

Overcoming Performance Issues:

Preschoolers Know When to Use *The*-Expressions in Production

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Abstract

Elicited production studies have suggested that children up to the age of 5 sometimes use singular definite descriptions (*the*-phrases) in non-adult-like ways, i.e., when the referent is not mutually known or not unique in the domain of reference. These production errors have often been attributed to children's deficiency in knowledge. Here, we focus on definite descriptions with "the" as the determiner and assess whether young children systematically overuse definites in production, as previous literature suggests, and whether their knowledge of definites is adult-like. Across four studies, we showed that children produce singular definites in an adult-like manner, both in natural and elicited speech. In natural speech, they use "the" at rates comparable to their mothers overall and across contexts (Study 1), with minimal referential failures (Study 2); adults presented with conversational snippets are equally successful in guessing determiners (*the* vs. *a*) used by children (2;0-5;0) and mothers (Study 3), suggesting that children use these determiners in an adult-like way. In elicited speech, 3- to 4-year-olds are adult-like in producing referring expressions when provided with a better controlled task than in previous studies and a clear domain of reference – they only use "the" when the referent is mutually known and uniquely identifiable in the context (Study 4). These results suggest that children's production errors reported in the literature likely stem from performance issues with certain task setups. There is little reason to believe that children have the wrong meanings for "the" or lack the pragmatic capacity to use it properly.

Keywords: definites, natural production, elicited production, pragmatic competence

1. Introduction

Adult English speakers use singular definite descriptions like *the*-phrases in a way that reflects their understanding of conversational dynamics. For instance, when they use *the mug* in the sentence *Give me the mug*, their choice implies the *existence* of a *unique* mug (Russell, 1905), within a contextually restricted domain that makes the mug *familiar* or *identifiable* in the discourse or speech situation (Gundel et al., 1993; Heim, 1982; Roberts, 2003; Strawson, 1950). For children learning to produce these singular definites, this means acquiring the ability to assess how identifiable an intended referent is within the shared knowledge and tailoring their language accordingly. The emergence of this ability can be reflected in whether they know when to use definite forms in production.

Studies on English-learning children's acquisition of *the*-definites seem to show a puzzling asymmetry between production and comprehension. On the one hand, children aged 3 to 5 are claimed to overuse "the" in contexts expecting indefinites during elicited production, where the intended referent is either unfamiliar or non-unique (Maratsos, 1976; Schaeffer & Matthewson, 2005, 2005; Schafer & de Villiers, 2000; van Hout et al., 2010; Warden, 1976; Wexler, 2011). On the other hand, they demonstrate adult-like comprehension of *the*-definites (Aravind et al., 2023; Syrett et al., 2010), even before they turn age two (Choi et al., 2018; Saylor & Ganea, 2007). For example, children aged 3 to 5 understand that definite descriptions are inappropriate when the intended referent is not unique (Syrett et al., 2010). Furthermore, toddlers as young as 19 months exhibit looking responses that presumably indicate an early grasp of the distinction between "the" and "a" – they are aware of the speaker's visual perspective when interpreting singular definites like *the ball* (Choi et al., 2018). These findings imply that

children have the correct meanings for “the” and are sensitive to the listener’s knowledge – they have the ingredients for correctly producing definite expressions.

However, there are potential issues with prior elicited production tasks. While the previous literature suggests that children systematically overuse definites in production, children’s rates of misuse vary widely depending on the experimental setup (van Hout et al., 2010). Additionally, many production studies lack adult control groups for comparison, making it difficult to define the term *overuse* precisely. Without a clear baseline, it is unclear whether children are truly overusing “the”. Moreover, the misuse of definites in elicited production may result from experimental artifacts. In fact, some studies that include adult control groups show that even adults who presumably have target knowledge of definites produce them in certain contexts where definites might be considered inappropriate (Maratsos, 1976; Schafer & de Villiers, 2000; van Hout et al., 2010).

Assuming that children do overuse definite descriptions, there are two possible explanations. On the one hand, their performance in production may be a direct reflection of their linguistic knowledge, indicating that they have not acquired the correct meaning for *the*-phrases. Alternatively, it could be that their production reflects not their grammatical knowledge, but their ability to put that knowledge to appropriate use. This hypothesis would imply either that something about previous tasks biased children away from correct performance, or that other nonlinguistic factors might intervene between linguistic knowledge and its use in production.

So in this paper we set out to test whether young children do systematically overuse *the*-definites in production, as previous literature suggests, and whether their production errors indeed reflect deficient knowledge. We examine children’s use of singular definites across both natural and elicited production contexts, drawing on two corpus studies (Study 1 and Study 2),

one human simulation study with adults (Study 3), and one elicited production study with children (Study 4). We find no conclusive evidence of systematic overuse of “the” by children. When considered alongside studies that reported overuse, our findings point to two key conclusions. First, like adults, preschoolers distinguish, in choosing determiners, whether the intended referent is unique. Second, higher rates of misuse of definites in prior production studies likely stem from unnatural experimental setups and unclear domains of reference.

2. Background

Generally, speakers use “the N” when they presuppose the existence of a relevant domain of Ns, inferrable to the audience, and refer to all its members. Thus *the mugs*, where N is plural, is used to refer to all the mugs in the contextually inferrable domain. When N is singular, as in *the mug*, the domain is taken to have a single member, and the speaker then refers to that unique N.

Strawson (1950) provides a useful perspective. He remarks that “the N” is used either anaphorically, when an N was mentioned in prior discourse, and the speaker wishes to signal reference to that same N, or when the context allows the listener to identify the referent, even without a prior introduction. One common theory is that such contexts are ones that exhibit *uniqueness*: only a single thing satisfies the noun N (Russell, 1905). This view implies that (1), for example, is acceptable only if the context of use provides a domain in which there is exactly one ball.

(1) The ball is missing.

But this theory is debatable. It can be correct only with a specialized notion of ‘context’.

Consider (2).

(2) Mick grabbed a pebble from his collection. Then he put the pebble in a jar.

A collection of pebbles includes more than one pebble. Nevertheless, *the pebble* can be used appropriately in the second sentence of the discourse, to refer to the pebble Mick was said to have grabbed. So ‘the context’ that would satisfy uniqueness is not the situation that contains a collection of pebbles, but rather the state of discourse created by the prior sentence. Sentences like (3) refine the required notion of ‘context’ even further.

(3) At the gold medal match, the Russian voted for the Russian. (Neale, 2004)

Here the ‘context’ must change within a single clause. For the subject it must be the judges, and for the object it must be the judged. This level of subtlety has led to some to say that *uniqueness* is not analytically relevant. What matters is just that the intended satisfiers of N be *familiar* or *identifiable* in the discourse. We refer to all of these, which are many when N is plural, and one when it is singular (Heim, 1982; Roberts, 2003). Moreover, the understood domain for the description may be given only by way of defeasible inferences based on specific practical knowledge. For example, (4) is acceptable only if we assume that John’s murder was plausibly committed with a knife.

(4) John was murdered yesterday. The knife lay nearby. (Roberts, 2003)

What is clear, in view of this debate, is that acquiring the correct understanding of when to use “the” may not be a trivial task. Learners must identify the presuppositions of using “the”,

and this will require careful attention to context. They must infer the conditions for using “the” from rather subtle data, tracking a speaker’s referential intentions through discourse. This requires sensitivity to how the plausible domains for reference may be shaped both by previous utterances (i.e., linguistic contexts), and by pertinent practical knowledge (i.e., pragmatic contexts) – perhaps a challenging task for young children.

