaker of American English to keep the use of prosody consistent across all participants.

4.2.3 Procedure

The experiment is conducted in a quiet space in the lab with a child seated next to the experimenter in front of a laptop computer.

The experimenter begins the session by introducing the on-screen puppet Charlie, a forgetful chimpanzee who loves stories, to the child.

Figure 2. The child is introduced to Charlie

After a brief interaction with Charlie, the child is told that together they will listen to some stories and that s/he will be helping Charlie learn those stories by answering Charlie's questions whenever Charlie fails to remember some of the details of the story.

There is a total of ten trials: two practice trials, four test trials, and four filler trials. The child first goes through a training phase, which consists of two practice trials to get him/her

familiarized with the task. After the training, the child enters the test phase, which alternates between test and filler trials. All trials, including practice, follow the same basic setup that we saw in §4.1.

The crucial difference between the trials lies in the incidental question used by Charlie to solicit the child's help: in the test trials, Charlie solicits the child's help by using *wh*-questions, but in the practice and filler trails, Charlie uses *yes*/*no*-questions. The *wh*-questions used in the test trials are the critical test sentences (e.g., *Who (also) ate a BANANA*?). We assess children's ability to consider the presupposition triggered by additive particles based on how they respond to these questions. The filler trials are there as a control to see if the child is understanding the general purpose of the task. Three children who failed to give more than two correct answers to the *yes*/*no*-questions (e.g., *Did Mickey eat a banana?*) during the four filler trials were excluded from the final analyses.

4.2.4 Prediction

If children are sensitive to the additive presupposition triggered by additive particles, then this should be reflected in their responses, and so, we expect a different pattern of responses across two conditions. Specifically, we expect children to give more TWO-ACTION CHARACTER (e.g., Mickey from the sample story, who ate both an apple and a banana) responses in the ALSO condition than in the NO-ALSO condition. Conversely, if they are not able to consider the additive presupposition triggered by additive particles, then we expect children to display the same pattern of responses across two conditions, as the test questions with and without an additive particle share the same at-issue content.

4.2.5 Results

Figure 3 summarizes the collapsed results from Experiment 1, displaying the mean percentage of two-action character responses across two conditions (ALSO vs. NO-ALSO) for each age group (Children vs. Adults). As expected, adults in the ALSO condition gave more two-action character responses than those in the NO-ALSO condition (81.25% vs. 33.33%), which is expected given the design of the task. Similarly, children in the ALSO condition gave more two-action character responses than the children in the NO-ALSO condition (50.00% vs. 10.93%). Using the glmer function in the lme4 package on R (R Core Team, 2020), we ran a mixed-effects logistic regression of the results with condition (ALSO vs. NO-ALSO) and age (children vs. adults) as fixed factors and participants and trials as random intercepts. The model revealed significant effects of condition (β = -17.003, $p < 0.001$) and age (β = -7.825, $p < 0.05$). We did not find a significant interaction of age and condition (β = 6.088, $p > 0.1$).

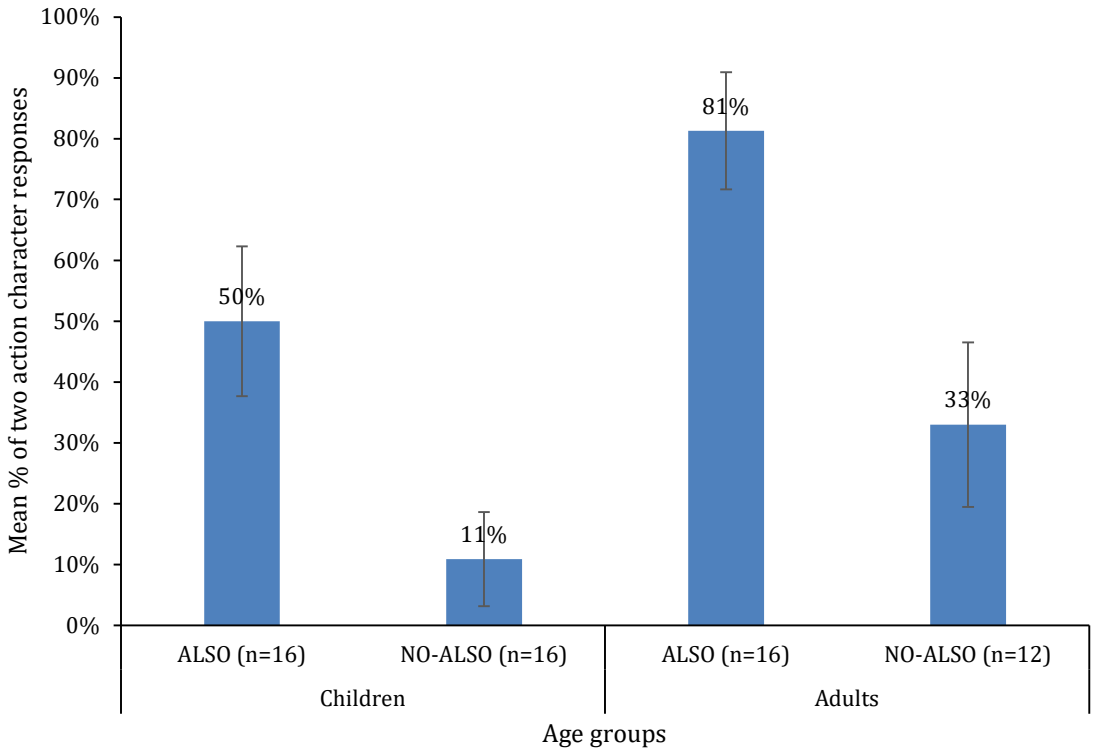


Figure 3. Mean percentage of two-action character responses across two conditions for each age group with error bars indicating 95% confidence intervals

Figure 4 plots the distribution of ALSO-condition children as a function of how often they gave a two-action character response across the four test trials to see their individual performance. Of the sixteen ALSO-condition children, we see that six of them were very consistent at giving two-action character responses, successfully providing the target response in more than three out of the four test trials. Of the remaining ten children, three of them gave a two-action character response in half of the trials. The remaining seven children gave one or less two-action charcter response across four test trials. The figure shows no sign of pattern in children's distribution; they appear to be distributed equally across each response profile.

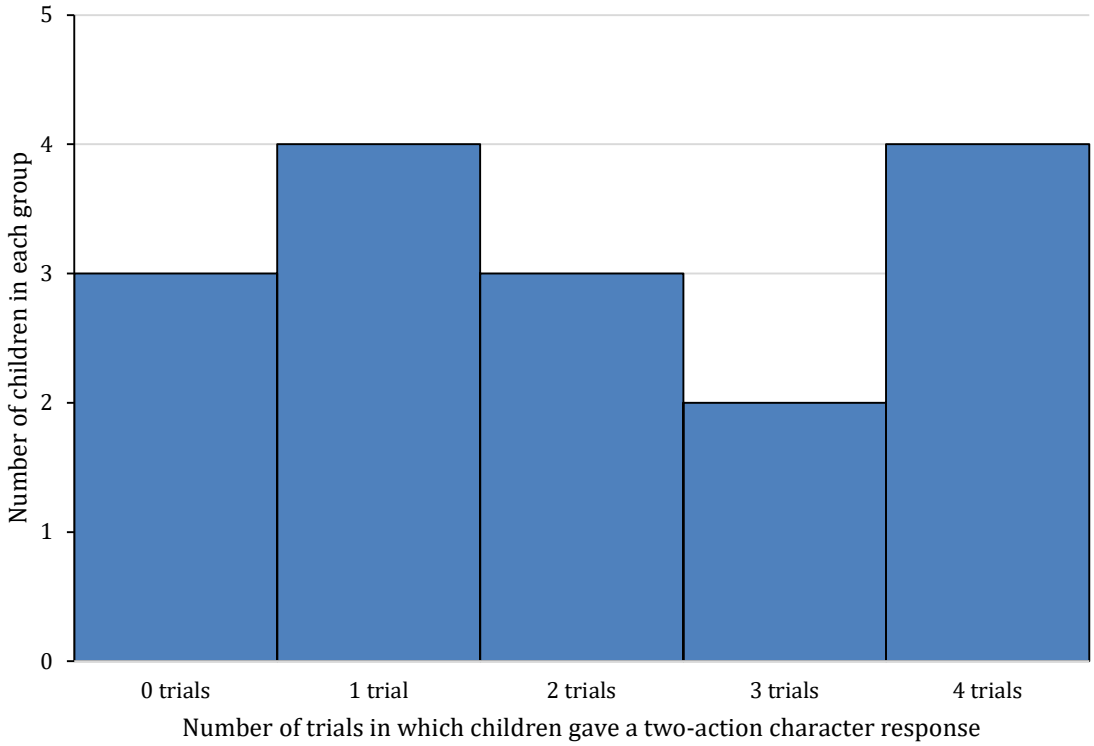


Figure 4. Breakdown of ALSO-condition children's performance based on the number of trials in which they gave a two-action character response

4.2.6 Discussion

Looking at the children's results, we see a robust difference in the mean percentage of two-action character responses across the two conditions (ALSO vs. NO-ALSO). This indicates that the English-acquiring children as a group were able to distinguish *wh*-questions with *also* from those without. Moreover, children's adult-like tendency to give more two-action character responses in the ALSO condition than in the NO-ALSO condition, as indicated by the significant effects of condition from our statistical analyses, suggests that the above difference is a reflection of children's ability to consider the additive presupposition triggered

by these particles, which children used to restrict their answer to a *wh*-question. Crucially, the English-acquiring children in the NO-ALSO condition very rarely gave two-action character responses. Since the only thing that is different across the two conditions is the use of additive particles in the critical test questions, what's responsible for the two-action character responses in the ALSO condition must be the additive particle *also*.

The lack of target responses in the NO-ALSO condition in our study provides a nice baseline for comparing children's performance with *also* in the ALSO condition to, which Berger and Höhle's study lacked. In their study, children displayed a general bias towards rewarding a puppet (their target response), even in the particle-less condition where adults almost never gave a reward. Thus, it was not immediately obvious whether children's adult-like, at-ceiling performance in their critical condition with *auch* is an accurate measure of children's competence or not. Specifically, if the German-acquiring children's performance in the *auch*-less condition was elevated by their natural tendency to reward a puppet, then Berger and Höhle's results could be overestimating children's understanding of *auch*'s presupposition. Hence, our task provides good testing ground for investigating children's comprehension of additive particles; we do not have to worry about children's performance being elevated by their bias towards the target response. And we see that while children as a group are able to discern the two types of sentences, not all children display sensitivity to the additive presupposition. The histogram plot in Figure 3 reveals that children's performance vary across individuals. The six ALSO-condition children that were able to give a two-action character response in more than three out of the four test trials, we can be confident that they have an adult-like understanding of *also*'s presupposition. However, as for the remaining ten

ALSO-condition children who failed to consistently give a two-action character response, we do not know if they have an adult-like interpretation of *also*.

The question we ask then is why there is such variation in children's individual performance. Specifically, we'd like to know whether or not our results underestimate the performance of children who did not behave like the adults, given that we tested older children than Berger and Höhle. One potential complication that might have affected English-acquiring children's performance lies in our design of the task. To succeed in our task, children had to pay close attention to the puppet's recounting of the story and update the common ground accordingly as the discourse developed such that the test questions with *also* can be interpreted naturally. The puppet's recount of the story contained an elided VP right before the target question (e.g., Mickey and Minnie did ~~<eat an apple>~~), requiring children to both resolve an ellipsis and assess a presupposition within a very short interval. It's possible that the ellipsis added to the difficulty of integrating the whole discourse together, which could have resulted in children's non-adult-like interpretation of the target question. The fact that the English-speaking adults in the ALSO condition failed to perform at ceiling suggests that this might have been difficult even for the adults. It's possible then that the non-adult-like children know that *also* triggers an additive presupposition, but the design of our task underestimates their performance.

Alternatively, it is possible that not all English-acquiring 4-year-olds have an adult-like knowledge about the presuppositional nature of *also*, and we are seeing that being reflected in our results. Unfortunately, there is no way for us to tell which possibility is more likely at this point, but we will come back to this issue in §4.5, where the results from Experiment 1, Experiment 2, and Experiment 3 will be discussed in tandem. For now, the results from

Experiment 1 tell us that some English-acquiring 4-olds have figured out that *also* is presuppositional in nature, which suggests that this knowledge begins to emerge in children by at least their fourth birthday.

4.3 Experiment 2

Using the same task and materials (but translated into Japanese), Experiment 2 investigates Japanese-acquiring 5-year-olds' interpretation of sentences containing an object-associated *mo* to test children's understanding of the particle's presupposition.[13]

4.3.1 Participants

Thirty-five monolingual Japanese-acquiring children (age 5;4-6;3, mean age 5;10) were tested. Three children were excluded from the data analysis as they failed to complete the experiment, leaving us with thirty-two children to analyze. In addition, eight adult native speakers of Japanese participated in the experiment as a control group. The participants were randomly assigned to one of the two conditions: MO or NO-MO; and had their results compared across the two conditions. The number of participants analyzed were the same across two conditions for both adults (n = 4 for each condition) and children (n = 16 for each condition). Adults and children were tested using the exact same task.

[13] Ideally, the age of children would be matched across the two languages so that the obtained results will better complement one another. However, this was not possible as I only had access to 5-year-old children.

4.3.2 Materials and design

The Japanese material also consisted of two types of test sentences (or questions to be more precise), one with an object-associated *mo* as in (35a), and another without *mo* as in (35b).

(35) a. Are, dare-ga banana-mo tabe-ta kana?
hmm who-NOM banana-also eat-PAST Q
'Hmm, who also ate a BANANA?'

b. Are, dare-ga banana-o tabe-ta kana?
hmm who-NOM banana-ACC eat-PAST Q
'Hmm, who ate a BANANA?'

Like English *also*, *mo* does not (typically) associate with a *wh*-phrase: if *mo* occurs in a sentence being adjoined to a *wh*-phrase like *dare*, then the resulting expression *daremo* is no longer interpreted as a *wh*-phrase; instead, it is interpreted as an indefinite. And so, *mo* in (35a) is unambiguously interpreted as scoping over the object in the adult grammar, i.e., it associates with the object NP. Again, just like in the English version of the task, the test sentences were complemented by a preceding discourse in which the truth of the intended presupposition was explicitly mentioned, which should make the scope of the particle even more obvious.

All of the materials were carried over from the English experiment. The only difference between the two experiments was the language that was used to administer the experiment

and also the puppet's name, who was named Hanako, a common female name in Japanese, because its voice was done by a female speaker.

Like for the English experiment, all utterances by Hanako were prerecorded by a native speaker of Japanese.

4.3.3 Procedure

The procedure is the same as the English experiment. In a relatively quiet space in a Kindergarten, a child is seated next to the experimenter in front of a laptop computer. S/he is first introduced to a forgetful puppet named Hanako. After briefly interacting with Hanako, the experimenter explains to the child that together Hanako and the child will listen to some short stories and the child will help Hanako learn those stories by answering her questions. The experiment comprises ten stories, two practice, four test, and four filler tials. All trials, including practice trials, follow the same basic setup that we saw in §4.1. The experimenter tells a story and then asks Hanako a question about the story's content to test her understanding of the story. The purported goal of the task is to help Hanako answer this question. Hanako responds to the experimenter's question by giving a recount of the story, but failing to remember everything, Hanako seeks help from the child by asking an incidental question. After hearing the child's response, Hanako proceeds to answer the experimenter's original question. The experimenter then asks the child whether or not the child thinks Hanako is correct. Hanako's answer to the experimenter's original question was counterbalanced between correct and incorrect answers.

The incidental questions in the test trials are the critical *wh*-questions (e.g., *Dare-ga banana-mo/o tabe-ta-ka na*? 'Who (also) ate a banana'). We assess children's ability to

consider the presupposition triggered by *mo* based on how they respond to these questions. In the filler trials, Hanako uses *yes*/*no*-questions to solicit the child's help. The filler trials are there to see if the child is understanding the general purpose of the task. If the child fails to give all correct answer to the *yes*/*no*-questions during the filler trials, then s/he is excluded from the final analyses.[14]

4.3.4 Predictions

The prediction are the same as Experiment 1. If children understand that *mo* is a presupposition trigger and are able to account for the contextual constraint they impose on an utterance, then children should give more two-action character responses following the *wh*-questions with *mo*. If children do not know that *mo* is a presupposition trigger and thus, are not able to account for the additive meaning component in their comprehension of the *wh*-questions, then we do not expect any difference in their pattern of responses across the two conditions.

4.3.5 Results

Figure 5 summarizes the collapsed results from Experiment 2, displaying the mean percentage of two-action character responses across two conditions (MO vs. NO-MO) for the two age groups (Children and adults). As expected, adults in the MO condition gave more two-action character responses than those in the NO-MO condition (75.00% vs. 0.00%).

[14] Though no child were excluded on this basis.

Although they aren't perfectly adult-like, children displayed the same general pattern, where children in the MO condition gave more two-action character responses than the children in the NO-MO condition (51.56% vs. 6.25%). Since we barely see a variance in the number of two-action character responses in the MO-TOO condition, logistic regression is inappropriate here; we have a quasi-complete separation of the results. Instead, 95% confidence interval is calculated to see if the MO condition results exclude the results from the NO-MO condition to see if the pattern is statistically reliable and it does: the 95% confidence interval is 39.21% and 63.91% for the MO condition and 0.27% and 12.23% for the NO-MO condition for children. Since the two results do not overlap, the pattern is statistically reliable for children.

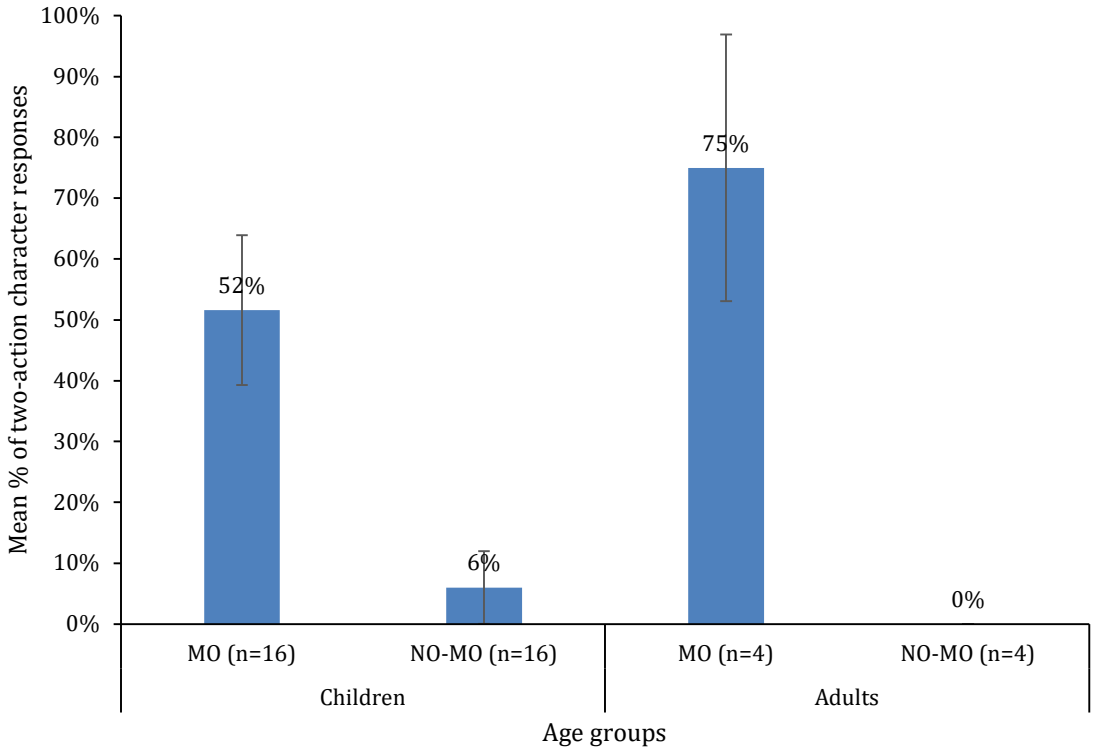


Figure 5. Mean percentage of two-action character responses across two conditions for each age group with errors bars indicating 95% confidence intervals

The histogram in Figure 6 plots the MO-condition children's distribution as a function of how often they gave a two-action character response. We see that the majority of the children in the MO condition belong to either the 0-trials group (five children) or the 4-trials group (six children), showing bimodal distribution. The remaining five children were distributed equally across the 1-trial (two children), the 2-trials (two children), and the 3-trials group (one child).

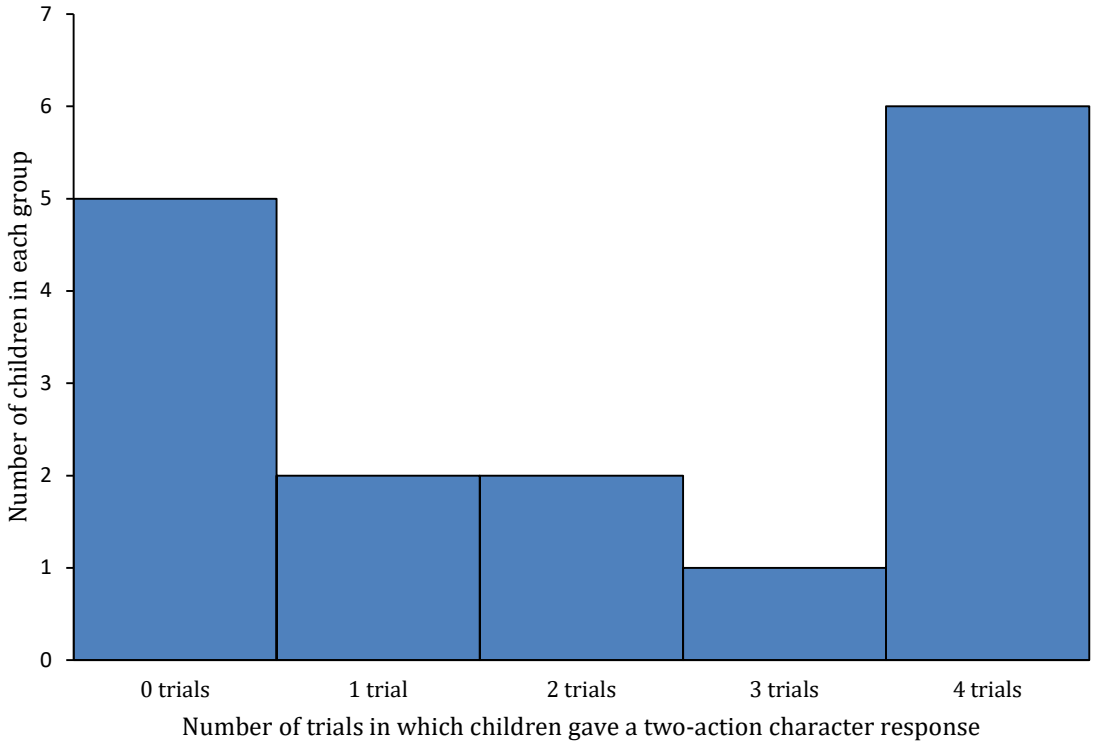


Figure 6. Breakdown of MO-condition children's performance based on the number of trials in which they gave a two-action character response

Before we move on to discuss the results, let me briefly explain the difference in the pattern of responses given by the particle-less condition adults across this experiment and the English experiment. While the English-speaking adults in the NO-ALSO condition gave a

notable amount of two-action character responses, the Japanese-speaking adults in the NO-MO condition never gave this kind of a response. I suspect this difference is due to Japanese Q particle *kana* requiring complete answers (Miyagawa, 2001) which led the Japanese-speaking adults in the NO-MO condition to name both characters that satisfy the at-issue content of the test question. As for the English-speaking adults, the two-action character responses in the NO-ALSO condition comes as no surprise, since such answers are perfectly sensible answers given the pragmatics of the task: if the purported goal of the task was to help the puppet answer the experimenter's question *Who ate the most fruit?* and it is clear from the immediate discourse that the puppet already knows that Mickey and Minnie ate an apple but Donald didn't, then Mickey's eating a banana is the only thing that the puppet needs to know to answer the original question by the experimenter. Hence, this difference has no real connection to the interpretation of additive particles per se.[15]

4.3.6 Discussion

The robust difference in the mean percentage of two-action character responses across the two conditions (MO vs. NO-MO) for children indicates that the Japanese-acquiring children that we tested distinguished *wh*-questions with *mo* from those without. Moreover, their adult-

[15] This does raise the question as to whether English-acquiring children's performance in the ALSO condition was elevated with this type of response in Experiment 1, which we do not have a definitive answer for at this point. Our intuition was that if the discourse was integrated properly, then the most natural response to the particle-less *wh*-question would be to give the maximally correct answer. However, this preference for such an answer turned out to be weaker than expected. That said, the said issue no longer persists in the improved version of the study as we will see when we discuss the results from Experiment 3.

like tendency to give more two-action character responses in the MO condition than in the NO-MO condition, suggests that the above difference is a reflection of children's ability to consider the additive presupposition triggered by these particles, which children used to restrict their answer to a *wh*-question. And the very low rate of two-action character responses in the NO-MO condition ensures that our results do not overestimate children's performance. The remaining question then is why the Japanese-acquiring children weren't able to perform at the level of German-acquiring children in Berger and Höhle's or let alone any better than the English-acquiring children in Experiment 1, especially given that the Japanese-acquiring children were even older than the English-acquiring children tested in Experiment 1.

The test materials used in Experiment 2 also contained an ellipsis, not of the VP, but of the argument (e.g., *Mikkii to Minii-wa tabe-ta-n-da* 'Mickey and Minnie ate <~~an apple~~>'), right before the critical test questions were presented. Hence, just like in Experiment 1, children had to simultaneously resolve an ellipsis and assess a presupposition in a very short interval. Again, the elliptical structure in the puppet's recount could have made the integration of the discourse more difficult for children, leading to their non-adult-like interpretation of the sentence. Just like the English-speaking adults, the Japanese-speaking adults were also not perfect at the task, suggesting that the task was also difficult for adults.[16]

[16] It's hard to make a definite conclusion about the difficulty of the task based just on the performance of Japanese-speaking adults in the MO condition, given that there were only four subjects in this group. However, the English speaking-adults in the ALSO condition also did not perform at the expected level. Since the two tasks were basically identical in terms of their design, it's safe to assume that whatever can be said about the design of the English experiment applies to the Japanese experiment as well, at least intuitively speaking.

In addition to the overall difficulty of the task, the Japanese version of the experiment had a further complication having to do with the phonological similarity between the additive particle *mo* and the accusative case-marker *o*. The position in which *mo* is used in our test questions, i.e., the position immediately following the object nominal, is a position usually associated with the accusative case-marker *o*. Incidentally, the two elements are similar in terms of their pronunciation, which could have led children to misinterpret *mo* as *o*.

The above two factors could have lead children to ignore *mo*, in which case our results would underestimate children's true competence with *mo*. Notably, the Japanese-acquiring children in the MO condition were distributed bimodally, displaying a consistent pattern in how they responded to the test questions across all four test trials: they consistently gave a two-action character response; or they consistently gave a maximally correct answer, naming both characters that satisfy the at-issue content of a question (e.g., Mickey and Donald, who both ate a banana). The distributional pattern fits well with the possibility that some children were struggling to interpret *mo* either due to the difficulty of integrating the discourse as a whole or mistaking *mo* for *o*. Unfortunately, the same could be said about children who have yet to figure out that *mo* expresses an additive presupposition. Whether or not these confounds might have affected children's performance should be addressed in future work. Regardless, our results do confidently show that some Japanese-acquiring 5-to-6-year-olds have a fairly good understanding about the presuppositional nature of *mo*, adding new insights to our understanding about the acquisition of the Japanese additive particle.

4.4 Experiment 3

With slight modifications to the experiment materials, Experiment 3 investigates English-acquiring children's interpretation of the additive particle *too*. While children tested in Experiment 1 and Experiment 2 were showing some glimpse of adult-like understanding of *also* and *mo*, we saw some variation in children's performance. Unfortunately, the design of the task employed in the two experiments makes it difficult to tease apart whether children's non-adult-like performance in Experiment 1 and Experiment 2 is due to their non-adult-like understanding of the particles or is due to a task effect.

To address the above confound, we made slight modifications to the design of our task. The modification involved replacing the elliptical structure in the puppet's recount (e.g., *Donald didn't eat an apple, but Mickey and Minnie did ~~<eat an apple>~~*) with a fully pronounced verb phrase (e.g., … *but Mickey and Minnie did eat an apple*). If children's performance in previous studies were affected by the need for having to both integrate a discourse with an elliptical structure and assess the additive presupposition in a very short interval, then we no longer have to worry about this possibility. Additionally, to make the transition from the puppet's recount of the story to his incidental question more natural, we replaced the very first word that introduces the critical *wh*-questions from *now* to *and*; intuitively, *now* gave the impression that the puppet's recount and his incidental question were separate utterances.

4.4.1 Participants

Thirty-five monolingual English-acquiring children (age range 4;0-5;0, mean age 4;8) were recruited for the experiment. Three children were excluded from the data analysis as they failed to get past training, leaving us with thirty-two children to analyze. Additionally, eight adult native speakers of English were recruited as a control group in the experiment. The participants were randomly assigned to one of the two conditions (TOO vs. NO-TOO), and had their results compared against one another. Both children and adults were tested using the same material. In order to minimize the risk of COVID-19 exposure, children participated in the experiment over Zoom from their home computer.

4.4.2 Materials and design

Two types of subject *wh*-questions were constructed as test items, one with a sentence-final *too*, as in (36a), and one without *too*, as in (36b). In the adult grammar, the sentence-final *too* in (36a) is unambiguously interpreted as associating with the object NP: the nuclear pitch accent on the object indicates that the focus of the sentence is *banana*, and *too* typically does not associate with *wh*-words.

(36) a. And, who ate a BANANA, too?

b. And, who ate a BANANA?

Just like in Experiment 1 and 2, each test sentence was presented with a preceding discourse, which provided a recount of the story to setup a natural context for additive

particles to be interpreted. To eliminate the confounds we outlined earlier, we slightly modified this material by replacing the elliptical structure in the recount of the story with a fully pronounced VP.

(37) ***Puppet's recount of the story (new)***

Well let's see. There were apples and bananas to eat. Donald didn't eat an apple, but Mickey and Minnie did eat an apple.

With the VP-ellipsis gone, we no longer have to worry about the possibility that children's performance is being hindered by the need for integrating a discourse with an elliptical construction.

All other materials were kept the same as Experiment 1, including Charlie's name. Charlie's utterances were prerecorded by the same native speaker of English as in Experiment 1 to keep the prosody consistent across all participants.

4.4.3 Procedure

The experiment is conducted over Zoom with children seated in front of a laptop computer in a quiet area of their home.

The overall procedure is the same as Experiment 1 and 2, but with small tweaks due to the experiment taking place over Zoom. First, the child is introduced to the on-screen character, Charlie. The two briefly interact, during which Charlie asks the child to be his teacher. The child is explained that together they will listen to some stories, and that Charlie

wants the child to help him by answering his questions, whenever he has a problem remembering some of the details about the stories.

There are ten stories total, two practice, four test, and four filler trials. Again, the stories are about Mickey, Minnie, and Donald, who each perform some action(s) (e.g., eating fruit). All of the stories follow the same setup where one character performs one action (e.g., eats an apple), one character performs a different action (e.g., eats a banana), and one character performs both of those actions (e.g., eats an apple and a banana). The character that completes both actions (the 'two-action' character) varied across stories.

After interacting with Charlie, the child goes through a quick exercise, in which the child helps Charlie learn the names of Mickey, Minnie, and Donald. In this part of the experiment, the child has to simply confirm Charlie's answer when he gives the correct name (*Oh I know her name! She's Minnie!*) or give him the character's name when Charlie asks for help (*I don't think I know his name. Teacher, can you help me? Do you know his name?*). The purpose of this exercise to get the child comfortable at answering Charlie's questions.

The rest of the procedure is the same as Experiment 1 and Experiment 2. First, the child goes through a training phase consisting of two practice trials. After the training, the child enters the test phase, which alternates between test and filler trials. All trials, including practice, follow the same basic setup that we saw in §4.1. The experimenter tells a story and then asks Charlie a question about the content of the story to test Charlie's understanding of the story. The purported goal of the task is to help Charlie answer this question. Charlie initially responds to the experimenter's question by giving a recount of the story, but because he does not remember some of the details, Charlie tries to solicit help from the child by asking an incidental question. After hearing the child's response, Charlie proceeds to answer

the experimenter's original question. The experimenter then asks the child whether or not Charlie was correct. Charlie's answer to the experimenter's original question was counterbalanced between correct and incorrect answers.

4.4.3 Predictions

The general predictions are the same as Experiment 1 and Experiment 2. If children are sensitive to the additive presupposition triggered by *too*, then they should respond differently to questions with and without *too*. Specifically, children in the TOO condition should give more two-action character responses than children in the NO-TOO condition. Conversely, if children are not sensitive to the additive presupposition of *too*, then we predict no such difference.

Additionally, if the hypotheses about English-acquiring children's difficulty in Experiment 1 were correct—that is, both the VP-ellipsis and the low frequency of *also* were contributing to children's difficulties—then we should see an overall increase in children's performance compared to Experiment 1.

4.4.5 Results

Figure 7 summarizes the aggregated results from Experiment 3, displaying the mean percentage of two-action character responses across two conditions (TOO vs. NO-TOO) for each age group (Children vs. Adults). The figure shows a robust difference in the amount of two action character responses across two conditions for both children and adults. Whereas both children and adults in the TOO condition were consistent in giving two-action character

responses (70.31% and 87.5% for children and adults), neither children nor adults in the particle-less condition gave a single two-action character responses. Since there was no variance in the amount of two-action character responses in the NO-TOO condition, a logistic regression would be inappropriate here. Instead, we calculated the 95% confidence interval of for the TOO condition to see if it excludes the results from the NO-TOO condition, and it does: the 95% confidence interval of the TOO-condition is 59.04% and 81.58% for children.

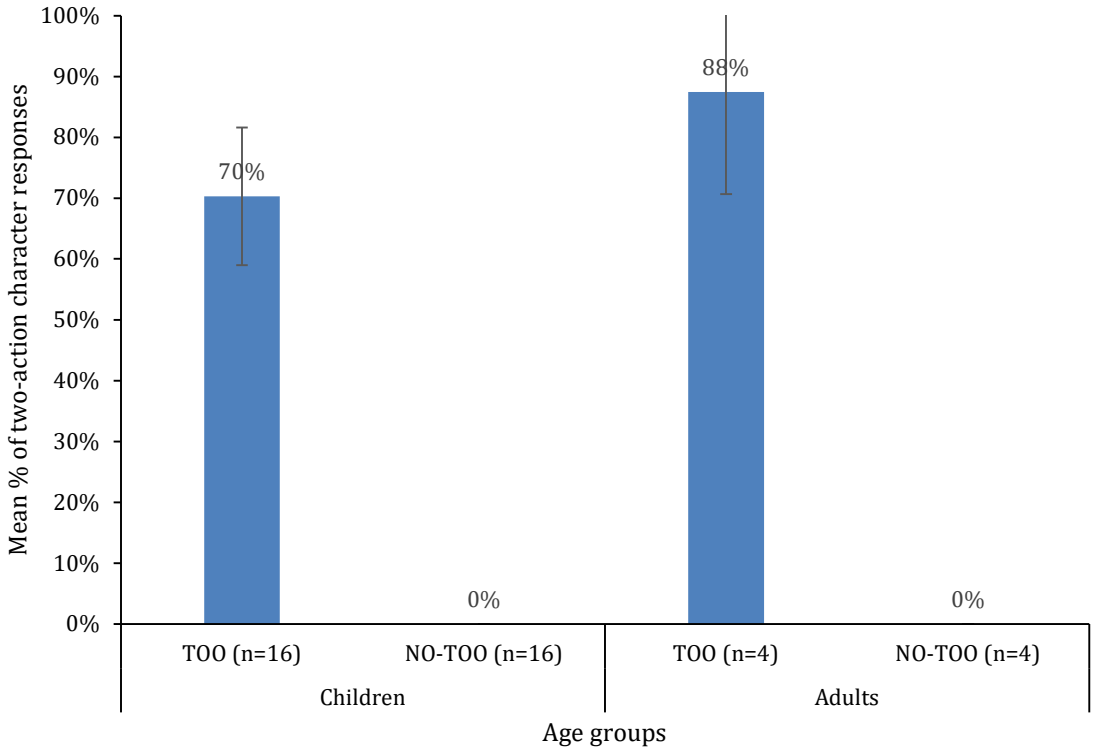


Figure 7. Mean percentage of two-action character responses across two conditions for each age group with errors bars indicating 95% confidence intervals

Figure 8 is a histogram plotting TOO-condition children's distribution as a function of how often children gave a two-action character response to look at their individual

performance. We see that majority of the children were able to give a two-action character response at a very consistent rate; nine of the sixteen children in the TOO condition belong to either the 3 trials or the 4 trials group. Four of the remaining seven children gave the target response in half of the trials. Only three children failed to give more than one two-action response across the four test trials.