Many previous studies of elicited production have concluded that, indeed, it is a challenging task (Maratsos, 1976; Schaeffer & Matthewson, 2005; Schafer & de Villiers, 2000; van Hout et al., 2010). In response, two major theories have been proposed to account for children’s production errors. A common explanation attributes children’s misuse to non-adult-like reasoning. Either children are egocentric, meaning they are less skilled than adults in accurately assessing what their listeners know (Karmiloff-Smith, 1979; Maratsos, 1976), or they are immature in their reasoning, specifically about conversations (Schaeffer & Matthewson, 2005; van Hout et al., 2010). The other theory proposes that children’s errors result from a fundamental misunderstanding of the meaning of “the”. For instance, they might have failed to grasp the uniqueness requirement (Wexler, 2011).

However, recent studies indicate that children behave adult-like in comprehending *the*-definites (Aravind et al., 2023; Syrett et al., 2010), even at 19 months of age (Choi et al., 2018). This notable asymmetry between findings from elicited production and those from comprehension prompts us to reassess hypotheses on children’s knowledge of definite descriptions.

2.1 Hypotheses on children’s knowledge of definite descriptions

The apparent production-comprehension discrepancy can be understood in two ways. Either children's understanding of "the" is immature, and revealed in production studies, or it is adult-like, but masked in production studies.

According to the first "deficient knowledge" hypothesis, children's misuse in production reveals their immature or deficient grammar. Their success is limited to certain comprehension tasks, and their true, flawed understanding can only be exposed in production tasks targeting specific referential scenarios. Furthermore, children's production errors are tied to either underdeveloped cognitive skills (Karmiloff-Smith, 1979; Maratsos, 1976; Schaeffer & Matthewson, 2005) or incorrect linguistic meaning (Wexler, 2011).

According to the second "task performance" hypothesis, children's production errors are due to performance issues with artificial production setups. The unnaturalness of experimental contexts makes it unclear which potential referents are more or less salient, which then boosts "inappropriate" uses of *the*-expressions.

To tease apart these hypotheses, it is crucial to examine children's use of definite and indefinite expressions in both natural speech and elicited production. The "deficient knowledge" hypothesis predicts that children will consistently overuse "the" in both natural and elicited settings, as production will expose their fundamentally immature understanding. The "task performance" hypothesis predicts that production errors should decrease significantly in more natural settings where extraneous demands are removed, either in natural production or in elicited production with natural setups and clear domains of reference.

2.2 Reconsidering prior studies

A careful examination of previous elicited production studies gives us reasons to question whether they truly point to a non-adult-like grasp of definites. Indeed, when we compare

children’s rates of misusing “the” with those of adult control groups across different studies (Table 1), two key findings emerge. First, children do not exhibit consistent rates of misuse. Second, the baseline established by adult control groups is highly variable, and hence may indicate the unreliability of previous measures.

Table 1: The rate of misusing “the” reported in previous elicited production studies

Study	Children	Adult control groups
Maratsos (1974)	Exp: 17% (3yrs)	
Schafer & de Villiers (2000)	Cond 8: 49% (3yrs)	Cond 8: 30%
Matthewson et al. (2001)	72% (108/150)	16% (24/148)
Schaeffer & Matthewson (2005)	25% (19/76)	2% (2/113)
van Hout et al. (2010)	Exp 1: 50%	Exp 1: 17%
	Exp 2: 26%	Exp 2: 24%
de Cat (2013)	17% (age 2;6-3;3)	

Additionally, there is significant variability in misuse rates among both children and adults. To illustrate this, we plot the misuse data in Figure 1, which clearly shows the wide variance in both groups.

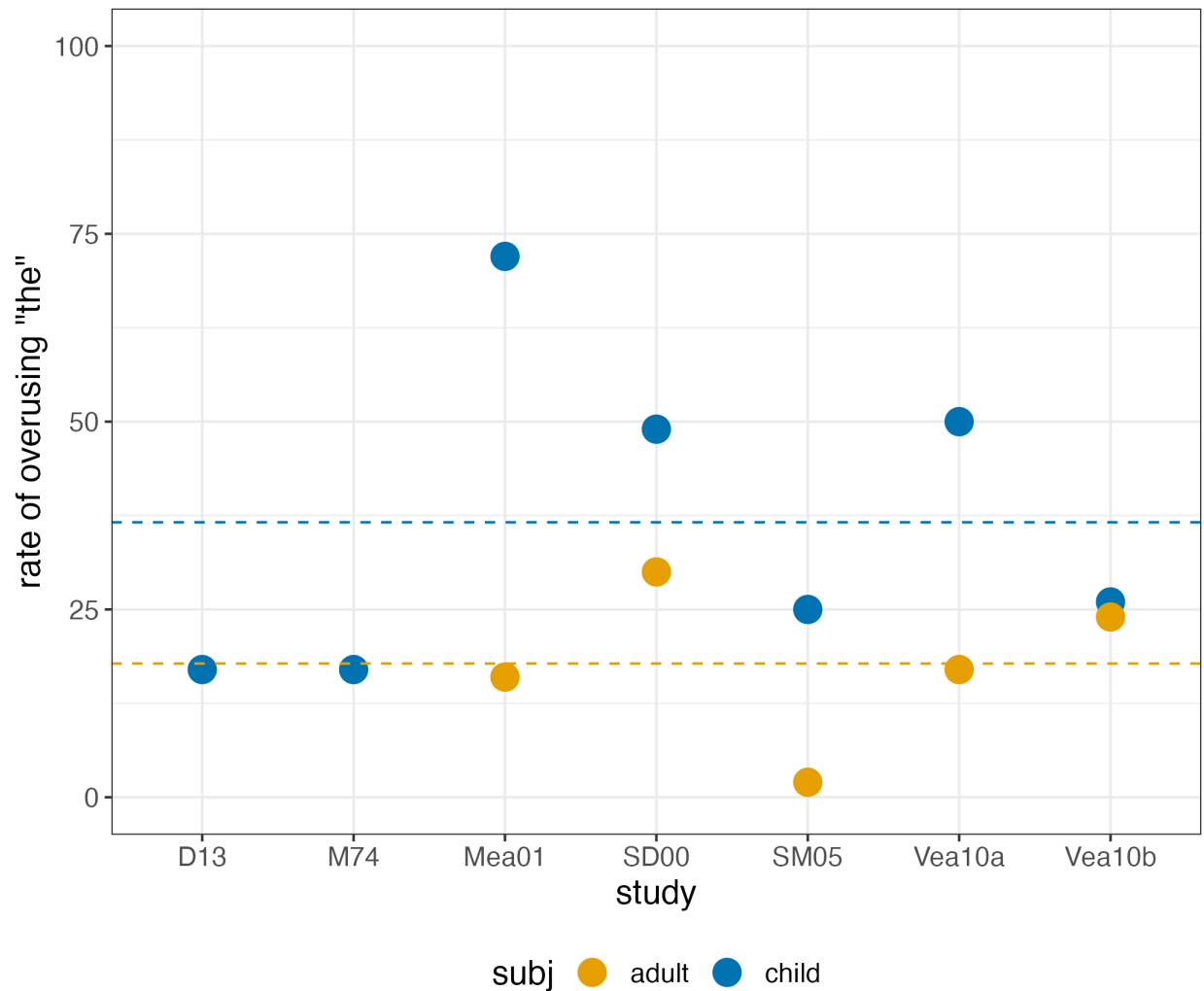


Figure 1: Rates of misusing “the” in previous elicited production studies (blue dotted line for children’s mean and orange for adults’)

The wide variability in performance across both children and adults suggests that different task demands might significantly influence their referential choice. Children’s inflated rates of misuse may be tied to specific task demands, including unnatural setups for perspective-taking and unclear domains of reference.

Focusing exclusively on production studies with preschoolers may obscure the broader picture of how children’s understanding of definite descriptions evolves over time. Recent works using comprehension tasks suggest that children have an adult-like understanding of “the” from

early on. For example, Syrett et al. (2010) found that when presented with two identical red balls, 3- to 5-year-old children consistently rejected or questioned an inappropriate request like *Give me the red one*, which violated the uniqueness requirement of “the”. This indicates that children associate singular “the” with some notion of uniqueness of an object within a restricted domain. Similarly, Choi et al. (2018) demonstrated that by 19 months, children are considering the speaker’s knowledge when interpreting “the”. At a scene that naturally called for visual perspective-taking, 19-month-olds, but not 14-month-olds, looked significantly longer when a listener who heard *Give me the ball* grabbed a ball hidden from the speaker, rather than one that was visible to the speaker. This was not the case when the listener heard *Give me a ball*. In fact, additional evidence indicates that the perspective-taking skills necessary for interpreting definite descriptions emerge early in life, even before children turn age two (Luo & Baillargeon, 2007; Moll et al., 2008; Saylor & Ganea, 2007).

It is important to note, however, that all evidence so far for children’s understanding of “the” is indirect. The processes involved in comprehending *the*-definites may differ from those required for producing appropriate referring expressions, so different measures may point to different conclusions. Children might correctly respond to definites without fully considering the presuppositions associated with “the”. For instance, they might understand that a speaker can use singular “the N” to refer to some specific object – and be puzzled if they don’t understand which – without understanding that the referent should be the unique N in the relevant ‘context’. Therefore, we need more tightly controlled studies from different angles to identify which parts of the prior literature are more indicative of what children know about definite descriptions.

2.3 This paper

In this paper, we present new evidence supporting children’s adult-like grammar for *the*-expressions. They use *the*-definites appropriately in natural speech as well as natural elicited production. This suggests that their adult-like grammar is masked by unnatural setups in prior production tasks.

Across four studies, we demonstrate that children do not systematically overuse “the” in natural speech or in elicited production. Through two corpus studies, we show that in natural speech, children follow their mothers’ patterns of determiner use overall and across different clause types and syntactic environments, and their rate of miscommunications due to inappropriate use of “the” is low and comparable to that in adult-adult interactions. Additionally, through an experiment using the Human Simulation Paradigm, we further show that when naïve adults are given only limited linguistic context, they are equally accurate at guessing determiners (*the* vs. *a*) used by children as those used by their mothers in conversation, suggesting that children’s use of determiners is adult-like. Furthermore, in a new elicited production task designed to minimize extraneous demands in production setups, children consistently produced appropriate determiners based on whether the intended referent was uniquely identifiable within the context.

3. Study 1: Overall distribution of *the*-definites in natural production

We begin with a corpus study to compare the frequency of singular *the*-definites produced by children and their mothers in natural speech. This coarse analysis helps us to assess whether there are obvious signs of children misunderstanding the meaning of “the”. Specifically, we look at the distribution of singular definites of the form “the N” used by children vs. their mothers. Do children produce singular definites more frequently than their mothers? Do children and mothers produce these definites in the same linguistic environments?

3.1 Method

The distributional analysis of singular definites is based on several CHILDES corpora, including Brown (1973), Soderstrom et al. (2008), Suppes (1974), and Valian (1991). These corpora provide a large sample of data, with 27 children from a broad age range (1;0-3;11), consisting of a total of 912,530 words and 254,753 sentences.

In our analysis, we focus specifically on singular definites produced by children and mothers, as these require a choice between a definite or an indefinite determiner. We analyzed instances of singular definites in the form of “the N_{SG}”, while excluding plural definites, since plurals either require “the” for definite referents or no determiner for indefinite referents.

To determine whether children overuse singular definites, we used mothers’ input as a baseline and compared the proportion of “the N” used by the two groups. The proportion of “the N” was calculated by dividing the count of “the N_{SG}” by the combined count of “a/an N_{SG}” and “the N_{SG}”. We excluded other determiner alternatives (e.g., demonstratives like *this* and *that*) from the denominator, given that *the* and *a* are typically contrasted in elicited production studies. This analysis helps us examine whether the overuse of “the” observed in previous elicited production studies is also present in natural speech.

3.2 Results

In general, children use a lower proportion of singular definites than their mothers across all age groups, as shown in Figure 2.

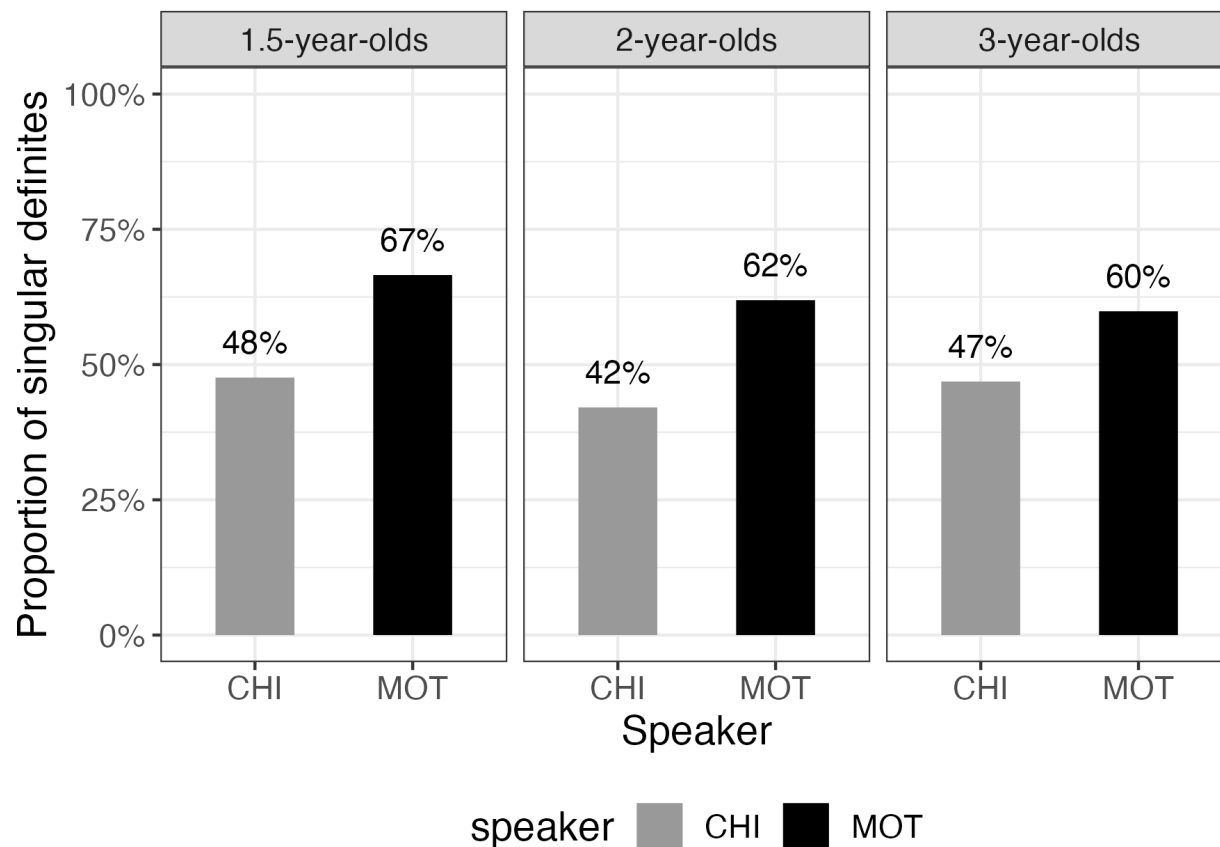


Figure 2. Overall proportion of singular *the*-definites by age

Specifically, children use the definite determiner (as opposed to the indefinite determiner) about half of the time, whereas mothers use it more frequently, in over 60% of their utterances. This higher usage of “the N” by mothers may reflect their more dominant role of the relevant environments in directing the child’s attention to previously mentioned or familiar objects during conversations. The absence of overuse in children is also evident when we examine individual data from our two-year-old corpora, as depicted in Figure 3.