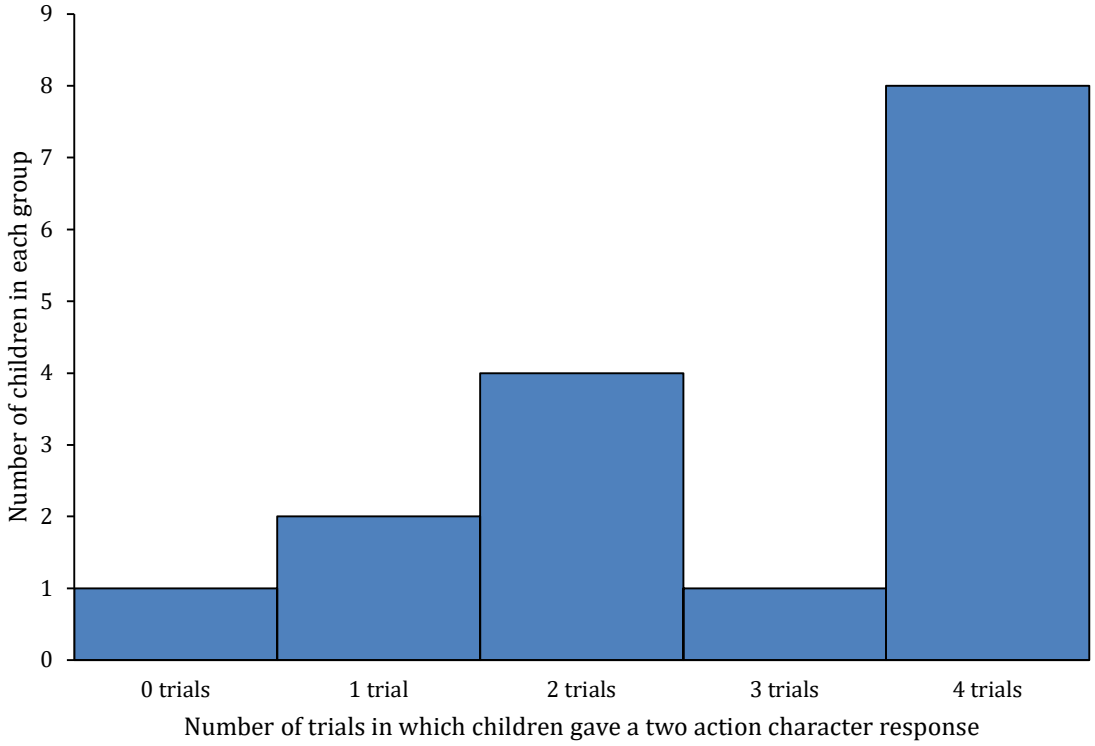


Figure 8. Breakdown of TOO-condition children's performance based on the number of trials in which they gave a two-action character response

4.4.6 Discussion

As can be seen in Figure 6, children in the TOO condition showed a strong preference for a two-action character response. Children in the NO-TOO condition, on the other hand, showed no such preference. Instead, they seem to strongly dis-prefer this type of response, as they never gave any two-action character responses, despite being truth-conditionally valid answers. Since the only difference between the two conditions is the presence/lack of *too* in the test questions, the difference in children's behavior must be due to whether or not the test questions contained *too*. And because our (*too*-less) baseline is zero, we can be confident that our experiment does not overestimate children's comprehension.

Furthermore, we see a notable improvement in children's performance compared to Experiment 1 (and Experiment 2): the TOO-condition children in this experiment gave 20% more two-action character response than those in Experiment 1. At this point, it is not immediately obvious whether children's improved performance is due to the modification in the materials used (i.e., the lead-in to the test question no longer contains a VP-ellipsis) or to the difference in the particle children are being tested on (*too* vs. *also*). To adjudicate, children should be further tested on their interpretation of sentences containing *also* using the exact same design and materials.

Individually, ten of the sixteen TOO-condition children were performing like adults; they were very consistent at giving a two-action character response during the four test trials (more than three times out of the four). We can safely assume that these children have adult-like understanding of the presuppositional nature of *too*. As for the remaining six children, four of them gave a two-action character response during half of the trials, while the rest either never gave that kind of a response or only gave that kind of a response during one of

the trials. Since none of the sixteen NO-TOO-condition children gave any two-action character responses, it's unlikely that the four children who gave two-action character responses twice did so by randomly choosing between the two characters that make truth-conditionally valid answers; a more likely explanation is that they arrived at the answer by going through the same pragmatic reasoning as the adults. The question then is what went wrong in the trials in which children were not able to give a two-action character response.

First, we should acknowledge the fact that the study was administered online over Zoom, which could have contributed more noise than we are used to. Online study over Zoom can be more distracting than an in-person study in a quiet lab area. Usually, a child participating in an online study will do so from some quiet area in his/her house, but even then, there are many distractions happening around the child while he/she participates in a study, whereas a lab space is more controlled and has less distraction for the child. In order to succeed in our task, participants had to pay close attention to the experimental material and follow along as the conversational context develops, which might not be as easy when they are participating in a study over Zoom from home. Inevitably, running a study over Zoom will involve some delay, regardless of how good the connection, which could make things worse. These are just some of the things that could go wrong when running an online study over Zoom, which must be taken into consideration when discussing the results.

On a more theoretical note, plausibly, what we see being reflected in children's performance could be an indication of an inherent difficulty pertaining to the interpretation of a sentence containing multiple focuses. It is widely accepted in the literature that *wh*-

questions are related to focus (von Stechow, 1990; Rooth, 1985, 1992; Krifka, 2006; a.o.).[17] To illustrate how questions and focus are related, consider the following question-answer pairs.

(38) Q: Who ate a banana?

a. A: MICKEY ate a banana!

b. A: # Mickey ate a BANANA!

(39) Q: What did Mickey eat?

a. A: # MICKEY ate a banana!

b. A: Mickey ate a BANANA!

In order for a question and an answer to be considered "congruent", the placement of focus within the answer must align with the position of the *wh*-word in a question, as illustrated in (38a) and (39b); if not, then the answer is judged as infelicitous, (38b) and (39a). Setting aside the precise details, the contrast in felicity across different question-answer pairs in (38) and (39) is explained straightforwardly if we assume that question is a focus-related phenomena and a question and an answer can only form a congruent pair if their focus-structure matches one another. If this is the case, then our test sentences necessarily contain multiple focuses. Precisely, an adult-like interpretation of the sentences will require children to represent two separate sets of alternatives simultaneously, one for the *wh*-word and

[17] In fact, Hamblin (1973) already entertains the idea that (*wh*-)questions denote a set of propositions that are possible answers of those questions, an idea later adopted by Rooth's alternative semantics theory of focus.

another for the object NP, while also assessing the additive contrast that is triggered by *too*. Intuitively, this sounds like a rather complicated process, which could impact children's performance of the task. It's possible then that the need to simultaneously consider multiple sets of alternatives affected children's ability to successfully represent the relevant contrast set in the discourse model when they were interpreting the test sentences.

With all that said, the results from Experiment 3 convincingly show that the majority of the 4-year-olds tested in the experiment are able to comprehend *wh*-quesitons containing *too* in an adult-like-way, which indicates that children around this age understand that *too* is a presupposition trigger and that they are able to use that information to restrict the range of appropriate answers to a *wh*-question. Having shown that English-acquiring 4-year-olds understand *too*'s presupposition, a follow-up study is underway in which we investigate 3-year-olds' sensitivity to the presupposition triggered by *too*. This will help in adjudicating whether the German-acquiring 3-year-olds' apparent sensitivity to *auch*'s presupposition in Berger and Höhle (2012) is a faithful reflection of children's true capacity or it is an overestimation of the knowledge due to high-baseline.

4.5 General Discussion

This chapter presented three experiments, Experiment 1, Experiment 2, and Experiment 3, which were conducted with the intent of reinvestigating preschool-aged children's understanding of the presuppositional nature of additive particles. Previous studies on the acquisition of additive particles either failed to provide a discourse context that makes the use of additive particles natural or lacked a reliable baseline to which children's performance during the critical test trials should be compared. These confounds raise the worry that

children's success/failure in previous studies are not necessarily due to their linguistic knowledge but are due to some extra-linguistic factor(s) that might have affected children's performance. To address these issues, we designed a novel task, which examined children's sensitivity to the additive presupposition by probing to see whether children are able to use the additive information to restrict the range of appropriate answers to a *wh*-question in comprehension. The setup of the task allowed us to test children's understanding of the presuppositional nature of additive particles in their naturally occurring context, while providing a reliable baseline to which children's performance in the critical test trials could be compared.

The results from Experiment 1 and Experiment 2 show that a good portion of the English-acquiring 4-year-olds tested in Experiment 1 and Japanese-acquiring 5-year-olds tested in Experiment 2 treat sentences with *also*/*mo* differently from those without, indicating that those children that succeeded at the task were able to account for the additive information triggered by the particles in question comprehension. To the best of my knowledge, no previous studies have shown children's ability to discern sentences with *also*/*mo* from those without, let alone in the context of question comprehension. These results contribute new findings to the acquisition literature. Specifically, they provide novel evidence that at least some English-acquiring 4-year-olds and Japanese-acquiring 5-year-olds have an adult-like understanding that *also* and *mo* are presupposition triggers. As for those children that failed to reliably give the expected, adult-like response during the critical test trials, it's possible that those children lack an adult-like understanding of the presuppositional nature of *also* and *mo*. Alternatively, there is a possibility that the results obtained in the two experiments underestimate children's competence as the design of the tasks adopted in

Experiment 1 and 2 involved some methodological confounds: for both Experiment 1 and Experiment 2, the puppet's recount of the story, which acted as the lead-in to the critical test item, involved an elliptical structure (a VP-ellipsis in Experiment 1 and an argument-ellipsis in Experiment 2), which could have made the integration of discourse difficult for children; and for Experiment 2 specifically, the phonological similarity between *mo* and the accusative case-marker *o* could have led children to misinterpret the additive particle as the accusative case-marker. A follow-up to these studies should examine whether or not children's performance was hindered by these confounds, which would result in an underestimation of their competence.

Using a slightly improved version of the task, Experiment 3 shows that English-acquiring 4-year-olds were able to discern sentences with and without *too* with very high accuracy that is comparable to the adults. This suggests that children around the age of 4 understand that *too* triggers an additive presupposition and that they are able to account for the contextual constraint that the additive presupposition imposes on discourse. Though Aravind (2018) reports similar findings about children's understanding of *too*'s presuppositional nature, her study lacked a reliable baseline to which children's performance during the critical test trials should be compared, making us hesitant to accept Aravind's findings at face value as it might overestimate children's true competence. Experiment 3 provides a reliable baseline to compare children's performance with *too* to, and so, we can now be confident that English-acquiring 4-year-olds have a very good understanding that additive particles are additive presupposition triggers.

The difference in children's performance arcross Experiment 1 and Experiment 3 raises the question of whether children's success/failure in the two studies are due to the difference

in the particle children are tested on (*also* vs. *mo*) or the difference in the design of the task that was used to test children (VP-ellipsis in puppet's recount vs. no VP-ellipsis in puppet's recount). Having seen how well children performed with *too* when they were tested using a design that does not involve an elliptical structure in the puppet's recount, it only makes sense that we revisit *also* and see if children's performance improves as well when they are tested using materials that do not involve an ellipsis. Afterall, the two particles are identical with regards to their semantics, and so, it's possible that children that have figured out that *too* triggers an additive presupposition have figured out that the same is true of *also*. Of course, we do not preclude the possibility that the results from Experiment 1 faithfully reflect children's understanding of the meaning of *also*. A quick corpus analysis of the twenty-four children in the Gleason corpus (Masur and Gleason, 1980) from CHILDES (MacWhinney, 2000) reveals that *also* is rarely used in child-directed speech as opposed to the additive particle *too*, which occurs much more frequently (25 occurrence of *also* vs. 241 occurrences of additive *too* out of 36,594 total utterances by parents). If we take input frequency as an estimate of the number of opportunities a child has to learn a given word, then we expect a lower frequency word like *also* to be acquired later than higher frequency word like *too*. Thus, it is plausible that children around this age have not acquired *also* yet, simply because they have not been exposed to enough tokens of *also* to have acquired its meaning. We cannot tell which is the more likely possibility, and so, follow-up study is necessary to adjudicate. But if it turns out that children's performance in Experiment 1 was indeed hindered by the elliptical structure in the puppet's recount, then there is going to be a high chance that Japanese-acquiring children's performance in Experiment 2 was also influenced

by the confound. We leave these issues for future studies to investigate and move on to discuss our findings regarding children's acquisition of the focus-sensitive nature of *too*.

Chapter 5

Testing focus-sensitivity

This chapter presents findings from an experiment (Experiment 4) which investigates English-acquiring 4-year-olds' comprehension of sentences containing either a subject-associated *too* or an object-associated *too*. The following is an example of the test sentences used in the experiment (with the caveat that the actual test items will consist of the pronoun *he* instead of the made-up monster names, i.e., *Gorphus* in (40)).

(40) a. Subject-associated *too*

GORPHUS is holding a flag, too.

b. Object-associated *too*

Gorphus is holding a FLAG, too.

By testing whether or not children around this age are able to distinguish between the two sentence types, the experiment examines English-acquiring 4-year-olds' understanding of the focus-sensitive nature of *too*.

As mentioned earlier in Chapter 2, focus-sensitivity is one of the key properties that characterize additive particles. The interpretation of the particles crucially relies on the placement of focus within a sentence, as shifting the focus effectively varies their scope. Precisely, in order to arrive at an adult-like interpretation of sentences containing an additive

particle, children must understand how additive particles interact with focus, and furthermore, how focus is marked in their target language. Previous studies that investigated children's understanding of this interaction report that even school age children struggle to give an adult-like interpretation of sentences containing an additive particle with varying associates, often accepting them in contexts adults would likely reject on the basis of false presupposition. A possible interpretation of these results is that children are miss-associating the particles with the unfocused constituent. The authors take these results as evidence that children lack adult-like understanding of the focus-sensitive nature of these particles, leading them to make scope-analysis errors (Bergsma, 2006; Matsuoka et al., 2006).

These results, however, are also compatible with the view that children's difficulty with additive particles reflects methodological problems that hide children's actual knowledge. The lack of appropriate context in which additive particles should be interpreted and the truth-value-oriented nature of the tasks that were employed to test children's comprehension could have led children to ignore the particles. Crucially, all erroneous responses by children become appropriate if only the prejacent, particle-less meaning of the test sentences were considered, because their at-issue content was always satisfied in the experimental context.

To eliminate the possible confound, we designed a novel task that allows us to test children's understanding of the focus-sensitive nature of *too* in contexts where its presupposition is always satisfied, while without having to rely on truth-verification.

5.1 Methodology

Consider the following sentence in (41).

(41) John is holding a trumpet, too.

A sentence like (41) is (at least) two-ways ambiguous: (i) the subject-associated reading of *too*, which implies that someone in addition to John is holding a trumpet; and (ii) the object-associated reading of *too*, which implies that John is holding something in addition to a trumpet. We've already seen that this ambiguity can be resolved through prosodic information. When the nuclear pitch accent falls on the subject pronoun as shown in (42), the scope of the particle is restricted to the subject NP, and the sentence is interpreted as having the subject-associated reading. Conversely, when the nuclear pitch accent falls on the object NP as shown in (43), then the scope of the particle is restricted to the object NP, and the sentence is interpreted as having the object-associated reading.

(42) JOHN is holding a trumpet, too.

Presupposed content: Someone in addition to John is holding a trumpet

(43) John is holding a TRUMPET, too.

Presupposed content: John is holding something in addition to a trumpet

This exact process of ambiguity resolution is what we try to exploit to probe children's understanding of how additive particles and focus interact.

Carrying out such an experiment is not as straightforward as one might think though. As we have repeated numerous times, additive particles cannot be used in an "out-of-the-blue" fashion, isolated from discourse; they require a discourse context that makes the actual event that satisfies its presupposition maximally salient. Accordingly, for the sentence in (41) to be

uttered felicitously, it should be accompanied by a preceding discourse in which the actual event that satisfies each of the intended presuppositions salient as shown in (44) and (45).

(44) Subject-associated *too*

Mary is holding a trumpet.

JOHN is holding a trumpet, too.

(45) Object-associated *too*

John is holding a flag.

John is holding a TRUMPET, too.

However, presenting the *too*-sentences with such context takes away the potential ambiguity for children to resolve.

Imagine this was part of a Picture selection task, where children were supposed to select the picture that matched the situation described by (44) and (45). Materials for such an experiment will minimally consist of the following: Picture 1 in which you have two people, Mary and John, each holding a trumpet; and Picture 2 in which you have one person, John, holding both a trumpet and a flag. Figuring out which picture matches which description is trivial here. There is no ambiguity for children to resolve because which pictures matches which description can be figured out by simply following what is explicitly mentioned in these sentences. The additive presupposition that *too* triggers does not help in completing the task at all because that information is already made explicit by the preceding utterance. In

fact, you can still figure out that the picture that matches (46) is Picture 1 and the picture that matches (47) is Picture 3, even if *too* was not there.[18]

(46) Mary is holding a trumpet.

JOHN is holding a trumpet.

(47) Mary is holding a flag.

Mary is holding a TRUMPET.

Previous studies that investigated children's understanding of the focus-sensitive nature of additive particles tried to overcome this difficulty by not providing any discourse. That is, they introduced some ambiguity into the design—or retained the ambiguity in the design—by not providing any supporting discourse. Unfortunately, this was not the ideal solution to the problem. The design of the task forces children to interpret sentences containing an additive particle in a context that lacks a supporting discourse, and so the results are open to the criticism that children are ignoring the additive particles in the test sentences because the experiment lacks a natural context in which additive particles should be interpreted, making

[18] It seems that (44) and (45) are somewhat degraded without the *too*. This likely has to do with the obligatoriness of presupposition triggers in presupposition-fulfilling contexts, as shown in (i).

(i) a. The / #A sun is shining.
b. Bob came to the store. Bill came, #(too).
c. Mary went to Japan last year. She's going to Japan #(again) this year.
d. John knows / #believes Paris is in France.

For more on the issue, see Heim (1991), Percus (2006), and Chemla (2008).

their use infelicitous. As a result, we do not know whether children's non-adult-like interpretation of the test sentences in previous studies stems from children's non-adult-like understanding of the particles or from the unnatural design of the tasks employed in the studies. Therefore, to test children's understanding of the interaction between additive particles and their focus-associates in their naturally occurring context, we designed a novel task, which probes their ability to infer the intended presupposition based on prosodic cue when the presuppositions is supported in context, but part of the discourse is inaudible, thus requiring participants to rely on prosodic information to recover the presupposition.

5.2 Participants

Twenty-eight monolingual English-acquiring children (age 4;0-4;9, mean age 4;3) were recruited for the experiment. Four children were excluded from the data analysis as they failed to pass training, leaving us with twenty-four children to analyze. In addition, eight adult native speakers of English participated as a control group in the experiment. Children and adults were tested using the same materials. While the adults were tested in-person, children were tested over Zoom to eliminate the risk of COVID-19 exposure during the experiment.

5.3 Design and materials

Two types of test sentences were constructed for the experiment. Both types of sentences contained a sentence-final *too*, whose scope varied across two types as indicated by

the placement of the nuclear pitch accent: the first type contained a subject-associated *too* as in (48); the second type contained an object-associated *too* as in (49).

(48) Subject-associated *too*

HE's holding a trumpet, too!

(49) Object-associated *too*

He's holding a TRUMPET, too!

To make the use of *too* natural, the test sentences must be presented in a context that makes the content of their presupposition maximally salient. One way to do this would be to present them with a preceding discourse in which the presupposition of *too* is made explicit, for example, like in (50) and (51).

(50) Speaker 1: Look! Somebody is holding a trumpet!

Speaker 2: Yeah, and HE's holding a trumpet, too!

(51) Speaker 1: Look! somebody is holding a flag!

Speaker 2: Yeah, and he's holding a TRUMPET, too!

To make things easier, imagine that there are two monsters, one holding a flag and a trumpet, and the other holding just a trumpet (Figure 9).