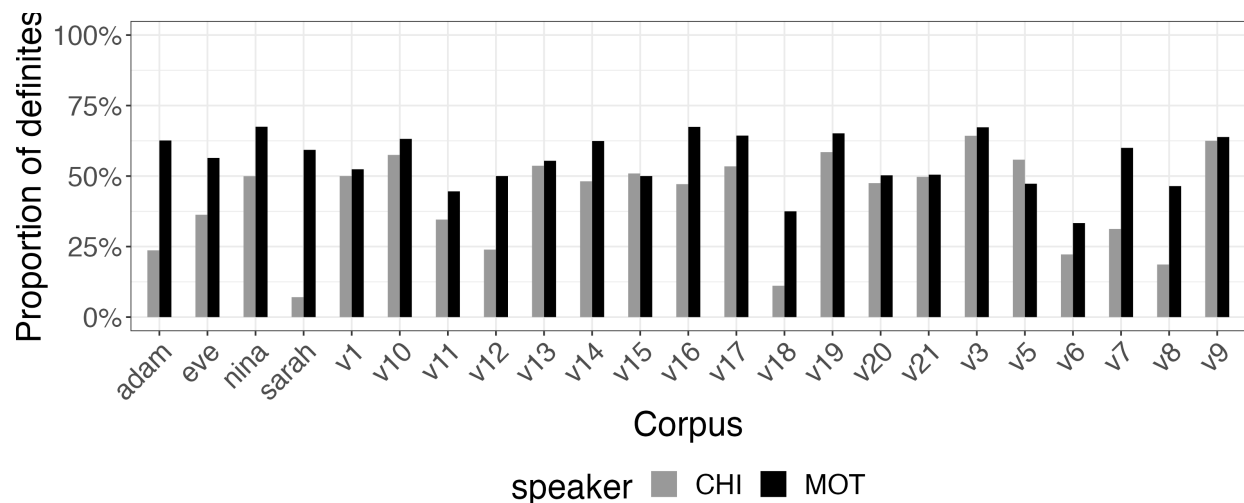
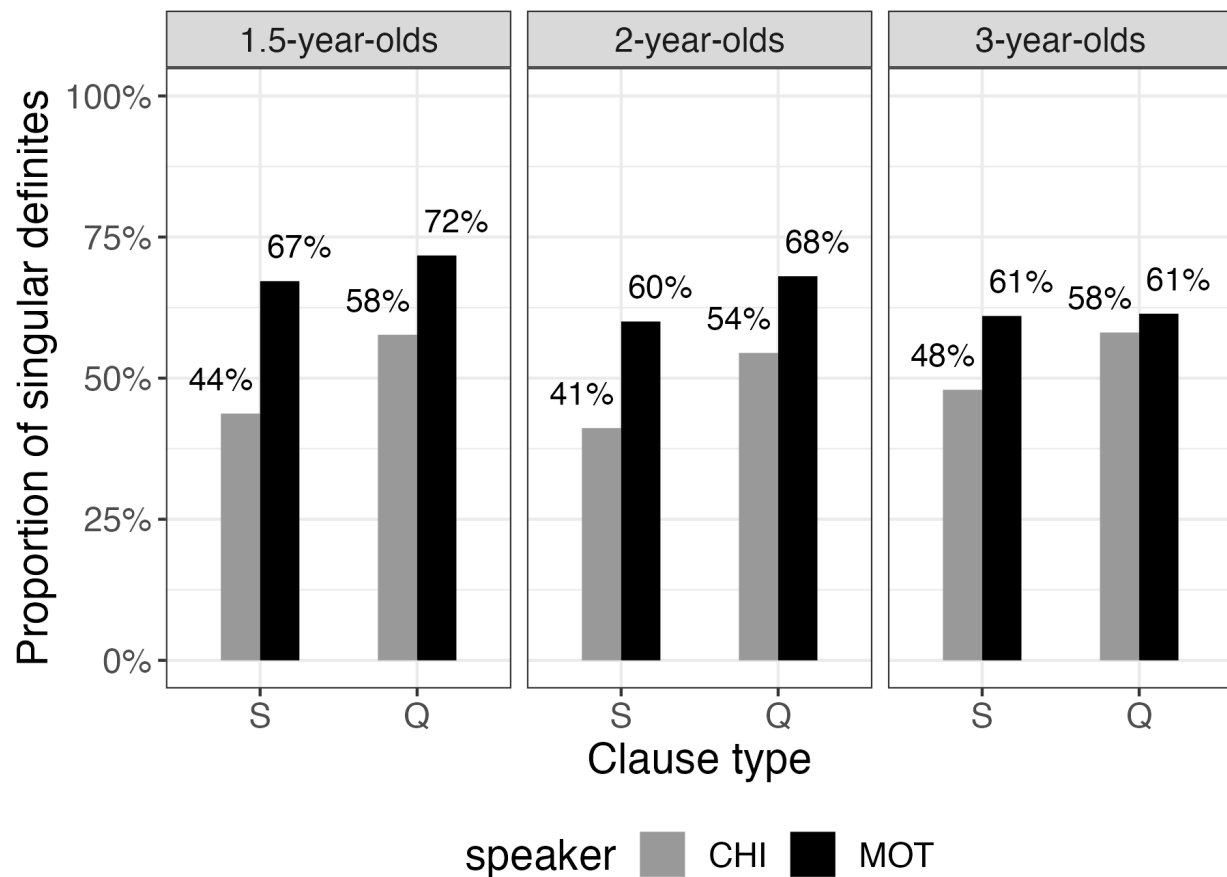


Figure 3. Overall proportion of singular *the*-definites by 2-year-old corpus

In short, this data does not provide evidence for overuse. However, the overall proportion of singular definites may be too coarse as a measure, as these differences may reflect broader differences in how adults and children participate in conversations. If this measure is not sensitive enough, what more specific measures then could we use to probe for potential overuse?

One way we can refine our measure is to examine whether children adjust their definite usage in response to pragmatic differences across clause types (declaratives vs. interrogatives). Declaratives are typically used to assert information, whereas interrogatives are used to seek information, so we might expect caregivers to use more definites in either clause type than children to guide children's attention and elicit responses. If children were truly overusing definites, we would expect them to use more definites across these clause types than their caregivers, even though they are less likely than their caregivers to direct a conversation.

Across clause types, we did not find evidence that children overuse definites compared to their mothers' baseline usage (declaratives/statements vs. interrogatives/questions; see Figure 4).



S = Statement (declaratives), Q = Question (interrogatives)

Figure 4. Proportion of singular the-definites across clause types (S for statements/declaratives vs. Q for questions/interrogatives) by age

In fact, children use fewer definites than their mothers, either in declaratives or in interrogatives. This means that even when asserting information, where a referent is often already known or inferable within the discourse, children do not overuse definites in referring to established entities.

Another way we can refine our measure is to examine whether children adjust their definite usage in response to pragmatic differences across syntactic environments (subjects vs. objects vs. fragments) for declaratives. In English, subjects tend to refer to entities mentioned earlier in the discourse (Prince, 1992), so we expect caregivers to use more definites in subject

positions. If children were truly overusing definites, we would expect their proportion of definite usage to be insensitive to such distinctions. To test this, we conducted further analyses to examine whether this finer-grained measure would reveal children's overuse of definites.

Across syntactic positions (i.e., subjects, objects, and fragments) in declarative clauses, we again find no evidence of overuse when examining children's determiner use (see Figure 5).

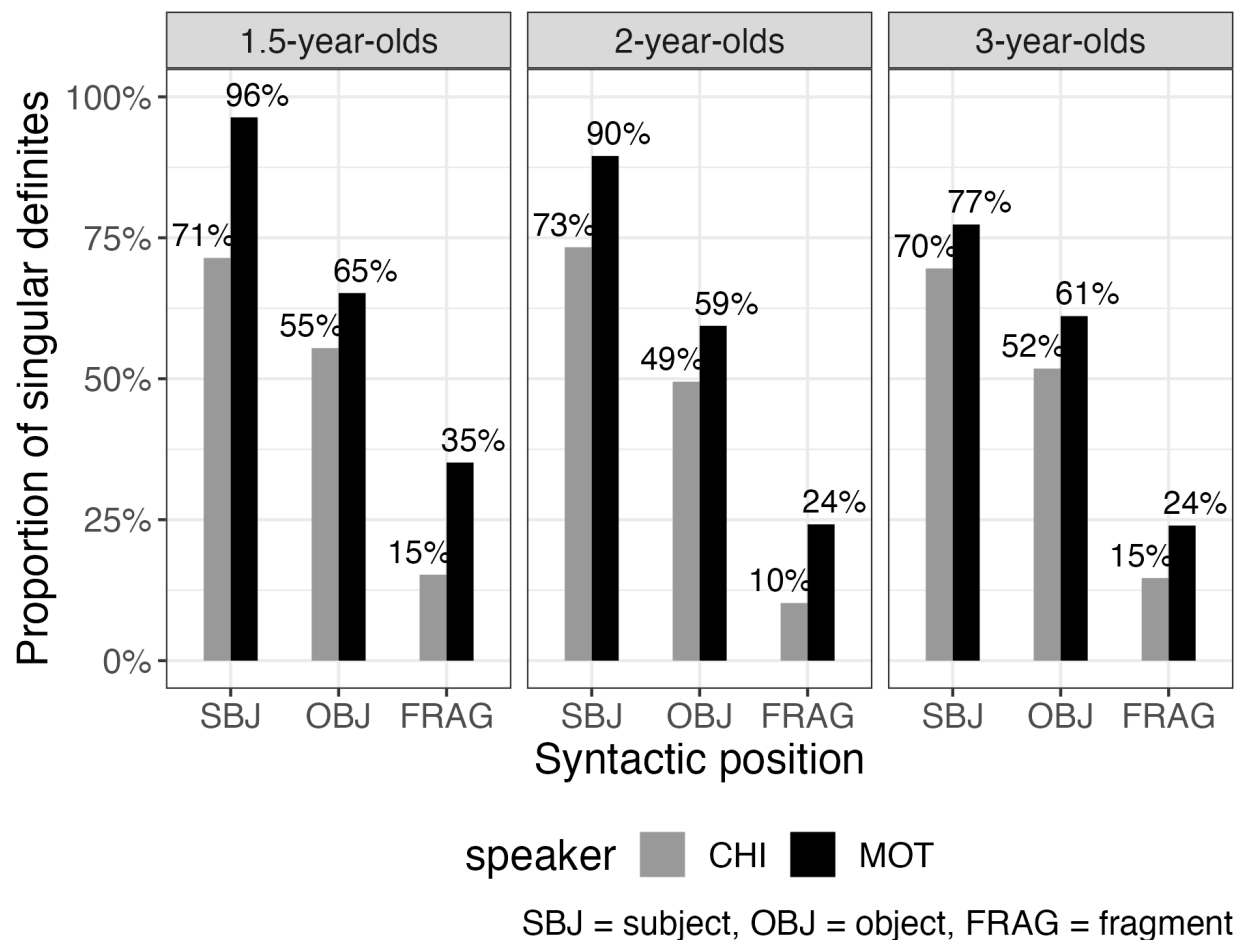


Figure 5. Proportion of singular *the*-definites across syntactic positions

Moreover, children use more singular definites for subjects than for objects, mirroring their mothers' patterns. That is, children's usage patterns align with the general observation that in English, subjects typically refer to entities mentioned earlier in the discourse (Prince, 1992).

One concern is that children’s rate of definites might be underestimated relative to their mothers’ due to young children frequently producing noun phrases (NPs) without determiners (e.g., Hyams, 1996). If children tend to drop determiners more often for definites than for indefinites, excluding these null determiners could significantly impact their overall rate of definites. To explore this, we calculated the instances of null determiners in children’s speech (see Table 2).

Table 2: Revised rate of definites (excluding fragment NPs)

Age (year)	#Def	#Ind	#Null	(Def+Null)%
1	209	166	550	82.1
2	1,364	1,342	2,599	74.7

If we consider all null determiners as potential definites, the revised rates of definites for 1-year-olds and 2-year-olds increase to 82.1% and 74.7%, respectively—higher than their mothers’ rates of 66.5% and 60.2% in the same corpora. However, if we assume that all null determiners are definites, this would overestimate children’s definite usage, as some of these null determiners in object positions are grammatical (5), and others seem to involve indefinite drop (6).

(5) I want coffee. (Valian, 1991: 01;09;25)

(6) I take walk. (Brown, 1973: Eve, 01;09;00)

To obtain a more accurate estimate of potential definites among children’s null determiners, we factored in their distribution of definites across different syntactic environments. We recalculated children’s revised rates of definites by including in the numerator null determiners that could

have been definites ($N_{\text{null as def}}$) probabilistically (8), i.e., based on the rates of definites produced in subject ($\text{rate}_{\text{def-sub}}$) and object ($\text{rate}_{\text{def-obj}}$) positions (7).

$$(7) \quad N_{\text{null as def}} = N_{\text{null-sub}} \times \text{rate}_{\text{def-sub}} + N_{\text{null-obj}} \times \text{rate}_{\text{def-obj}}$$

$$(8) \quad \text{rate}_{\text{revised def}} = (N_{\text{def}} + N_{\text{null as def}}) / (N_{\text{def}} + N_{\text{ind}} + N_{\text{null}})$$

The revised rates of definites for 1- and 2-year-olds then become 58.2% and 52.1%, respectively, both lower than their mothers' rates of 66.5% and 60.2% in the respective corpora. Therefore, when using this finer-grained estimate, children do not appear to overuse definites in their natural production.

In summary, we find no clear evidence of overuse in children's natural speech. Across different clause types and syntactic positions, children's distribution of singular definites aligns closely with that of their mothers. However, these broad measures may overlook more subtle patterns of overuse. To gain a clearer picture, we turn to the discourse contexts in which definites are used, as overuse may only become apparent when considering how children's definites function in communication. In the next section, we focus on miscommunications in specific discourses to probe for potential overuse in children.

4. Study 2: Rate of *the*-driven miscommunications in natural production

In this study, we evaluate the quality of children's use of *the*-definites. If children misunderstand the meaning of "the", we would expect them to use it inappropriately, leading to communication breakdowns. Specifically, if children use "the" in contexts where its presuppositions were not satisfied or could not be accommodated, their listeners would likely be confused about the referent or seek clarification.

To assess whether miscommunications induced by “the” are common in natural speech, we compare the rates of such miscommunications in mother-child interactions with those in adult-adult interactions. We calculate the rate of misuse of “the” by 1- and 2-year-olds and compare it to that of adults. If children’s understanding of “the” is non-adult-like, we would expect to see a higher rate of miscommunications, with children’s misuse of “the” frequently causing listener confusion or prompting requests for clarification.

4.1 Method

The rate of *the*-driven miscommunications was analyzed using CHILDES corpora, including Brown (1973), Soderstrom et al. (2008), Suppes (1974), and Valian (1991), while the rate for adult-adult interactions was calculated using the CALLHOME corpus (Kingsbury et al., 1997).¹

For children, we focused on miscommunications involving singular definites, where the choice of determiner is between “the” and “a/an”. For adults, we expanded the scope to include both singular and plural definites to capture a more comprehensive view of their miscommunication scenarios. In the analysis of mother-child interactions from CHILDES, sentences containing ‘a/an N_{SG}’ or ‘the N_{SG}’ were extracted using CLAN commands and functions.