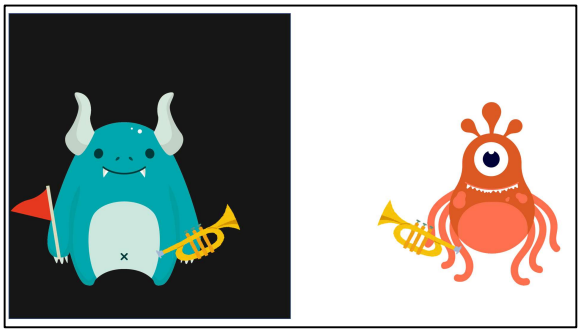


Figure 9. A toy context with one monster holding a flag and a trumpet and another monster holding just a trumpet

The subject-associated *too* in (50) triggers the presupposition that there is someone else other than the referent of *he* that is holding a trumpet. This presupposition is satisfied in the context illustrated in Figure 9 if *somebody* and *he* are interpreted as having disjoint referents: we have one monster, say the green one, that is holding a trumpet, and another monster, the orange one, that is also holding a trumpet. Conversely, the object-associated *too* in (51) triggers the presupposition that there is something else other than a trumpet that the referent of *he* is holding. Again, this presupposition is satisfied in the context illustrated in figure 9, but this time, if *somebody* and *he* are interpreted as being coreferential: the green monster, who happens to be the referent of both *somebody* and *he*, is holding a trumpet, and he is holding a flag. By following the flow of the discourse, we can easily figure out what the intended presupposition is for each of the two sentence types, because this information is right there in the discourse. There is no ambiguity to resolve here. Hence, to test children's sensitivity to prosodic information, we must somehow add ambiguity to the context. Let us see how this could be done.

The experimental task used in this study takes on the form of a *Guess Who?* game. Children listen to a prerecorded conversation, in which two characters, a girl named Daisy and Daisy's father, talk about two monsters shown on a computer screen. Daisy is a girl who loves monsters, but she is still learning so she does not know much about them. Daisy's father, on the other hand, is a monster scientist, and so he knows everything about monsters, including their names. At certain points of the conversation, Daisy's father will make an utterance about one of the two monsters, which happens to be the critical test sentence containing *too*. This utterance is immediately followed by another utterance in which Daisy's father mentions that same monster's name (e.g., *His name is Mr. Gorphus!*). The task for children is to help the experimenter figure out which of the two monsters shown on the computer screen had his name mentioned. Because which monster Daisy's father is talking about is not made explicit in his utterance, this information must be inferred from the discourse context, for which children's ability to reason using the presupposition of *too* becomes crucial.

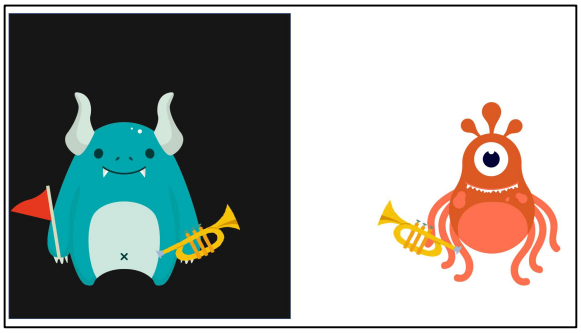
To illustrate how the task works, let us walk through a sample trial of the experiment. We will begin with the condition involving subject-associated *too*. The trial begins with the appearance of two cartoon monsters. Daisy begins talking about the monsters by delivering an utterance that is directed towards one of the two monsters. Since Daisy knows nothing about the monsters, she refers to them by using the indefinite pronoun *somebody*. Her utterance will always be about the monster holding two items, which will be indicated by her pointing. During her utterance, a glitch happens to the audio, which makes part of her utterance not audible as shown in (52). Hence, we only get to hear part of what Daisy is saying.

(52) Daisy: Look! Somebody is holding <--white noise-->!

After Daisy is done talking, Daisy's father follows up on her by uttering the sequence of sentences in (53).

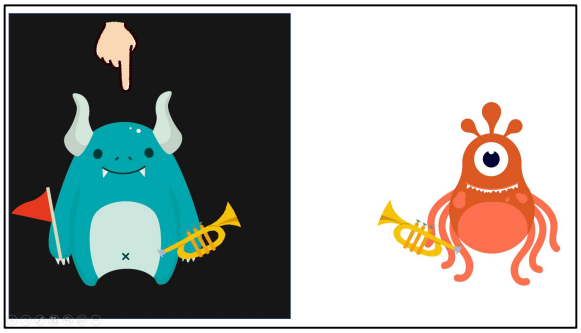
(53) Daisy's father: Yeah! And HE's holding a trumpet, too! His name is Mr. Gorphus!

The first sentence in the sequence is the critical test sentence containing a subject-associated *too*. In the second sentence, Daisy's father mentions the name of one of the monsters. The second sentence is uttered immediately after the first, and so *he* and *his* should be understood as referring to the same individual. However, unlike Daisy, Daisy's father does not point to the monster that he is talking about. Hence, the actual referent of the pronouns must be inferred from the experimental context. The entire procedure of the trial from start to finish is illustrated in Figure 10.



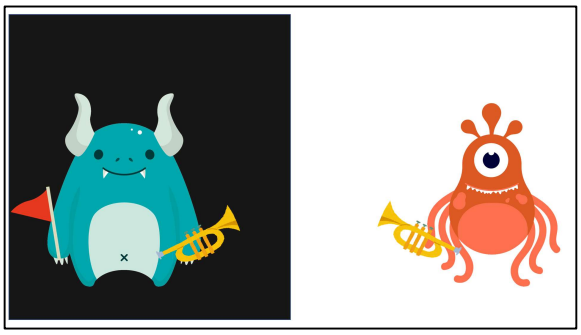
Experimenter:

Hey! Look at those monsters! Let's see what Daisy and Daisy's dad have to say about them!



Daisy:

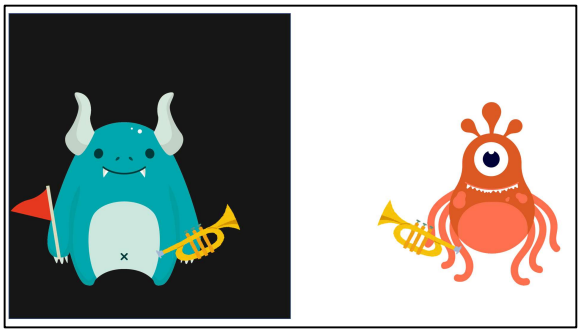
Look! Somebody is holding <white noise>!



Daisy's father:

Yeah! And HE's holding a trumpet, too!

His name is Mr. Gorphus!



Experimenter:

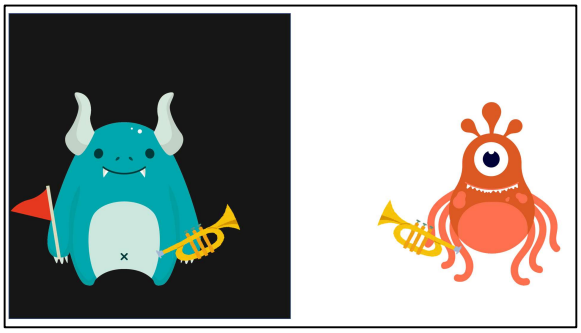
Alright. So which side of the screen is Mr. Gorphus on? Is he on the black side or the white side?

Figure 10. A sample trial of the experiment using a test sentence containing subject-associated *too*

For the use of *too* in (53) to be considered felicitous, the intended presupposition must be satisfied in the context of the discourse. Typically, what the intended presupposition is and whether or not that presupposition is satisfied can be easily figured out from the preceding discourse. However, in this particular task, the information is not readily retrievable from the preceding discourse, because part of Daisy's utterance is covered by white noise as we saw earlier. Instead, the participants must infer the information from the visual context, for which they must first determine the scope of the particle based on prosodic information, or more specifically, the placement of the nuclear pitch accent within the test sentence.

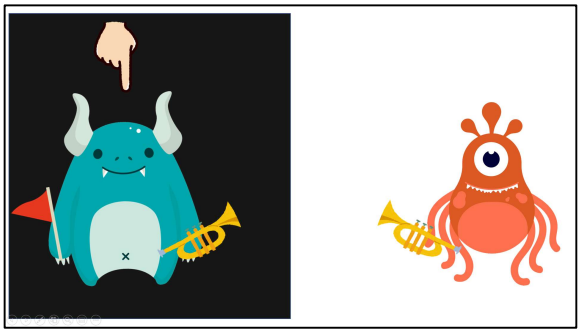
The nuclear pitch accent on *he* indicates subject-focus, and so, *too* in (53) should be interpreted as associating with the subject. Hence, contextually salient alternatives are considered for the referent of *he,* for whom *too* expresses the additive contrast that the relevant alternative to *he* is also holding a trumpet. Since there are only two monsters in the context of the discourse and Daisy has already made a comment about one of the monsters, the referent of *he* must be interpreted as the monster that is different from Daisy's pointing; otherwise, if *he* is interpreted as referring to the same monster as Daisy's pointing, then Daisy's father's utterance would just be repeating what Daisy had said literally a second ago, i.e., that the monster Daisy is pointing to is holding a trumpet. This is not what a sensible and cooperative speaker would do under normal circumstances. If we think that the goal of a conversation is to broaden our common ground, then repeating trivially true information does not achieve this purpose.

The object-associated *too* condition proceeds in a similar fashion as shown in Figure 11.



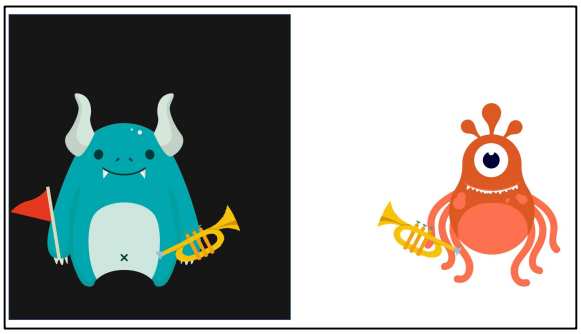
Experimenter:

Hey! Look at those monsters! Let's see what Daisy and Daisy's dad have to say about them!



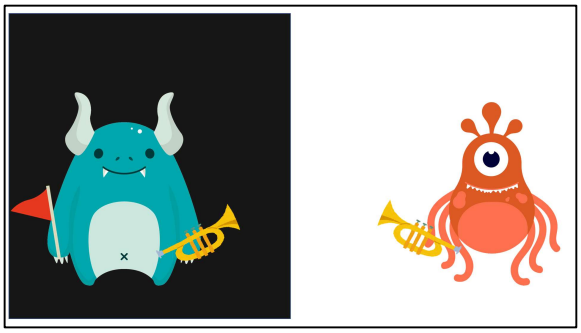
Daisy:

Look! Somebody is holding <white noise>!



Daisy's father:

Yeah! And he's holding a TRUMPET, too! His name is Mr. Gorphus!



Experimenter:

Alright. So which side of the screen is Mr. Gorphus on? Is he on the black side or the white side?

Figure 11. A sample trial of the experiment using a test sentence containing an object-associated *too*

First, two monsters appear on the computer screen. Daisy makes an utterance about one of those two monsters with her pointing indicating which. A glitch happens while Daisy is talking, and as a result, part of her utterance is rendered nonaudible. Once Daisy is done talking, Daisy's father responds to her with an utterance of his own, which could be about either monster. The difference is that the critical *too*-sentence in Daisy's father's utterance contains a nuclear pitch accent on the object NP, as shown below. Immediately following his first utterance, Daisy's father proceeds to mention the name of one of the two monsters.

(54) Daisy: Look! Somebody is holding <--white noise-->!

(55) Daisy's father: Yeah! And HE's holding a trumpet, too! His name is Mr. Gorphus!

The nuclear pitch accent on the object NP indicates object-focus, and so, *too* in (55) is interpreted as associating with the object. The object-focus in (55) evokes a set of alternatives to the focused-constituent *trumpet*, the only possible candidate in the given context being a flag. This results in the additive presupposition that the monster that is the referent of *he* is holding some item other than a trumpet, i.e., specifically the presupposition *he is holding a flag*. Therefore, in order for Daisy's father's utterance to be interpreted naturally, his utterance must be understood as being about the same monster that Daisy was pointing to; there is no other monster that is holding something in addition to a trumpet.

While it has been documented in previous literature that testing the same child on materials that involve prosodic manipulation can result in carry-over effects (Gualmini *et al*., 2003; Snedeker & Yuan, 2008; Szendrői *et al*., 2018), we are looking for the strongest

possible evidence. If we can show that the same child could distinguish between subject-associated and object-associated *too*-sentences in an adult-like way, then this would provide strong evidence that the child understands the interaction between *too* and focus. For this reason, we will go ahead and adopt a within-subject design. Given the subtly of the effect, it is possible that children might not notice the variation in pitch-accent pattern if they were only exposed to one type of sentence (subject- vs. object-focus). Exposing children to both sentence types should highlight the difference in the pitch-accent pattern across the two conditions, making prosody more salient.

All utterances by Daisy and Daisy's father were prerecorded by native speakers of American English to keep the use of prosody consistent across all participants.

5.4 Procedure

The experiment was conducted over Zoom with children seated in front of a laptop computer in a quiet area of their home.

To familiarize them with the experimental materials, the child first plays a quick game where s/he is asked to answer which side of the screen (black vs. white) an item mentioned by the experimenter is on (e.g., *Where's the trumpet? Is it on the black side of the screen or the white side of the screen?*).

After this game, the experimenter introduces two characters to the child: a girl named Daisy, who knows nothing about monsters, and Daisy's father, who is a monster scientist (Figure 12). The experimenter explains to the child that together they will watch a series of cartoon clips in which Daisy and Daisy's father talk about two monsters shown on a computer screen. The child is further explained that during the cartoon, Daisy's father will

mention the name of one of the monsters and will be asked to help the experimenter figure out which of the two monsters had its name mentioned.

Figure 12. Introducing Daisy and Daisy's father

Once the rules are introduced, the child goes through a series of practice trials before entering the critical test trials so that s/he becomes familiar with the task. The basic setup is the same as for the test trials from §5.3. Each trial begins with Daisy's utterance about one of the two monsters. Which monster she is talking about is indicated by her pointing. After Daisy is done delivering her line, Daisy's father proceeds to give his utterances, in which he happens to name one of the two monsters. Daisy's father does not point to a monster and so, which monster Daisy's father is talking about must be figured out by comparing his speech against the visual context. The main purpose of the training phase is to get the child familiarized with the general setup of the task. Specifically, it's crucial that the child understands that Daisy's father's utterance can be about the same monster as Daisy's utterance, but not necessarily. Put it another way, the child must be taught that for some trials, Daisy and her father can be talking about the same monster, but for others, they might

be talking about different monsters. The training is there to teach this basic setup to the child. If the child does not learn this by the end of the training phases, then s/he is excluded from the sample and the results are not analyzed. Another purpose of the training is to get the child comfortable with the white noise in Daisy's utterance such that s/he is not distracted by it during the critical test trials. The full training materials are provided in the Appendix.

After the training, the child enters the critical test phase, where s/he goes through the subject-focus and object-focus trials in pseudo-random order (within-subject design). There is a total of twelve critical test trials: six subject-focus and six object-focus. The child never goes through the same type of trials more than two times in a row.

5.5 Predictions

If children are able to use prosodic emphasis to determine *too*'s scope, then we predict different responses across the two sentence types. After hearing the subject-associated *too*-sentence, children should give more different-monster (i.e., the monster that is different from Daisy's pointing) responses because the nuclear pitch accent on the subject indicates that the *too* in the test sentence (e.g., *HE's holding a trumpet, too!*) associates with the subject, giving rise to the presupposition that there is another monster that is different from the one Daisy's father is talking about, who shares the same property of holding a trumpet. To satisfy this presupposition, Daisy and Daisy's father's utterances should be interpreted as being about different individuals. Conversely, after hearing the object-associated *too*-sentence, children should give more same-monster (i.e., the monster that is the same as Daisy's pointing) responses because the nuclear pitch accent on the object indicates that the *too* in the test sentence (*He's holding a TRUMPET, too!*) associates with the object, triggering the

presupposition that the monster that Daisy's father is talking about is holding something else in addition. Since the only monster that is holding a second item is the one Daisy first points to, Daisy's father's utterance should be interpreted as being about the same monster.

For the aggregated results, we will use the mean percentage of same-monster response as the dependent measure, and so, we expect to see more same-monster responses in the object-focus condition than in the subject-focus condition, if children are sensitive to the additive presupposition of *too*. No such pattern is predicted if children are unable to use prosodic emphasis to discern the two types of test sentences.

5.6 Results

Figure 13 summarizes the results from the experiment, displaying the mean percentage of same-monster responses across the two conditions (SUBJECT-FOCUS vs. OBJECT-FOCUS) for each age group (Children vs. Adults). As can be seen in the figure, adults gave substantially more same-monster responses in the OBJECT-FOCUS condition than in the SUBJECT-FOCUS condition (96% vs. 27%). Although the magnitude of the difference is not as substantial, children displayed the same general pattern: they gave more same-monster responses in the OBJECT-FOCUS condition than in the SUBJECT-FOCUS condition (60% vs. 45%). Using the glmer function in the lme4 package on R (R Core Team, 2020), we ran a mixed-effects logistic regression of the results with condition (SUBJECT-FOCUS vs. OBJECT-FOCUS) and age group (children vs. adults) as fixed factors and participants and trials as random intercepts. The model revealed significant effects of both condition (β = -8.032, $p < 0.001$) and age (β = -5.096, $p < 0.01$), with condition being the stronger predicter. We also found an interaction between the two (β = 6.968, $p < 0.001$). Additionally, we analyzed just the children's results

with condition as fixed factors and participants and trials as random intercepts to verify that the adults aren't the only driving factor for the statistically significant effect of condition. The model reveals a significant effect of condition for children (β = -1.005, $p < 0.05$).

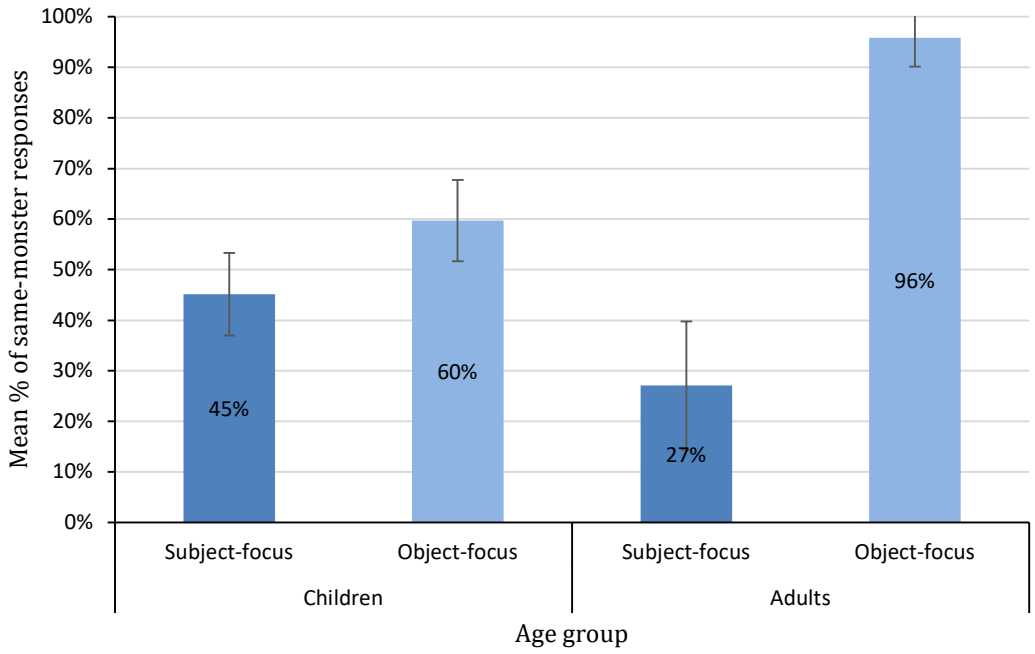


Figure 13. Mean percentage of same-monster responses across two conditions for children and adults with error bars indicating 95% confidence interval

To examine their individual performance, children's distribution was analyzed based on the number of trials in which they were able to give an adult-like response in each condition. The result of this analysis is summarized in Table 1.

Table 1. Observed distribution of children's individual performance with two-sentence types based on the number of trials in which children gave an adult-like response

OBJ-FOC / SBJ-FOC	0~1 trial(s)	2 trials	3 trials	4 trials	5~6 trials
0~1 trial(s)	0	0	0	1	4
2 trials	0	0	0	1	3
3 trials	1	1	0	0	0
4 trials	0	1	1	0	3
5~6 trials	3	2	2	1	0

OBJ-BIAS

SBJ-BIAS

ADULT-LIKE

There are roughly three groups of children: (semi-)adult-like children, object-bias children, and subject-bias children. The four children found in the section of the table with dark green shading are those that we consider to be adult-like. These children were able to give an adult-like response at a very consistent rate in both conditions (more than four in both conditions). The three children found in the section of the table with light green shading were very close to being classified as adult-like but were 1 response short in making the criterion (i.e., more than four in one condition, but three in the other). I will classify these children as semi-adult-like. These seven children make up the group of (semi-)adult-like children. The remaining seventeen children are the group of non-adult-like children, who can be further broken into two groups. The first group comprises of the nine non-adult-like children found in the red shaded section of Table 1. These children consistently gave a same-monster response, i.e., a response that is associated with the object-focus interpretation of *too*, regardless of which sentence type. This group of children, we classify as the object-bias children. Two adults also showed this pattern of responses across the entirety of the critical test trials. The other group

of non-adult-like children is the subject-bias children. This group consists of the six children found in the blue shaded area of Table 1. These children were very consistent at giving a different monster response, i.e., a response that is associated with the subject-focus interpretation of *too*, across both conditions. The remaining two children did not fit into any of the above groups.

5.7 Discussion

As expected, adults show a sharp contrast in the number of same-monster responses across two conditions. This pattern indicates that (the majority of the) adults are noticing the difference in prosodic emphasis across two sentence types and are using that information to determine the scope of *too*. Although the degree of difference is much smaller, children also show a similar pattern, providing more same-monster responses in the OBJECT-FOCUS condition than in the SUBJECT-FOCUS condition. The results of the statistical analysis indicate that this difference in children's results is statistically reliable ($p < 0.05$). Evidently, these results suggest that children as a group are able to distinguish between the two types of sentences. Because the two sentence types only differ with regards to the placement of nuclear pitch accent, it's safe to assume that this pattern is driven by children's sensitivity to the prosodic information, and furthermore, their understanding of the interaction between *too* and focus. That said, we do find a notable difference in children's ability to correctly discern the two types of sentences across individuals, which is reflected in their distribution based on individual performance (Table 1).

Presumably, this variation suggests a difference in children's underlying knowledge regarding *too*'s focus-sensitivity. The seven (semi-)adult-like children, we can safely assume,

have an adult-like understanding of the focus-sensitive nature of *too*. As for the remainder of the children, we are not able to find any signs of an adult-like understanding of *too*'s focus-sensitive nature. A straightforward interpretation of the results would be that the remaining seventeen children have yet to acquire an adult-like understanding of the interaction between *too* and focus, and that they are still in the course of developing this knowledge. Because they haven't fully figured out the focus-sensitive nature of *too*, children are unable to use prosodic information to determine *too*'s scope. Instead, they must rely on other strategies to figure the scope out. This explains why the object-associated interpretation of *too* is the most common type of errors among the non-adult-like children. Without any manipulation to prosody or syntax, the default focus structure of a sentence is the one where the direct object is focused. Having seen that there are no relevant cues that would allow them to disambiguate the scope of *too* (or so they think), it's likely that these children are settling for the default focus interpretation of a sentence. If that were the case, then the more interesting pattern is the bias for subject-associated interpretation that some children displayed, since subject-focus is the more marked interpretation. I suspect that this has to do with the setup of the task in which we presented two monsters and asked children which of the two monsters had their name mentioned. Naturally, the task contrasts the two monsters with one another because the purported goal for children was to figure out which of the two monsters had its name mentioned. Daisy's pointing to the monster also increases the saliency of the subject contrast. This setup could have over-highlighted the contrast between the two monsters, leading children to default to the subject-associated interpretation of *too*. In that sense, the subject-bias children are essentially using the same strategy as the object-bias children: they are also defaulting to a specific interpretation, except for different reasons. The children that

consistently gave the subject-associated interpretation of *too* are defaulting to the interpretation because it is the most salient contrast illustrated in the design of the task. These errors occur because the non-adult-like children do not realize the variation in pitch accent, or even if they did, they do not know its relevance in disambiguating the scope of *too* yet. [19]

However, there also remains a possibility that the non-adult-like children's failure to correctly discern the two types of sentences is a lingering effect of the pitch accent manipulation in our experimental design. Recall that Experiment 4 was conducted using a within-subject design, meaning the same child was tested on materials with varying pitch-accent patterns (subject- vs. object-focus). While previous studies report the risk of carry-over effects, we felt that this shouldn't be of an issue for test items involving *too*; if children understand the meaning of *too*, then the presence of the particle in the test items (and the expectation that arise from their understanding about *too*'s meaning) should be enough for children to inhibit such bottom-up effects. However, things did not turn out as we anticipated though, leaving us to wonder whether or not carry-over effects had an influence on children's individual performance. Additionally, we manipulated the pitch accent placement in Daisy's father's utterances such that both the pronoun *he* and the object NP were marked

[19] Here, we've tacitly assumed that children understand *too* is focus-sensitive but they haven't fully figured out how prosody affects focus-interpretation. It's also possible that children around this age have yet to figure out that *too* is focus-sensitive. Either way, the outcome is going to be similar: children must still figure out what the intended presupposition is, not by figuring out the scope of *too*, but presumably, by figuring out the referent of *he*. Without any other clues, the most straightforward strategy for children would be to interpret *he* as having the same referent as Daisy's pointing; after all, pronouns are typically used to refer to a previously mentioned entity. This will result in an object-bias-*ish* pattern of responses. Conversely, the natural set up of the task that contrasts the two monsters might make the disjoint interpretation of *he* more favorable for some children, in which case they will display a subject-bias-*ish* pattern of responses.

prosodically. The manipulation was done intentionally so that children weren't accidentally trained to only pay attention to whether or not *he* was stressed. Perhaps, this manipulation worked too well and wrongly taught the children to not pay attention to prosodic information since it does not help them discern which character Daisy's father's utterances are about. As a matter of fact, it seems that some adult participants might have been affected by the manipulation we put in during training. As mentioned earlier, we found that two of the eight adults that participated in the study as control failed to discern the two types of test sentences, always selecting the same monster as Daisy's pointing across all trials. After the experiment, adult participants were debriefed about the purpose of the study, during which the two adults that failed to succeed at the task mentioned that they did not notice the difference in the pitch-accent pattern across conditions at all. If adults failed to notice the variation in pitch accent, then it's possible that children could have also encountered the same issue.

Of course, these are all just speculations and the results obtained in Experiment 4 could be a faithful reflection of children's understanding of *too*'s focus-sensitive nature as we pointed out originally. Unfortunately, we have no way of telling whether individual children's failure to discern *too*-sentences with subject- and object-focus are due to their non-adult-like knowledge or prosodic manipulation(s) in our experimental design. Either way, children will end up defaulting to whatever interpretation they feel is reasonable, which could be the unmarked object-associated(-*ish*) interpretation or the more salient subject-associated(-*ish*) interpretation. Regardless, our results do show that some 4-year-olds understand the focus-sensitive nature of *too*, suggesting that the acquisition of the focus-sensitive nature of additive particles begin earlier than what previous studies suggest, which

was not until sometime in the early school years. This aligns well with what we know about English-acquiring children's understanding of the relationship between prosodic emphasis and (contrastive) focus from Szendrői *et al.*'s (2018) study. Given that the two phenomena are closely related, it's not all that unlikely for English-acquiring 4-year-olds to have figured out the relevance of prosodic information in focus-association: the prosodic information that is relevant for completing the task in Szendrői *et al.*'s study is also relevant for completing the task in Experiment 4. Future studies should examine whether a task that does not involve any prosodic manipulation would yield better results as there remains a possibility that our design of the task could have hindered children's performance. It would also be interesting to test Japanese-acquiring children on *mo* using the same method to see how well they perform. Japanese is a language that relies primarily on syntax to mark focus-association. In theory, syntactic position of a particle should provide a stronger cue for its scope (or their associate to be more precise) given that the scope of the particle can be directly read off from word order: if *mo* adjoins to the subject, then it takes scope over the subject; if *mo* adjoins to the object, then it takes scope over the object. Intuitively, syntax should make the association between *mo* and focus more salient than prosody does for *too*, in which case we predict that Japanese-acquiring children will perform better than English-acquiring children when tested using a similar task. And moreover, we will not have to worry about children's performance being affected by prosodic manipulation like in English. Comparison between the two languages could lend us a valuable insight into how syntax/prosody might affect children's acquisition of focus-sensitive particles.

Chapter 6

Corpus Study

This chapter presents findings from a supplementary corpus study that we conducted to examine whether or not child input consists of any evidence for *too*'s presuppositional and focus-sensitive nature, all in the light of better understanding how children acquire the presuppositional and focus-sensitive nature of the additive particle.

In Chapter 1, we outlined a potential learning path for how children might come to acquire an adult-like understanding of the presuppositional and focus-sensitive nature of additive particles. Specifically, we hypothesized that children would come to figure out the presuppositional nature of additive particles before they figure out that additive particles are focus-sensitive. The experimental results presented in this dissertation fits well with the storyline we fleshed out, suggesting that the acquisition of *too*'s meaning proceeds in a step-by-step manner: children's overall success in Experiment 3 and their limited success in Experiment 4 is an indication that most English-acquiring 4-year-olds have figured out *too*'s presuppositional nature but not its focus-sensitive nature. Nevertheless, there remains a possibility that the results from the two experiments (the results from Experiment 4 in particular) were influenced by task effects, in which case it's not clear whether children's limited success could be taken as evidence for their lack of linguistic knowledge. And furthermore, our experimental results alone do not tell us anything about why the acquisition of *too* should proceed in a step-by-step manner. Child input can provide us with a window to

look into these questions. If we find that the input children are exposed to comes with sufficient evidence for *too*'s presuppositional nature but not for *too*'s focus-sensitive nature, then that might explain why focus-sensitivity is acquired later than presuppositionality. This would also help ascertain the credibility of the results obtained in Experiment 4.

6.1 Methods and materials

To investigate whether any clues about *too*'s presuppositional and focus-sensitive nature exist in children's input, we examined every occurrence of additive *too* in parents' utterances from the Gleason corpus (Masur and Gleason, 1980) in CHILDES (MacWhinney, 2000). The Gleason corpus consists of conversations between twenty-four target children (twelve males and twelve females) and their families, children's age ranging from 2;1 to 5;2 years (mean age 3;4). The families were all white and upper-middle class, recruited through nursery schools and similar networks in the greater Boston area during the 1970s. All families spoke English as their first language.

The conversations included in the corpus were collected across three separate sessions: a laboratory play session with the mother; a laboratory play session with the father; and an at-home dinner session with both the mother and the father. The laboratory play sessions consist of conversations between the target child and the parent engaging in three activities: (i) working with a toy car that could be taken apart and put back together; (ii) reading a picture book that had no words; and (iii) playing with a grocery store set. Parents were encouraged to manage the 30-minute session time as evenly as possible among the three activities such that they could go through all three activities with their child during each session. Consequently, the content of the conversations from the play sessions were fairly uniform across

participants (each parent/family). The dinner session conversations, on the other hand, varied across families, as the content of the conversations was entrusted to the participants. Collectively, the conversations from the laboratory play and at-home dinner sessions should provide a naturalistic sample of child-ambient speech and allow for a good look at the typical distribution of *too* in the input (Dudley, 2017).

Using CLAN (MacWhinney, 2000), we extracted all utterances made by parents that contained the word *too*, from which we manually picked out those involving the additive *too*. There were 241 tokens of additive *too* in total, which amount to a little less than 1% of the total utterances by parents (36,594 utterances). The *too* tokens were then examined to see whether or not the additive meaning associated with each *too* is satisfied in the discourse context. This was done by examining up to 100 lines of previous discourse and 10 lines of the following dialogue to see if we can find an appropriate antecedent to the presupposition, be it linguistic or not. There were 27 tokens of *too* for which we could not identify an appropriate antecedent for. Those tokens were excluded from further analysis. The remaining 214 tokens were analyzed using a coding scheme that was designed specifically for the purpose of examining whether or not child input consists of any evidence for *too*'s presuppositional and focus-sensitive nature.

6.2 Coding scheme

The *too* tokens were analyzed using the coding scheme provided below, with which we also provide actual examples from the Gleason corpus to demonstrate how the coding scheme worked. There were two categories to the coding scheme: (i) clause type of the host utterance; and (ii) the scope relation of *too*. Clause-type category coding was done at the

level of individual utterances, meaning discourse context was not considered at all (though the discourse status of the presupposition has been already verified through our pre-analysis). The scope-relation category coding was done by evaluating each *too* token against the discourse context (i.e., 100 lines of preceding discourse and 10 lines of the following dialogue), through which we examined *too*'s scope.

Clause type

The *too* tokens were coded based on the clause type of the utterances they are hosted in to examine whether or not child input contains evidence for the presuppositional nature of *too*. Specifically, we are interested in knowing how many of the *too* tokens, if any, occur in an interrogative clause, i.e., a projective context. Presumably, *too* tokens that occur in projective contexts like an interrogative would provide great evidence for *too*'s presuppositional nature as the additive meaning should not be able to survive embedding if it was an entailment. By tracking the proposition pertaining to the additive meaning, evaluating its truth against the discourse context, and comparing that proposition to the common ground, children could, in theory, observe that the additive meaning associated with *too* is always true and backgrounded. Based on this observation, children will infer that the backgrounded-ness of the additive meaning is a matter of convention and so this relation must be encoded into the meaning of *too*. Ideally, projective contexts other than interrogatives should also be examined to understand the full range of evidence made available to children in their input. However, due to time constraints, we were unable to complete a thorough analysis for other projective contexts. Hence, our analysis is limited to *too* tokens involving embedding under questions, i.e., (*wh*-)interrogatives, which are contrasted with non-projective contexts, i.e.,

declaratives and imperatives. Only those utterances that consist of a fully pronounced clause were included in the count. The clause type of an utterance was determined based solely on syntactic features, meaning potential questions that did not involve subj-aux inversion were counted as declaratives in our analysis.

(56) *Declarative and imperative*

a. She's tough and older too . (mother of Charlie, 3;0, dinner)

b. Well , I did , too. (father of Guy, 3;0, dinner)

c. Let me put that away too. (mother of William, 2;2, play)

d. And she falls into the water too. (father of Nanette, 2;1, play)

(57) *Interrogative*

a. Do I do it too? (mother of Wanda; 4;0, dinner)

b. Do you have beef too? (father of Victor, 2;4, dinner)

c. Why don't you charge me for the soup too? (mother of Eddie, 4;3, play)

d. Are you gonna eat some too? (father of Katie, 3;2, play)

Scope relation

The *too* tokens were coded based on *too*'s scope to examine whether or not children's input consists of any evidence for the focus-sensitive nature of *too*. If it turns out that children's input is skewed towards a single scope-reading, then that might explain why children have a hard time figuring out the focus-sensitive nature of *too*. For example, if the input children are exposed to is overwhelmingly subject-focus scope, (and if that pattern is robust among all

English-acquiring children) then that might explain why some children preferred the subject-focus reading of *too* in Experiment 4.

(58) *Subject-focus*

Dinner session with Isadora (4;0):

*MOT: they all come out .

*MOT: and you know what he's go(i)ng do ?

*CHI: what ?

*MOT: he's gonna go back inside the pipe and run to the other end .

*CHI: 0 [=! giggles] how_about this page ?

*MOT: and now they're gonna go back inside too and look for him .

*MOT: and what do ya think happened ?

*MOT: who found the kitty ?

*CHI: the little boy .

(59) *Object-focus*

Dinner session with Charlie (3;0):

*MOT: cake is delicious , but you have something healthy first .

*MOT: I'll show you what I'll give you instead , how's that ?

*CHI: what ?

*MOT: watch this .

*CHI: no , I like cake .

*MOT: <u>oh , you can have cake too !</u>

*CHI: what is in there ?

*MOT: will you eat a piece of this ?

*CHI: no !

(60) *Other*

Play session with Susan (3;2):

*CHI: yup .

*CHI: I think I did .

*CHI: almost .

*CHI: I'm using your screwdriver (.) get this off .

*FAT: yes .

*FAT: <u>and you're doing very well with it too .</u>

*CHI: see ?

*CHI: it got off .

*FAT: what coordination .

6.3 Results

Table 2 summarizes the results of the clause-type category coding, showing the number of *too* tokens that were coded for each clause type and also their proportion to the total tokens that were analyzed. Looking at the table, we see that most of the *too* tokens found in the Gleason corpus occurred in either a declarative or an imperative clause: out of the 214 tokens of *too* that were included in the coding, 172 of them occurred in either a declarative or an imperative clause, which amount to 71% of the total *too* tokens. However, while they were infrequent, we also found some instances of *too* that occurred in an interrogative clause: out of the 214 tokens of *too*, 32 of them occurred in an interrogative, which make up about 13% of the total *too* tokens. These results indicate that *too* tokens that occur in a projective context exist in child input.

Table 2. Number of *too* tokens that were coded for each clause type in the Gleason corpus and their proportion to the total token count

Declaratives and imperatives	Interrogatives
172/241 (71%)	32/241 (13%)

Table 3 summarizes the results of the scope-relation category coding, showing the number of *too* tokens that were coded for each scope-relation type and their proportion to the total token count. At a glance, we see that subject-focus scope was the most frequent scope-relation pattern in child-ambient speech but only by a small margin: about 34% of the *too* tokens found in Gleason corpus involved subject-focus scope; 29% of the *too* tokens

involved object-focus scope; and 25% of the *too* tokens involved other types of scope, for example, sentential- and VP-focus. There were 27 tokens of *too* (11% of the total *too* tokens) for which we could not determine their scope because the discourse context lacked a clear antecedent. These results show that there is a notable variation in child input with regards to *too*'s scope.

Table 3. Number of *too* tokens that were coded for each scope-relation type in the Gleason corpus and their proportion to the total token count

Subject-focus	Object-focus	Other
83/241 (34%)	71/241 (29%)	60/241 (25%)

We will discuss the implications of these results in the following section.