For the analysis of adult-adult interactions in the CALLHOME corpus, sentences with referring expressions were extracted using a Python script². To identify cases of *the*-driven miscommunications, we searched for question marks, as a sign for clarification, within 1-3 lines following the target line containing the definite expression. We then manually reviewed these

¹ The CALLHOME corpus consists of 120 unscripted, 30-minute telephone conversations between native English speakers, primarily involving family members or close friends. This is particularly relevant because the corpora we selected for analyzing children’s miscommunication rates also involve interactions between mothers and their children, who are familiar with each other. The CALLHOME corpus includes a total of 301,805 words and 28,967 sentences.

² Many thanks to Weihang Wang and Sathvik Nair for helping with the script.

cases to confirm that they were true instances of miscommunication. To do so, we expanded the context and checked if they genuinely involved clarification questions.

4.2 Results

We first analyzed the use of “the N” by 1-year-olds and found only 1 instance of misuse out of 205 cases (0.49%), with no instances of miscommunication. Many of the uses of “the N” by 1-year-olds were repetitions of their mothers’ utterances or followed the mothers’ initial mention of “N”. After excluding these 14 repeated cases from the total, the misuse rate remained low at 0.52% (1 out of 191).

Next, we examined the use of “the” by 2-year-olds and found 0.39% (10 out of 2,575) instances of miscommunication driven by “the”. We identified two types of misuse: unfamiliar reference (8 cases) and non-unique reference (2 cases). (9) shows a case of unfamiliar reference, and (10) a case of non-unique reference.

(9) CHILD: What’s the people doing?

MOTHER: What people?

CHILD: The people there.

MOTHER: There aren’t any people out there.

(Brown, 1973: Eve, 02;02;00)

(10) CHILD: Hey, where’s the truck? I need ...

INVESTIGATOR: Where’s the what?

MOTHER: The truck?

CHILD: Yeah.

MOTHER: There’s two trucks.

(Brown, 1973: Eve, 02;02;00)

Do these cases reflect a semantic or pragmatic deficit with using definites? In order to assess this question, we further examined adult-adult miscommunications to determine whether this rate of miscommunication or the kinds of miscommunications differ between children and adults.

In adult-adult interactions, we found 0.13% (4 out of 3,121) instances where “the” led to miscommunications. All these cases were due to unfamiliar reference. (11) is one example of this type of case.

(11) A: You know, spent panting and spending every second of the day, w- with him only. You know what I’m saying and that probably part of the reason that it would be nice to actually stay with him is that **you could also go and visit the sights** or whatever and g- and...

B: Where? What are you talking about?

A: In Japan.

In summary, Study 2 provides no evidence that children overuse “the” in natural production. The rate of miscommunication driven by “the” in mother-child interactions is low and comparable to that in adult-adult interactions, both being well below 1%. This low rate of miscommunication contradicts the “deficient knowledge” hypothesis, which predicts that children should overuse *the* in natural production. However, the absence of miscommunication observed in Study 2 may be due to mothers accommodating their children’s use of definites. To

evaluate children's use of determiners more objectively, we need to involve adults who were not part of the conversations and thus are less likely to accommodate the presuppositions.

5. Study 3: Guessing determiners

In Study 3, we aim to determine whether children's use of determiners is adult-like by conducting a determiner-guessing experiment, using Dieuleveut et al.'s (2022) adaptation of the Human Simulation Paradigm (Gillette et al., 1999). This method, as demonstrated by Dieuleveut et al. (2022), is sensitive in detecting the adult-like-ness of children's use of different subclasses of words such as possibility vs. necessity modal verbs.

We presented adult participants with excerpts from mother-child conversations and asked them to select either definite "the" or indefinite "a" for a missing determiner used by either a child or a mother. Our first goal is to determine if adults can accurately guess the definites used by mothers. If they can correctly predict mothers' use of definites, it indicates that the context, combined with adults' understanding of determiners, provides sufficient information for accurate identification of the determiners that mothers used. Conversely, if children misuse definites, adults should perform worse at predicting children's determiners. Assuming that children's overuse is characterized by using definites in indefinite contexts, then the contexts in which children use definites would likely elicit indefinite choices by adults.

5.1 Predictions

If children overuse definite determiners, we expect adults to be less accurate in predicting children's use of definites compared to predicting mothers'. On the other hand, if children do not overuse definite determiners, we expect no significant difference in adults' accuracy of guessing for children's versus mothers' use of definites.

5.2 Method and Materials

Participants were recruited via Amazon Mechanical Turk (AMT), and the experiment was conducted using PClbex farm (Zehr & Schwarz, 2018). The task took approximately 15 to 20 minutes. Each participant completed 40 trials, including 10 trials with definites, 10 with indefinites, and 20 fillers. To ensure participants were engaged, one-fifth of the trials (8 trials) were followed by comprehension questions (i.e., simple memory questions).

The materials consisted of snippets from mother-child conversations involving 23 pairs (children aged 2;1;4 to 4;11;2). These snippets were randomly selected from Gleason's corpora in CHILDES (80,347 words; Menn & Gleason, 1986).³ To better capture cases of misusing "the" if any, we ensured that both "the" and "a" were viable options for their subsequent noun so that the participants' choice of either determiner would be based solely on contextual information. To do this, we excluded items biased toward either determiner. Items were removed if they included: 1) repetitions, such as echoing, speaker disfluency, and finishing another speaker's sentence; 2) idiomatic expressions (e.g., *wait a minute*) or collocations; or 3) plural or uncountable nouns.

5.3 Procedure

Before starting the experiment, participants received two practice trials to familiarize themselves with the process. They learned that: 1) they needed to press the spacebar to reveal each line of conversation in progression, 2) they would choose between two options for the blank at the end of each conversation, and 3) they would occasionally answer comprehension questions to ensure they understood the context. Figure 6 shows a sample test trial, where participants chose a determiner from options including target determiners (e.g., *the* vs. *a*), filler determiners (e.g., *this* vs. *that*), or mixed determiners (e.g., *the* vs. *this*).

³ The conversations took place in recorded lab sessions, where children and mothers interacted with new objects. *This type of interaction provides a nice setup to probe participants' use of definites*, as we are interested in exploring how children register new referents in a dynamic common ground.

CHILD: Yeah..
 MOTHER: Yeah?
 MOTHER: I'll go get it.
 MOTHER: Here, let's put the car back where it belongs.
 MOTHER: Okay.
 CHILD: No!
 MOTHER: You don't wanna put the car there?
 MOTHER: Okay.
 CHILD: No.
 CHILD: Wanna play with it and read ___ book, okay?



Figure 6. A sample test trial during Study 3

5.4 Participants

240 participants (127 males and 105 females; mean age: 41.3) were recruited via AMT. Data from 211 participants (109 males, 94 females, and 2 unspecified; mean age: 41.9) were included in the analysis. Participants who scored below 75% on the comprehension questions were excluded from the final dataset.

5.5 Results

We analyzed the rate of correct guesses for mothers' use of definites as a baseline to evaluate children's use of definites. Adults predicted mothers' definites above chance for conversations from all age groups (2-year-olds: $V = 666, p < .001$; 3-year-olds: $V = 780, p < .001$; 4-year-olds: $V = 389, p < .001$).⁴ Their accuracy rates were 0.9 ($N = 36, SD = .096$) for conversations with 2-

⁴ Here, V represents the sum of ranks for one group in a Mann-Whitney U test (also known as the Wilcoxon rank-sum test) often used to compare differences between two independent groups. It is a non-parametric test, without assuming normality.

year-olds, 0.895 ($N = 39$, $SD = .102$) with 3-year-olds, and with 4-year-olds, 0.765 ($N = 31$, $SD = .236$).