6.4 Discussion

The clause-type category coding results presented in Table 2 show that while they are sparse, children's input does provide possible evidence for *too*'s presuppositional nature, which comes in the form of an interrogative clause. While the process might be complicated, if children can figure out that the additive meaning expressed by *too* is true even when they occur in an interrogative, then that should provide evidence that the additive meaning is backgrounded and hence, a presupposition. Given that English-acquiring 3-to-4-year-olds have a fairly good understanding about the uniqueness presupposition triggered by *the* (Syrett

et al., 2009; Aravind, 2018), it's safe to assume that children by age 4 have a basic understanding of the concept of common ground. If that is the case, then figuring out that *too* is presuppositional by tracking the discourse status of the additive presupposition should be possible for children as well.

The scope-relation category coding results presented in Table 3 show us that children experience both subject- and object-focus *too* at roughly the same frequency, assuming that the pattern observed in Gleason corpus is robust across all children. Intuitively, being exposed to different scope patterns at a similar rate should be helpful for children, providing children with the opportunity to notice that the content of the additive meaning could vary depending on the placement of focus. However, the fact that the scope of *too* could be easily figured out by examining the preceding discourse means that the same is possible for children as well; they could figure out the intended presupposition simply by following the discourse, given that they are most likely going to find an antecedent to the presupposition. Perhaps, the crucial cases are those *too* tokens where we could not determine the scope of *too* by observing the preceding discourse. If children hear *too* get used in a context with more than one possible antecedent, then this might lead children to look for other clues. Unfortunately, we did not find such instances of *too* in the corpus, though this does not preclude the possibility that such evidence exists in actual child input, given the relative small sample size.

Chapter 7

Conclusion

This dissertation explored children's acquisition of additive particles to better understand how their knowledge about the meaning of additive particles develops throughout the course of language acquisition. The dissertation was organized as follows. Chapter 1 went over the learning problem that children must overcome in order to figure out the meaning of additive particles and laid out a possible learning path for how the particles might be acquired. Chapter 2 discussed the focus-sensitive, presuppositional, and anaphoric properties of additive particles, shedding light on why testing children's understanding of the meaning of additive particles is difficult. Chapter 3 reviewed findings from previous acquisition work on additive particles, pointing out the underlying methodological issues of previous work and motivating the experiments presented in this dissertation. Chapter 4 presented findings from 3 experiments, Experiment 1, Experiment 2, and Experiment 3, which examined English- and Japanese-acquiring children's sensitivity to the presupposition triggered by *also*, *too*, and *mo*. Chapter 5 presented findings from Experiment 4, which looked at English-acquiring children's ability to determine the scope of *too* based on prosodic information. Chapter 6 discussed results from the corpus study conducted on *too*, which examined how the additive particle *too* is used in child input. Finally, this chapter concludes the dissertation by reviewing the findings from the four experiments and the

supplementary corpus study discussing what further insights can be drawn from those findings.

The four experiments presented in this dissertation were conducted with the following two questions in mind.

(61) Do preschool-aged children know that additive particles trigger an additive presupposition and are they able to account for the contextual constraint the particles impose?

(62) Do preschool-aged children know about the language specific cue that are relevant to focus association and are they able to use that information to determine the scope/associate of additive particles?

The first three experiments, Experiment 1, Experiment 2, and Experiment 3, all concerned the first question, probing for children's sensitivity to the additive presupposition by testing to see whether children are able to use the additive presupposition to restrict the range of appropriate answers to a *wh*-question. The English-acquiring 4-year-olds tested on *also* in Experiment 1 and the Japanese-acquiring 5-year-olds tested on *mo* in Experiment 2 both showed sign of sensitivity to the additive presupposition: the difference in the pattern of responses across two test conditions (ALSO/MO vs. NO-ALSO/NO-MO) show that (though there is some individual variation) children as a group treat sentences with the respective particle differently from those without. Using an improved version of the task, Experiment 3 tested English-acquiring 4-year-olds on their sensitivity to *too*'s additive presupposition, yielding a notable increase in children's performance: as a group, the children that participated in the

experiment were able to discern sentences with *too* from those without at a level comparable to adults; and as an individual, a majority of the children that were tested were able to consistently give an adult-like response. Minimally, these results tell us the following three things about the timeline at which the presuppositional nature of the particles children were tested on is acquired: (i) the majority of the English-acquiring children have figured out that *too* is presuppositional by around age 4; (ii) at least some 4-year-olds have figured out that the same is the case with *also*; and (iii) about half of the Japanese-acquiring children have figure out that *mo* is presuppositional by age 5. A follow-up is underway, in which we investigate whether the difference in children's performance across the three experiments is due to children's understanding of the presuppositional nature of the particles or a methodological artifact stemming from the confounds in the design of the experiments discussed earlier in Chapter 4. Regardless, these results contribute new evidence about the timeline at which children figure out the presuppositional nature of additive particles and provide an important steppingstone for testing their understanding of the particles' focus-sensitive nature.

Building on the findings from Experiment 3, Experiment 4 *too* examined children's understanding of *too*'s focus-sensitive nature by investigating English-acquiring 4-year-olds' comprehension of sentences which contained either a subject-associated *too* or an object-associated *too*. Previous studies that examined children's understanding of the focus-sensitive nature of additive particles did not account for their presuppositional and anaphoric nature and tested children's comprehension of the particles using infelicitous tasks. Therefore, it's not immediately obvious whether children really lack the understanding that additive particles are focus sensitive or children's non-adult-like performance in previous

studies were due to task effects and hence underestimate children's performance. Thus, we designed a novel task which gets at the exact question in (57) to test children's understanding of the focus-sensitive nature of *too* in its naturally occurring context. While their performance is not at the level of adults, we find that children as a group are able to distinguish between the two types of sentences, i.e., those with subject-associated *too* and those with object-associated *too,* at a reliable rate, demonstrating that some 4-year-olds have the focus-sensitive nature of *too* figured out. At the same time, we also find that only about a quarter of the 4-year-olds were able to correctly discern the two types of sentences; the rest failed to distinguish between the two types of sentences, showing strong preference for one of the two possible readings. At face value, these results suggest that the acquisition of *too*'s focus-sensitive nature begins sometimes around age 4 but it does not become complete until later. However, the design of the task adopted in the experiment involved some manipulation of prosody both across different phases of the experiment (training vs. test) and within test trials (SUBJECT-FOCUS vs. OBJECT-FOCUS), which could have hindered children's performance in the task. It's possible then that the findings from Experiment 4 underestimates English-acquiring 4-year-olds's true linguistic capacity.

Together, the findings from the four experiments speak to the importance of methodology when conducting a behavioral experiment in acquisition research. Both Truth-value judgement and Picture selection tasks have played a crucial role in the acquisition literature, providing us with a way to crack at children's underlying linguistic knowledge by testing their sensitivity to the asserted content of a sentence. Nevertheless, there are other dimensions to sentence meaning, i.e., presuppositions and implicatures, which Truth-value judgement and Picture selection tasks are not suited for testing; the truth-value-oriented

nature of the tasks might undermine the importance of non-asserted, presuppositional content of a sentence, hindering their chance to succeed in the tasks and ultimately resulting in an underestimation of children's linguistic capacity. The importance discourse context plays in the interpretation of sentences that contain a context-dependent expression like additive particles should not be taken lightly as well. Without any context, children will have a hard time inferring the relevant information that is necessary for interpretating sentences that contain a context-dependent expression like additive particles, in which case children might end up ignoring the expression. This also leads to an underestimation of children's performance. These things should always be kept in mind when conducting an experiment that gets at children's knowledge of semantics and pragmatics.

The collective results from the four experiments also speak to our understanding about the development of the cognitive and socio-pragmatic capacities that the interpretation of sentences containing an additive particle depends on. Our discussion in this dissertation revolved around the tacit assumption that children around the age of 4 to 5 have already developed an advanced and sophisticated system of cognitive and socio-pragmatic capacities such that they are able to represent presuppositional and focus-related meanings, at least under normal circumstances. If we only look at what previous studies tell us about children's interpretation of sentences containing an additive particle, we might be tempted to conclude that children's failure in those studies is due to the lack of fundamental capacities that are necessary for representing presuppositional/focus-dependent meanings. However, we know from previous acquisition work that this is likely false. For example, a study by Syrett *et al*. (2009) has shown that English-acquiring 3-year-olds are able to use the information pertaining to the uniqueness presupposition triggered by *the* in an adult-like way, suggesting

that the cognitive and socio-pragmatic capacities necessary for representing presuppositional meanings are already in place by at least age 3. And Szendrői *et al*'s. (2018) work that we touched on a number of times throughout the course of this dissertation demonstrates that English-acquiring children as young as age 3 are able to use prosodic information pertaining to contrastive focus in an adult-like way, which suggests that the relevant capacities that are necessary for representing focus-sensitive meanings are also in place by age 3. The results from the four experiments presented in this dissertation corroborate these findings. Assuming that typically developing children around the same age range share the same basic cognitive capacities, the results from the four experiments indicate that the English- and Japanese-acquiring children around age 4 to 5 have the capacities to represent the presuppositional, focus-sensitive meaning of additive particles. These capacities might undergo development across different stages of childhood, but the fundamental should be in place from very early. If that is the case, then we have further motivation to look at younger children's understanding of the presuppositional and focus-sensitive nature of additive particles.

Of course, not everything could be figured out by just looking at the results from behavioral experiments. There is a limit to the extent of knowledge that can be drawn from experimental findings alone. Specifically, the results from our four experiments provide insight into what children know about the meaning of additive particles and when that knowledge begins to emerge, but it does not tell us how children acquire that knowledge; or if they haven't acquired the knowledge, then why so. Instead, the latter issues may be better addressed through other methods like corpus analysis. The supplementary corpus analysis presented in Chapter 6 suggests that children's difficulty discerning sentences containing a subject-associated *too* from sentences containing an object-associated *too* might reflect

children's lack of adult-like understanding about the focus-sensitive nature of *too*, which stems from the sparseness of evidence for *too*'s focus-sensitivity in child-ambient speech. Nonetheless, the corpus analysis we conducted leaves a lot to be desired. Further study is needed as the volume of our analysis was rather limited due to the small sample size.

The findings presented in this dissertation are neither complete nor conclusive, leaving behind number of unanswered questions that must be addressed by future work. Regardless, they provide an important step forward in understanding how an adult-like understanding of words with complex meaning like additive particles might be acquired by children.

Appendix A: Materials for Experiment 1, 2, and 3

A.1 Materials for Experiment 1

A.1.1 Practice materials

PRACTICE 1

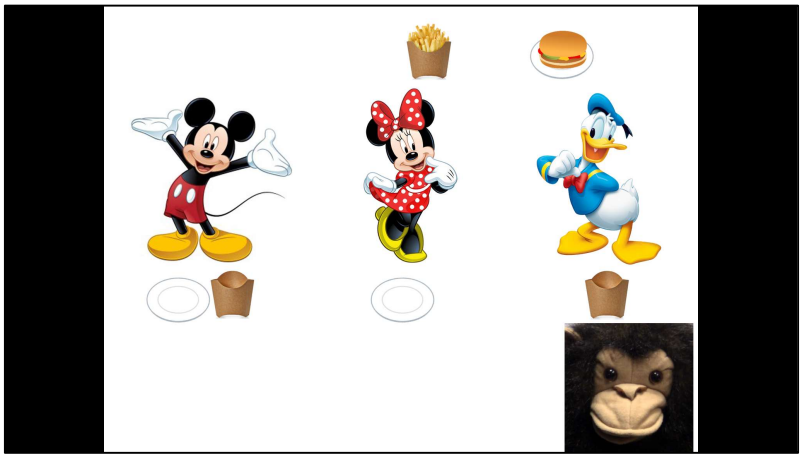


Figure 14. A sample of the PowerPoint slides used in Practice item 1 of Experiment 1

STORY Mickey, Minnie, and Donald are going to eat lunch. There are hamburgers and French fries to eat. Mickey says, "wow, the food looks delicious, but there so much of it! I think I'll just eat one thing" Mickey eats a hamburger. Mickey then says, "that was delicious! I think I can eat more!" Mickey eats French fries! Minnie says, "eating too much greasy food is not good for me. I'll just eat one thing." Minnie eats a hamburger! Donald says, "I ate a lot for breakfast so I'm not so hungry. I'll just eat one thing." Donald eats French fries!

EXPERIMENTER'S QUESTION Tell me, Charlie. Who ate hamburgers in this story?

PUPPET'S RESPONSE Well, let's see. Mickey and Minnie ate a hamburger. But wait. I can't remember what Donald did. Teacher, can you help me? Did Donald eat a hamburger?

PRACTICE 2

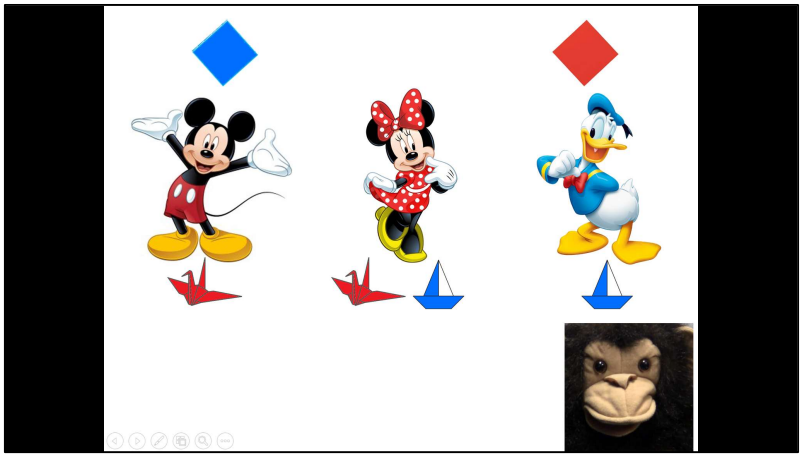


Figure 15. A sample of the PowerPoint slides used in Practice item 2 of Experiment 1

STORY Mickey, Minnie, and Donald are working on papercraft. They are trying to make birds and boats from sheets of paper. Mickey says, "making both a bird and a boat looks difficult. I think I'll just make one thing." Mickey makes a bird! Minnie says, "I like papercraft, but making both things neatly will take a lot of time. I'll just make one thing." Minnie makes a bird! Minnie then says, "that was so much fun! I'll make one more!" Minnie makes a boat! Donald says, "I'm not good at papercraft, but this looks super fun. I'll try making one thing" Donald makes a boat!

EXPERIMENTER'S QUESTION Tell me, Charlie. Who made boats in this story?

PUPPET'S RESPONSE Well, let's see. Mickey didn't make a boat, but Donald did. But wait, I can't remember what Minnie did. Teacher, can you help me? Did Minnie make a boat?

A.1.2 Filler materials

FILLER 1

Figure 16. A sample of the PowerPoint slides used in Filler item 1 of Experiment 1

STORY Mickey, Minnie, and Donald came to the garden for a walk. The garden is full of pretty flowers! They're going to pick some flowers to take back home. Mickey says, "these flowers are so pretty. I'm going to pick one flower!" Mickey picks a red flower! Minnie says, "I love flowers, but I feel bad if I take a lot of them. I'll just pick one flower." Minnie picks a red flower! Minnie then says, "oh, it's so pretty! I'm going to pick another flower!" Minnie picks a blue flower! Donald says, "I like food more than flowers, but these flowers are pretty! I'm going to pick one flower!" Donald picks a blue flower!

EXPERIMENTER'S QUESTION Tell me, Charlie. How many flowers did Donald pick?

PUPPET'S RESPONSE Well, let's see. There were red flowers and blue flowers. Donald picked a blue flower, but did he pick a red flower?

FILLER 2

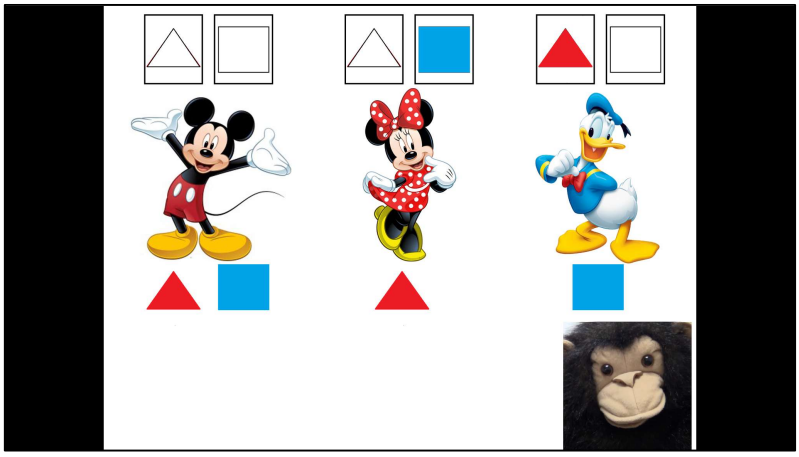


Figure 17. A sample of the PowerPoint slides used in Filler item 2 of Experiment 1

STORY Mickey, Minnie, and Donald are practicing using scissors. They are going to come some shapes out from sheets of paper. There are triangles and squares to cut out. Mickey says, "Cutting things out with my scissors is fun, but these shapes look difficult. I think I'll just cut one shape out." Mickey cuts a triangle out! Mickey then says, "that was a lot of fun! I'll cut another shape out!" Mickey cuts a square out! Minnie says, "cutting both shapes out neatly will take a lot of time. I'll just cut one shape out!" Minnie cuts a triangle out! Donald says, "I'm not good at using scissors, but cutting these shapes out looks fun! I'll try cutting one shape out!" Donald cuts a square out!

EXPERIMENTER'S QUESTION Tell me, Charlie. How many shapes did Minnie cut out?

PUPPET'S RESPONSE Well, let's see. There were triangles and squares to cut out. Minnie didn't cut a square out, but did she cut a triangle out?

FILLER 3

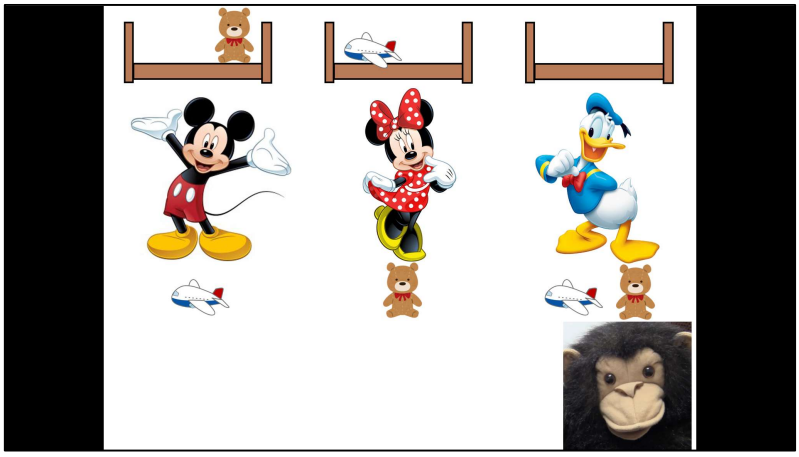


Figure 18. A sample of the PowerPoint slides used in Filler item 3 of Experiment 1

STORY Mickey, Minnie, and Donald came to the toy store to buy some toys. There are toy airplanes and teddy bears in the store. Mickey says, "I don't want to spend all my money on toys. I'll just buy one toy!" Mickey buys a toy airplane! Minnie says, "I want to buy some clothing afterwards, so I have to save my money. I'll just buy one toy" Minnie buys a teddy bear! Donald says, "I didn't bring a lot of money so I can't buy both toys. I'll just buy one toy." Donald buys a toy airplane! Donald then says, "Oh I have enough money for more! I'll buy another toy!" Donald buys a teddy bear!

EXPERIMENTER'S QUESTION Tell me, Charlie. How many toys did Mickey buy?

PUPPET'S RESPONSE Well, let's see. There were toy airplanes and teddy bears in the store. Mickey but a toy airplane, but did he buy a teddy bear?

FILLER 4

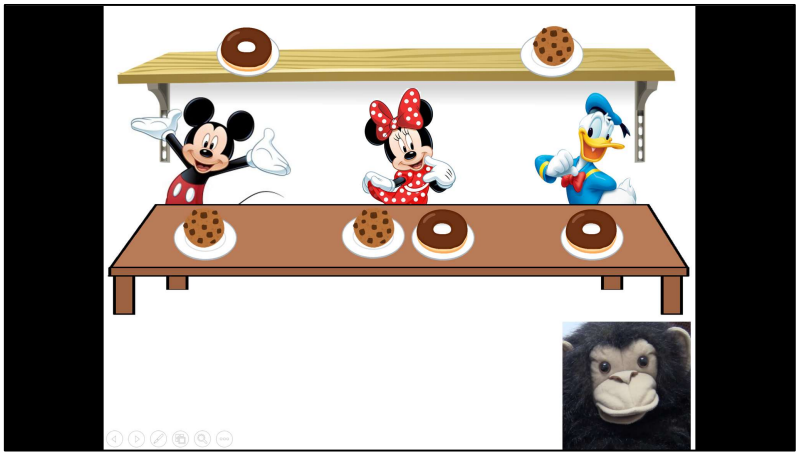


Figure 19. A sample of the PowerPoint slides used in Filler item 4 of Experiment 1

STORY Mickey, Minnie, and Donald are looking for some snack in the kitchen. They find cookies and donuts on the shelf. They are going to take what they want to the table. Mickey says, "I ate a lot for lunch, so I'll just have one snack." Mickey takes a cookie! Minnie says, "having a lot of sweet stuff is bad for my teeth. I'll just have one snack." Minnie takes a cookie! Minnie then says, "actually, I think it'll be okay if I brush my teeth. I'll have another snack!" Minnie takes a donut! Donald says, "I won't be able to eat dinner if I eat a lot. I'm going to have one snack." Donald takes a donut!

EXPERIMENTER'S QUESTION Tell me, Charlie. How many snacks did Donald take?

PUPPET'S RESPONSE Well, let's see. There were cookies and donuts on the shelf. Donald didn't take a cookie, but did he take a donut?

A.1.3 Test materials

TEST 1

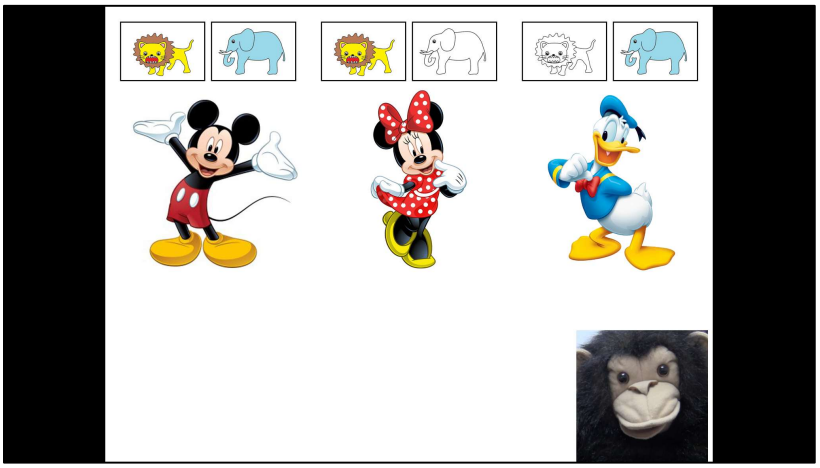


Figure 20. A sample of the PowerPoint slides used in Test item 1 of Experiment 1

STORY Mickey, Minnie, and Donald are going to color some pictures. There are lions and elephants they can color. Mickey says, "coloring these pictures looks difficult. I'll just color one picture!" He colors a lion! Mickey then says, "that wasn't so bad! I'll color another picture!" He colors an elephant! Minnie says, "coloring both pictures neatly will take so much time. I'll just color one picture!" Minnie colors a lion! Donald says, "I'm not good at coloring pictures but this looks fun! I'll give it a try!" Donald colors an elephant!

PUPPET'S RESPONSE Tell me, Charlie. Who colored the most pictures?

EXPERIMENTER'S QUESTION Well, let's see. There were lions and elephants to color. Donald didn't color a lion, but Mickey and Minnie did. Now, who (also) colored an elephant?

TEST 2

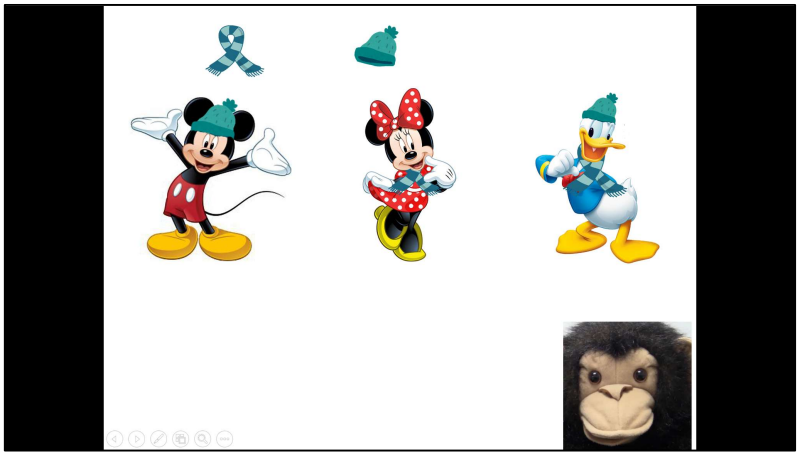


Figure 21. A sample of the PowerPoint slides used in Test item 2 of Experiment 1

STORY Mickey, Minnie, and Donald are going outside to play. It's a little cold outside, so they're going to put on some winter things to stay warm. There are hats and scarfs they can put on. Mickey says, "It's not so cold outside, so I'll just put on one winter thing." Mickey puts on a hat! Minnie says, "it will be hot if I put on both. I'll just put on one winter thing!" Minnie puts on a scarf! Donald says, "I'm not cold at all, so I'll just put on one winter thing." Donald puts on a hat. Donald then says, "hmm, I don't want to get sick. I'll put on another winter thing!" Donald puts on a scarf!

EXPERIMENTER'S QUESTION Tell me, Charlie. Who put on the most winter things?

PUPPET'S RESPONSE Well, let's see. There were hats and scarfs to put on. Minnie didn't put on a hat, but Mickey and Donald did. Now, who (also) put on a scarf?

TEST 3

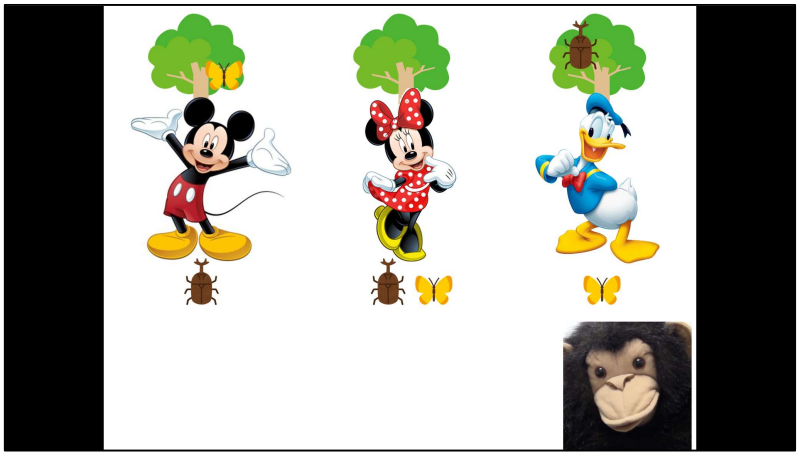


Figure 22. A sample of the PowerPoint slides used in Test item 3 of Experiment 1

STORY Mickey, Minnie, and Donald came to the woods to catch some bugs. There are beetles and butterflies in the woods. Mickey says, "it's hot today, and catching bugs is hard. I'll just catch one bug!" Mickey catches a beetle! Minnie says, "catching bugs is really hard, but I'm going to give it a try!" Minnie catches a beetle! Minnie then says, "That was super easy! Maybe I can catch another bug!" Minnie catches a butterfly! Donald says, "I'm not good at catching bugs, but I'll give it a try!" Donald catches a butterfly!

EXPERIMENTER'S QUESTION Tell me, Charlie. Who caught the most bugs?

PUPPET'S RESPONSE Well, let's see. There were beetles and butterflies in the woods. Donald didn't catch a beetle, but Mickey and Minnie did. Now, who (also) caught a butterfly?

TEST 4

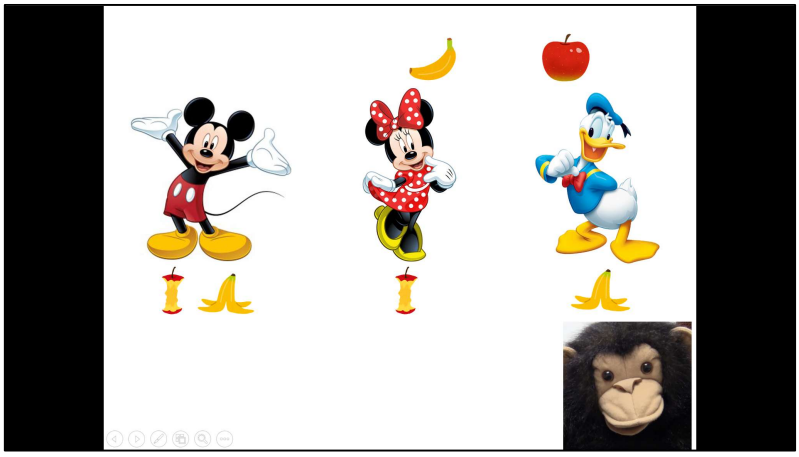


Figure 23. A sample of the PowerPoint slides used in Test item 4 of Experiment 1

STORY Mickey, Minnie, and Donald are going to eat fruit for breakfast. There are apples and bananas to eat. Mickey says, "I just woke up so I'm not so hungry. I'll just have one fruit!" Mickey eats an apple! Mickey then says, "that was delicious! I think I'll have another fruit!" Mickey eats a banana! Minnie says, "having a lot of fruit is not good. I'll just have one fruit!" Minnie eats an apple! Donald says, "I ate a lot for dinner yesterday, so I'm not that hungry. I'll just have one fruit!" Donald eats a banana!

EXPERIMENTER'S QUESTION Tell me, Charlie. Who ate the most fruit?

PUPPET'S RESPONSE Well, let's see. There were apples and bananas to eat. Donald didn't eat an apple, but Mickey and Minnie did. Now, who (also) ate a banana?

A.2 Materials for Experiment 2

Only the critical test items are provided. Other materials are basically the same as the first.

TEST 1

Are,	dare-ga	zoo-o/mo	nut-ta	kana?
hmm	who-NOM	elephant-ACC/also	color-PAST	Q

'Hmm, who (also) colored a LION?'

TEST 2

Are,	dare-ga	mafuraa-o/mo	tuke-ta	kana?
hmm	who-NOM	scarf-ACC/also	put.on-PAST	Q

'Hmm, who also ate a BANANA?'

TEST 3

Are,	dare-ga	chyoochyo-o/mo	tukamae-ta	kana?
hmm	who-NOM	butterfly-ACC/also	catch-PAST	Q

'Hmm, who also ate a BANANA?'

TEST 4

Are,	dare-ga	banana-o/mo	tabe-ta	kana?
hmm	who-NOM	banana-ACC/also	eat-PAST	Q

'Hmm, who (also) ate a BANANA?'

A.3 Materials for Experiment 3

Only the materials that were changed from Experiment 1 are provided (i.e., the puppet's recount and the test sentence during the critical test trials).

TEST 1

Well, let's see. There were lions and elephants to color. Donald didn't color a lion, but Mickey and Minnie did color a lion. And, who colored an elephant (too)?

TEST 2

Well, let's see. There were hats and scarfs to put on. Minnie didn't put on a hat, but Mickey and Donald did put on a hat. And, who put on a scarf (too)?

TEST 3

Well, let's see. There were beetles and butterflies in the woods. Donald didn't catch a beetle, but Mickey and Minnie did catch a beetle. And, who caught a butterfly (too)?

TEST 4

Well, let's see. There were apples and bananas to eat. Donald didn't eat an apple, but Mickey and Minnie did eat an apple. And, who ate a banana (too)?

Appendix B: Materials for Experiment 4

B.1 Training 1 materials

TRAINING 1 ITEM 1

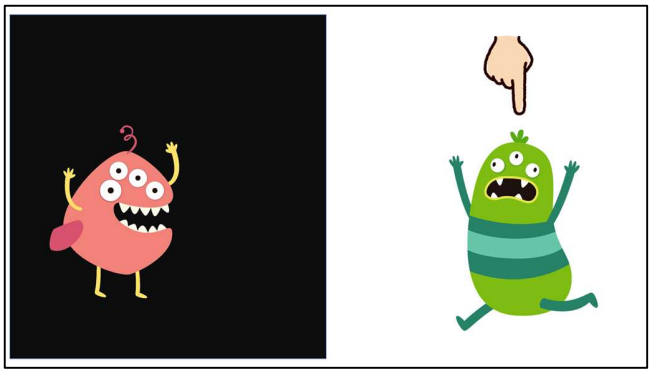


Figure 24. PowerPoint slide used in Training item 1-1 of Experiment 4

Daisy: Look! Somebody is green!

Daisy's father: Yeah, and HE is PINK! His name is Mr. Bris-low!

TRAINING 1 ITEM 2

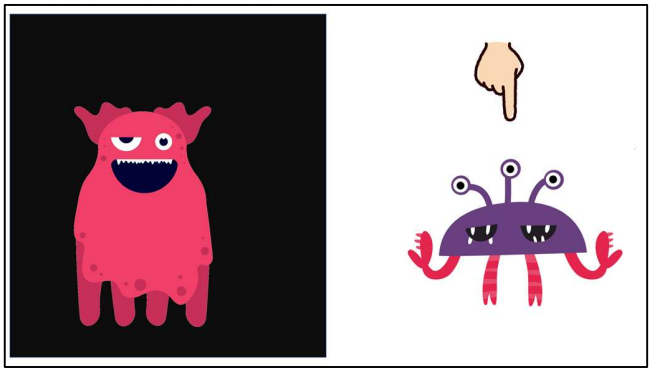


Figure 25. PowerPoint slide used in Training item 1-2 of Experiment 4

Daisy: Look! Somebody is purple!

Daisy's father: Yeah, and HE has two MOUTHS! His name is Mr. Ru-dant!

TRAINING 1 ITEM 3

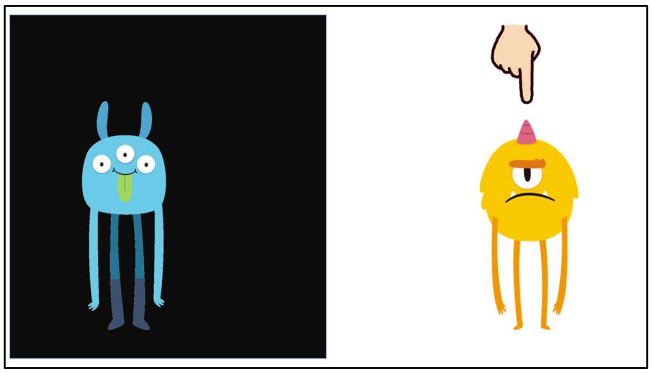


Figure 26. PowerPoint slide used in Training item 1-3 of Experiment 4

Daisy: Look! Somebody is yellow!

Daisy's father: Yeah, and HE has one EYE! His name is Mr. Coom-ba!

TRAINING 1 ITEM 4

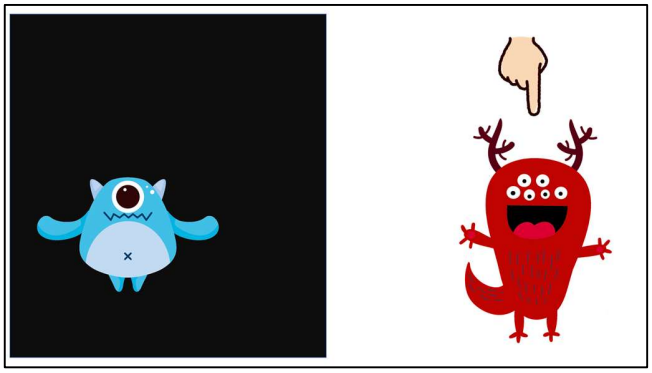


Figure 27. PowerPoint slide used in Training item 1-4 of Experiment 4

Daisy: Look! Somebody is red!

Daisy's father: Yeah, and HE is BLUE! His name is Mr. Hic-mic!

B.2 Training 2

TRAINING 2 ITEM 1

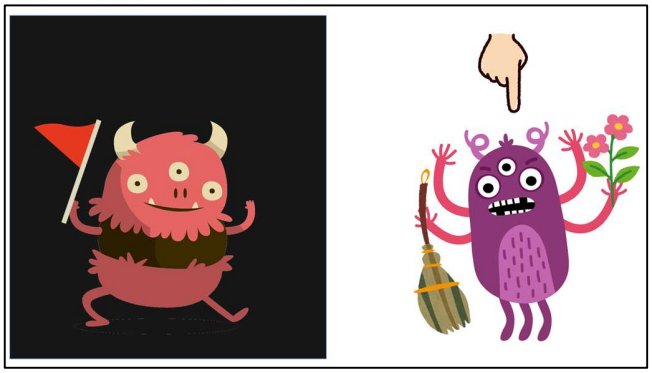


Figure 28. PowerPoint slide used in Training item 2-1 of Experiment 4

Daisy: Look! Somebody is holding a broom!

Daisy's father: Yeah, and HE's holding a FLAG! His name is Mr. Eee-bee!

TRAINING 2 ITEM 2

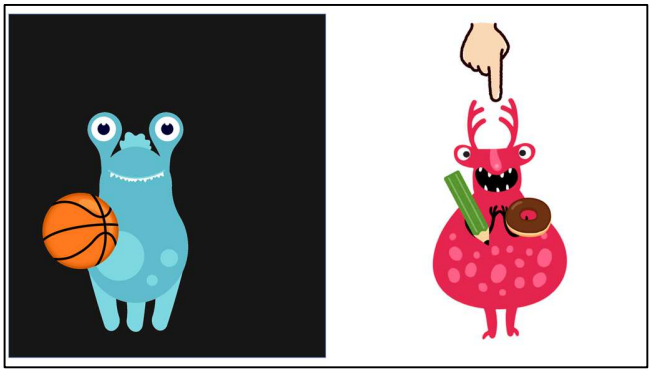


Figure 29. PowerPoint slide used in Training item 2-2 of Experiment 4

Daisy: Look! Somebody is holding a donut!