Adults also predicted children's definites above chance for conversations from all age groups (2-year-olds: $V = 595$, $p < .001$; 3-year-olds: $V = 595$, $p < .001$; 4-year-olds: $V = 595$, $p < .001$). Their accuracy rates were 0.844 ($N = 36$, $SD = .144$) for 2-year-olds, 0.857 ($N = 35$, $SD = .127$) for 3-year-olds, and 0.894 ($N = 34$, $SD = .110$) for 4-year-olds. Crucially, in no age group were adults significantly better at predicting mothers' definites than children's (2-year-olds: $W = 516$, $p = .124$; 3-year-olds: $W = 571.5$, $p = .212$; 4-year-olds: $W = 726.5$, $p = .007^{**}$) (Figure 7).⁵

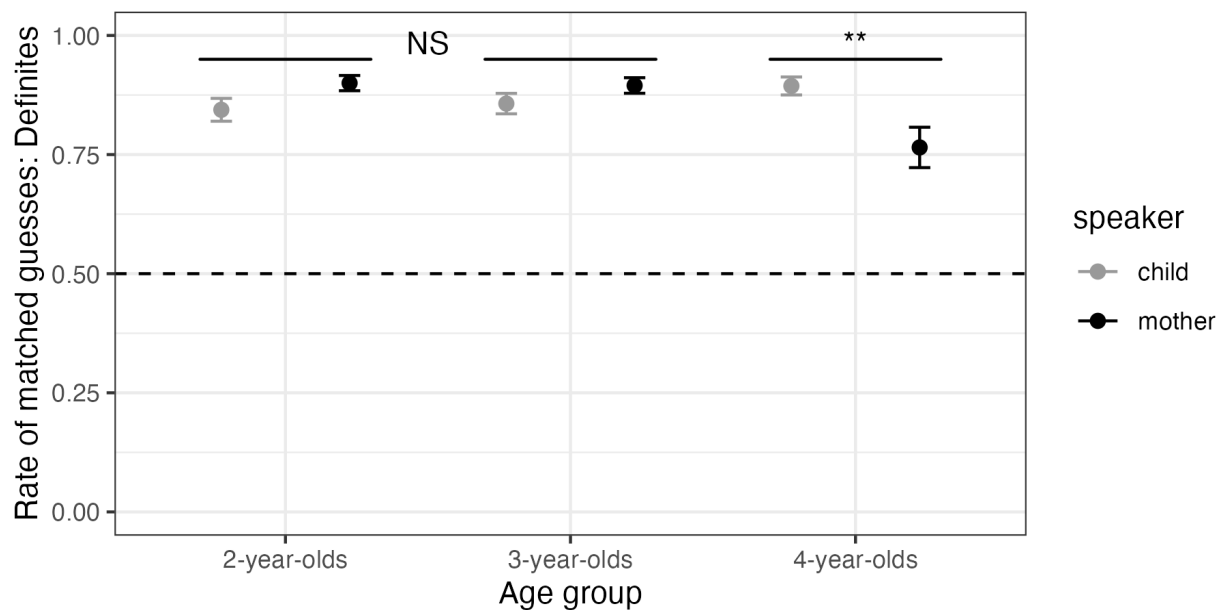


Figure 7. Rate of correct guesses for definites by speakers by child age

⁵ The Wilcoxon test was used to test whether adults were above chance at guessing definites for each condition, and the Mann-Whitney U test was for testing whether adults performed better with either child or mother utterances. These non-parametric tests were used, as the data did not follow a normal distribution.

One might suspect that adults' accurate predictions could be due to a general bias toward choosing definites, which would suggest poorer performance with indefinites. However, this is not supported by our data (Figure 8).

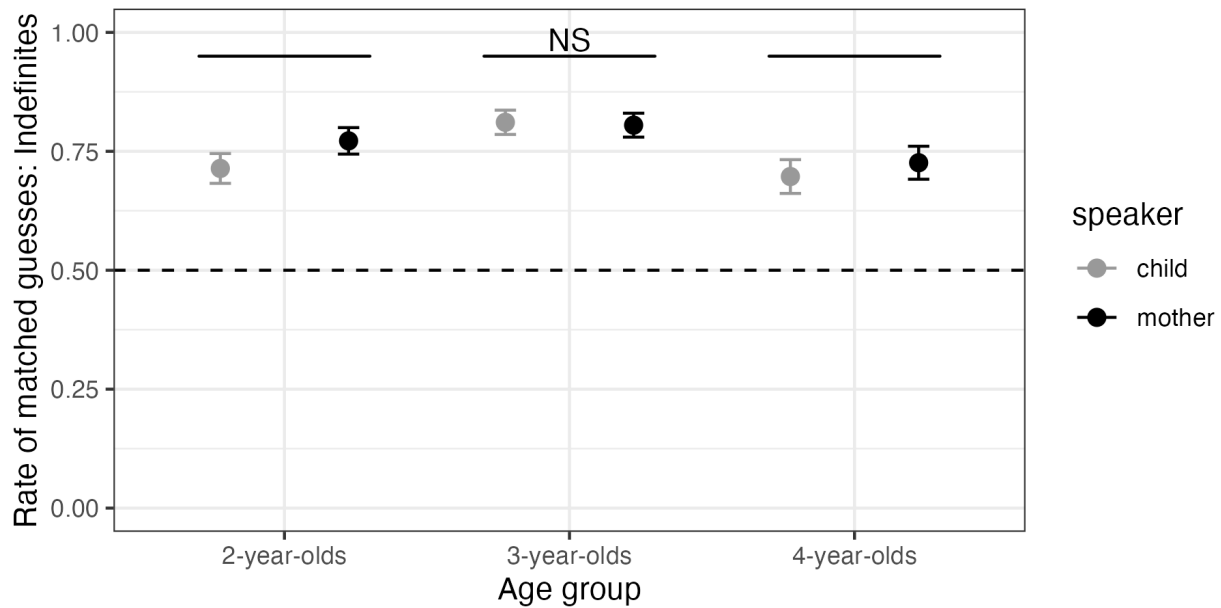


Figure 8. Rate of correct guesses for indefinites by speakers by child age

Adults were also above chance in predicting indefinites used by both children (2-year-olds: $V = 593.5$, $p < .001$; 3-year-olds: $V = 527$, $p < .001$; 4-year-olds: $V = 511.5$, $p < .001$) and mothers (2-year-olds: $V = 587$, $p < .001$; 3-year-olds: $V = 768$, $p < .001$; 4-year-olds: $V = 385$, $p < .001$).

Furthermore, adults were not significantly better at predicting mothers' indefinites compared to children's (2-year-olds: $W = 526$, $p = .163$; 3-year-olds: $W = 703.5$, $p = .819$; 4-year-olds: $W = 498$, $p = .704$).

Additionally, participants generally showed agreement in their determiner choices for most test items, whether the determiners were used by children or mothers (Figure 9).