Daisy's father: Yeah, and HE's holding a PENCIL! His name is Mr. Gorphus!

TRAINING 2 ITEM 3

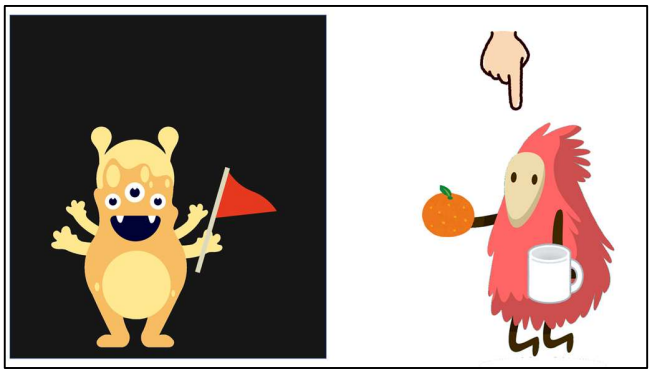


Figure 30. PowerPoint slide used in Training item 2-3 of Experiment 4

Daisy: Look! Somebody is holding an orange!

Daisy's father: Yeah, and HE's holding a CUP! His name is Mr. Raw-meek!

TRAINING 2 ITEM 4

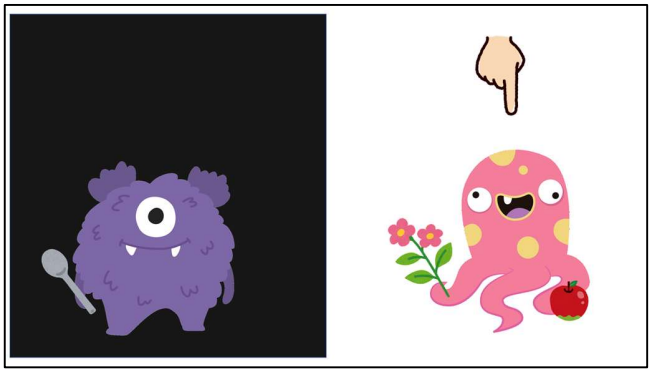


Figure 31. PowerPoint slide used in Training item 2-4 of Experiment 4

Daisy: Look! Somebody is holding a flower!

Daisy's father: Yeah, and HE's holding a SPOON! His name is Mr. Fin-gore!

B.3 Training 3

TRAINING 3 ITEM 1

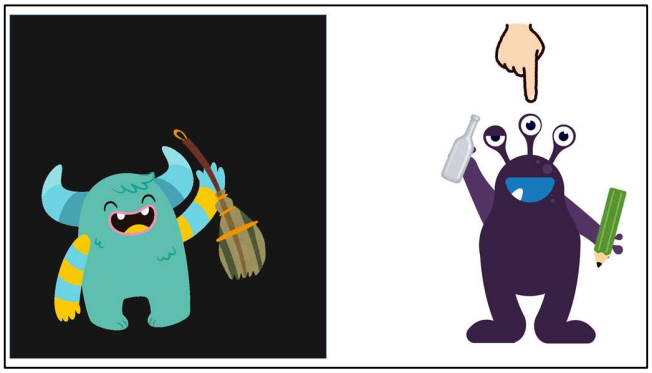


Figure 32. PowerPoint slide used in Training item 3-1 of Experiment 4

Daisy: Look! Somebody is holding <--white noise-->!

Daisy's father: Yeah, and HE's holding a BROOM! His name is Mr. Kas-tip!

TRAINING 3 ITEM 2

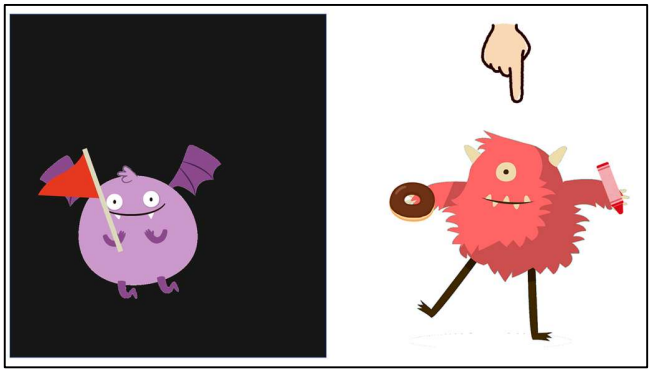


Figure 33. PowerPoint slide used in Training item 3-2 of Experiment 4

Daisy: Look! Somebody is holding <--white noise-->!

Daisy's father: Yeah, and HE's holding a DONUT! His name is Mr. Zee-moot!

TRAINING 3 ITEM 3

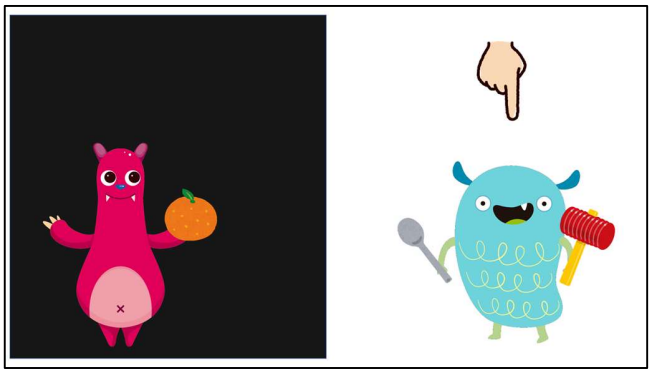


Figure 34. PowerPoint slide used in Training item 3-3 of Experiment 4

Daisy: Look! Somebody is holding <--white noise-->!

Daisy's father: Yeah, and HE's holding an ORANGE! His name is Mr. Tor-thee!

TRAINING 3 ITEM 4

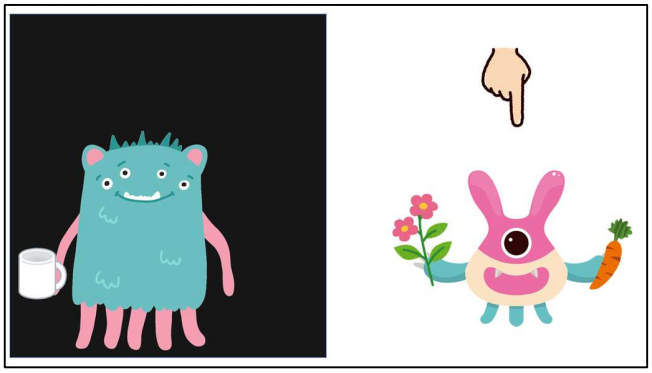


Figure 35. PowerPoint slide used in Training item 3-4 of Experiment 4

Daisy: Look! Somebody is holding <--white noise-->!

Daisy's father: Yeah, and HE's holding FLOWER! His name is Mr. Gar-ly!

B.4 Test

B.4.1 Subject-focus

SUBJECT-FOCUS ITEM 1

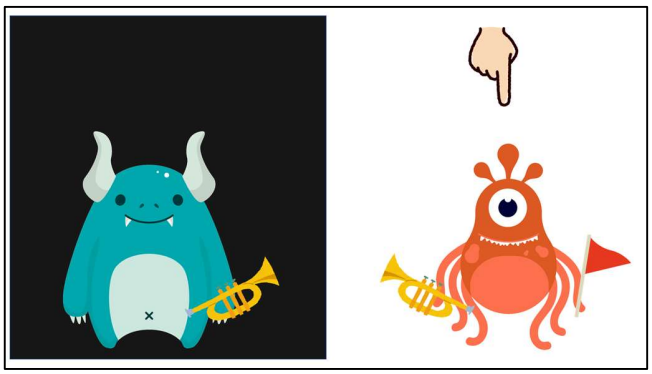


Figure 36. PowerPoint slide used in Subject-focus test item 1 of Experiment 4

Daisy: Look! Somebody is holding <--white noise-->!

Daisy's father: Yeah, and HE's holding a trumpet, too! His name is Mr. Jib-wok!

SUBJECT-FOCUS ITEM 2

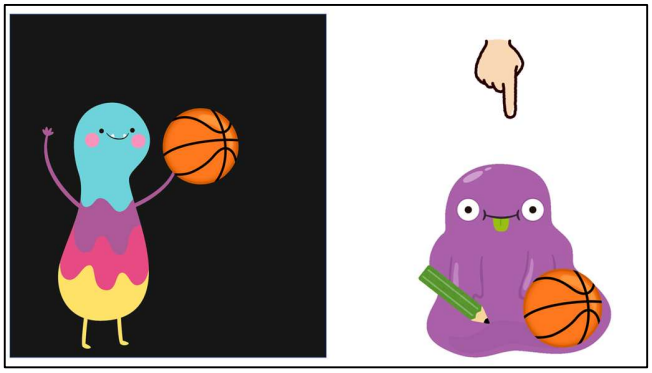


Figure 37. PowerPoint slide used in Subject-focus test item 2 of Experiment 4

Daisy: Look! Somebody is holding <--white noise-->!

Daisy's father: Yeah, and HE's holding a basketball, too! His name is Mr. Pea-dle!

SUBJECT-FOCUS ITEM 3

Figure 38. PowerPoint slide used in Subject-focus test item 3 of Experiment 4

Daisy: Look! Somebody is holding <--white noise-->!

Daisy's father: Yeah, and HE's holding a bottle, too! His name is Mr. Wim-ble!

SUBJECT-FOCUS ITEM 4

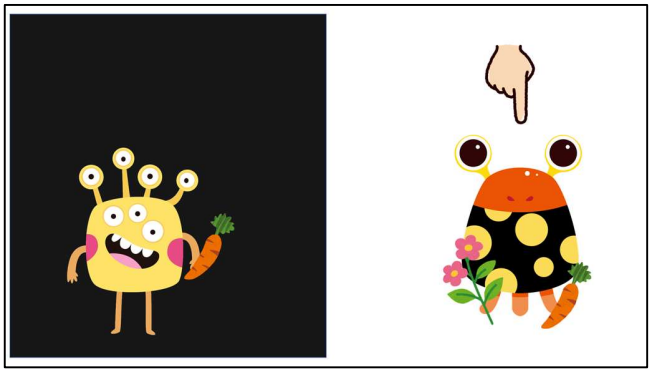


Figure 39. PowerPoint slide used in Subject-focus test item 4 of Experiment 4

Daisy: Look! Somebody is holding <--white noise-->!

Daisy's father: Yeah, and HE's holding a carrot, too! His name is Mr. Mic-toc!

SUBJECT-FOCUS ITEM 5

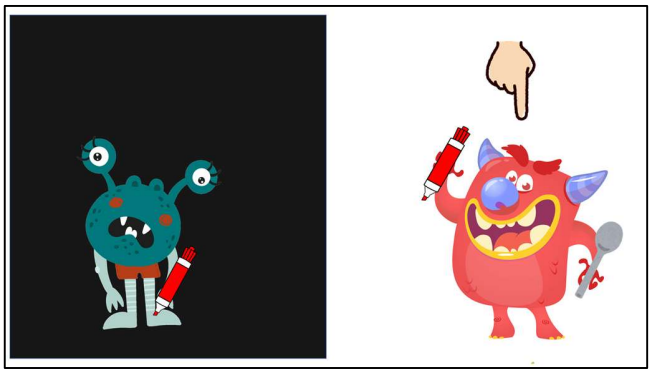


Figure 40. PowerPoint slide used in Subject-focus test item 5 of Experiment 4

Daisy: Look! Somebody is holding <--white noise-->!

Daisy's father: Yeah, and HE's holding a marker, too! His name is Mr. An-core!

SUBJECT-FOCUS ITEM 6

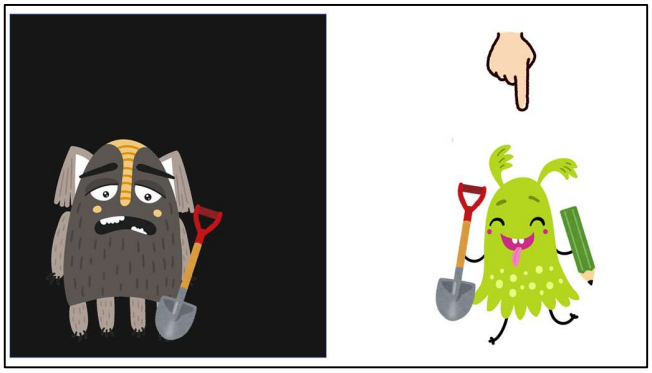


Figure 41. PowerPoint slide used in Subject-focus test item 6 of Experiment 4

Daisy: Look! Somebody is holding <--white noise-->!

Daisy's father: Yeah, and HE's holding a shovel, too! His name is Mr. Or-copp!

B.4.2 Object-focus

OBJECT-FOCUS ITEM 1

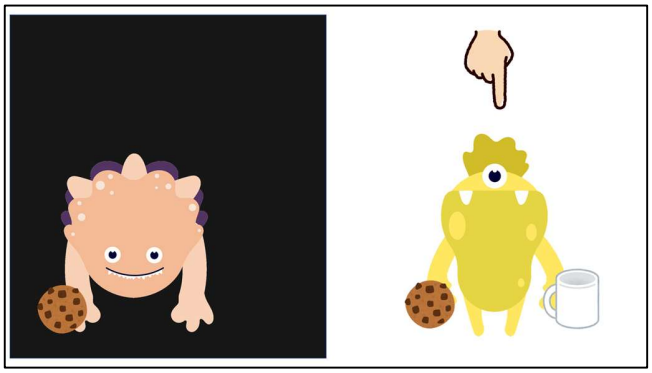


Figure 42. PowerPoint slide used in Object-focus test item 1 of Experiment 4

Daisy: Look! Somebody is holding <--white noise-->!

Daisy's father: Yeah, and he's holding a COOKIE, too! His name is Mr. Nar-vet!

OBJECT-FOCUS ITEM 2

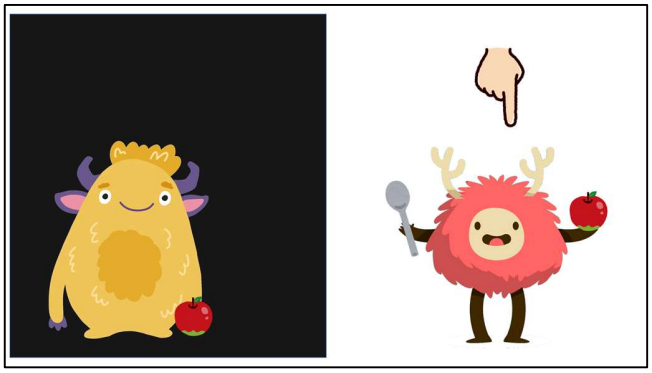


Figure 43. PowerPoint slide used in Object-focus test item 2 of Experiment 4

Daisy: Look! Somebody is holding <--white noise-->!

Daisy's father: Yeah, and he's holding an APPLE, too! His name is Mr. Meg-gles!

OBJECT-FOCUS ITEM 3

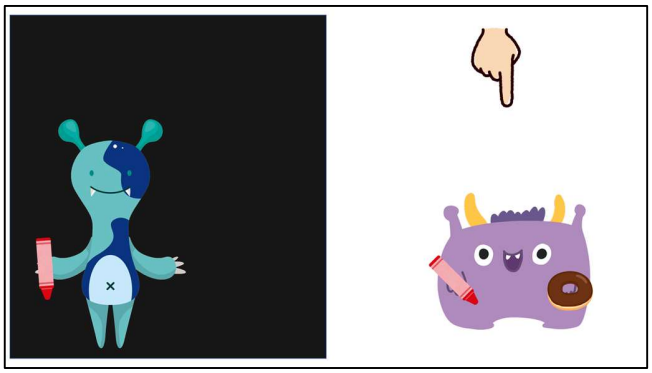


Figure 44. PowerPoint slide used in Object-focus test item 3 of Experiment 4

Daisy: Look! Somebody is holding <--white noise-->!

Daisy's father: Yeah, and he's holding a CRAYON, too! His name is Mr. Oh-mec!

OBJECT-FOCUS ITEM 4

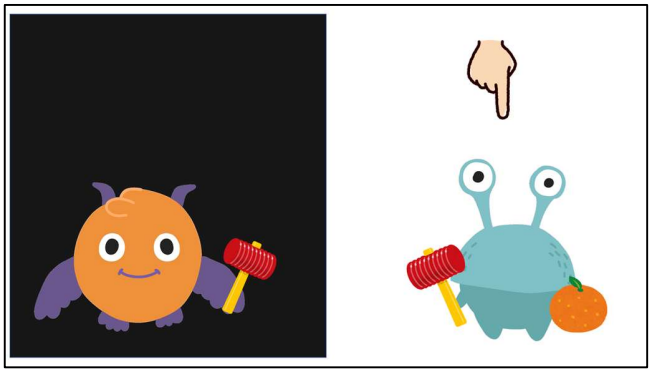


Figure 45. PowerPoint slide used in Object-focus test item 4 of Experiment 4

Daisy: Look! Somebody is holding <--white noise-->!

Daisy's father: Yeah, and he's holding a HAMMER, too! His name is Mr. Grisma!

OBJECT-FOCUS ITEM 5

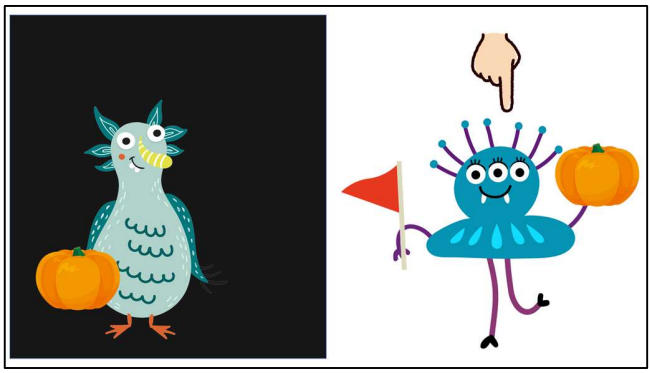


Figure 46. PowerPoint slide used in Object-focus test item 5 of Experiment 4

Daisy: Look! Somebody is holding <--white noise-->!

Daisy's father: Yeah, and he's holding a PUMPKIN, too! His name is Mr. Tur-row!

OBJECT-FOCUS ITEM 6

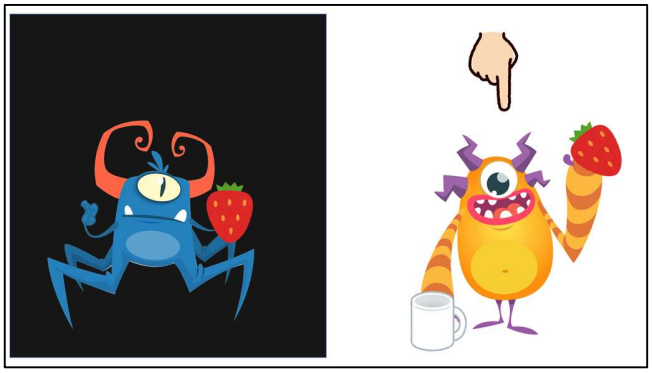


Figure 47. PowerPoint slide used in Object-focus test item 6 of Experiment 4

Daisy: Look! Somebody is holding <--white noise-->!

Daisy's father: Yeah, and he's holding a STRAWBERRY, too! His name is Mr. Goff-lee!

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