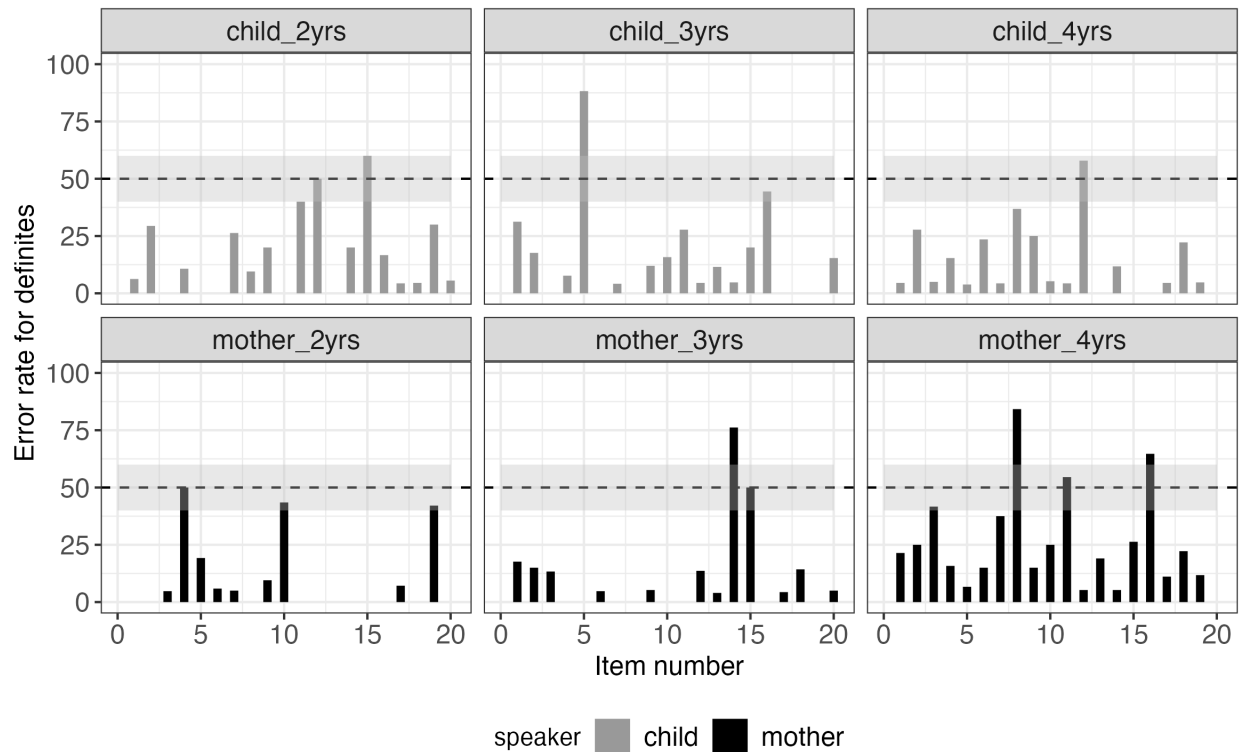


Figure 9. Adults' error rates for definites by item, speaker, and child age

We used gray to mark regions with an accuracy range between 40% and 60% to highlight items with significant disagreement (i.e., a near 50-50 split among participants). The figure shows very few items with such wide disagreement. Our examination of items with the highest mismatch rates revealed only one potential case of misusing “the” by children.

In summary, our results suggest that children use singular definites in a manner consistent with adult usage in natural production, as evidenced by adults' high accuracy in identifying definites used by both children and their mothers.

6. Study 4: Use of *the*-definites in conversational elicited production

In the first three studies, we observed that in natural production, children often use referring expressions in ways similar to adults. While natural production provides valuable insights into children's language use, it has certain limitations. During mother-child interactions, the common

ground tends to be less dynamic and more predictable than during an experimental setting, which might make it easier for children to assess what their listener knows. In other words, children's adult-like usages might be limited to mostly easy cases in natural production, so natural production scenarios might be insufficient to expose an underlyingly deficient grammar.

However, unnatural setups may be responsible for the overuse of *the*-definites in prior production studies. As discussed in the background section, we suspect that two factors might be at issue in boosting children's use of inappropriate *the*-definites in prior studies: 1) unnatural setups for perspective-taking, and 2) unclear domains of reference.

We conduct Study 4 to investigate the “task-related performance” hypothesis and test its prediction – children's misuse of *the*-definites will decrease significantly in a production task where the abovementioned task demands are controlled for. For this purpose, we adopt a conversational elicited production paradigm, aiming to create a more natural setup and a clear domain of reference.

6.1 Method

Participants in this task need to consider the perspective of the listener and assess whether the intended referent is uniquely identifiable within the domain of mutually known referents. The task setup involves Kermit the frog, who cannot see objects on the other side of a wall, while the participants can, so Kermit needs some help from participants to tell him what's behind some walls (Figure 10).

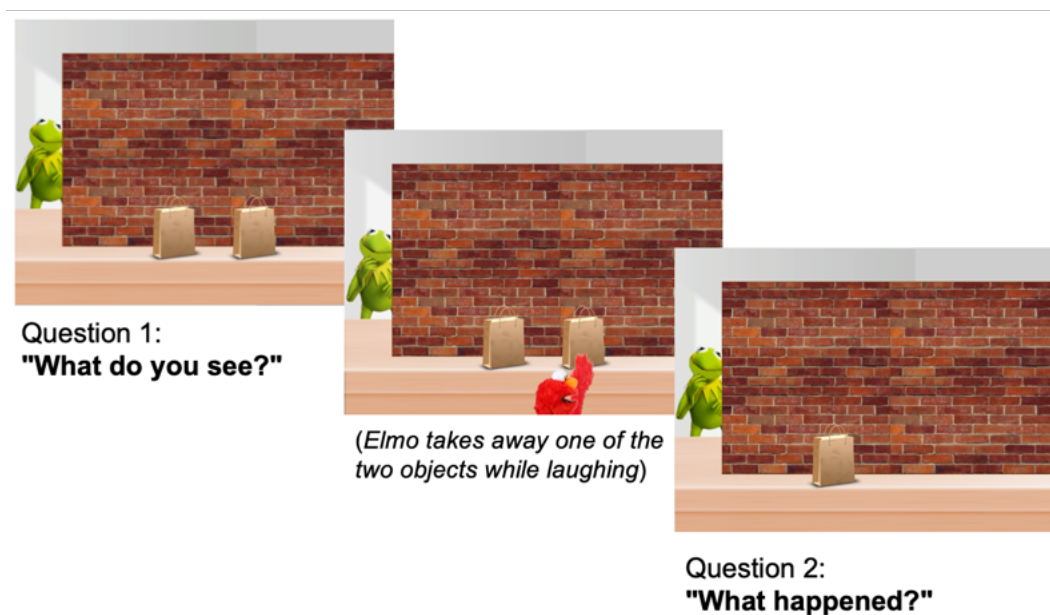


Figure 10. Experimental setup

To ensure that participants understand the procedure and are comfortable with the setup, we begin with three practice trials before the main task, each involving just one object behind the wall. In the first two trials, Kermit only asks Question 1, *What do you see?* After the participant responds, Kermit says, *Okay, thanks*. The third trial differs from the previous two in that after the participant answers Question 1, Elmo appears, takes away the object, and laughs. Kermit then asks, *Wait. Did you hear something? It sounded like someone's behind the wall. Who was it?* This question ensures participants understand the situation. Finally, Kermit asks Question 2, *What happened?* so that the participant knows what question to expect during the test trials.

The test trials include two trial types, where participants see two objects, either unique (e.g., a bottle and a mug) or non-unique (e.g., two identical bags). Kermit first asks, *What do you see?* (Question 1). We expect this to elicit indefinite responses (e.g., *a bottle and a mug* or *two bags*) regardless of the trial type (i.e., unique vs. non-unique trial), since the referents are unfamiliar to the listener (Kermit) and not within the shared visual common ground between Kermit and the participant. Next, Elmo appears on the other side of the wall and takes away one

of the objects, while laughing. Kermit then asks, *What happened?* (Question 2). Here, we expect participants to respond with definites for unique referents (e.g., *Elmo took the mug* if there's only one mug) but indefinites for non-unique referents (e.g., *Elmo took a bag/one of the bags* if there are two bags).

Our design reduces task demands in the following aspects. First of all, our task involves turn-taking in elicitation, which mimicks natural conversations and helps maintain the natural flow of speech. Additionally, as Kermit cannot see what's behind the wall and there are no referents in the visual common ground, it's clear to participants that the task requires visual perspective-taking, which has been proven to work even with infants (Brezack et al., 2021; Choi et al., 2018; Luo & Baillargeon, 2007). Moreover, we create a clear domain of reference (the area behind the wall) and provide visual support for the referents, so the memory load is minimized. Furthermore, we control for the saliency of the intended referent. When Question 2 (*What happened?*) is asked, Elmo has already taken the intended referent away, so it's not visually salient, and discourse-wise, *What happened* also serves as a neutral prompt from an ignorant listener (Kermit), targeting the broader context (i.e., what occurred behind the wall) rather than the specific identity of the stolen object.

We employ a 2 (Trial type: unique vs. non-unique) \times 2 (Question: 1 vs. 2) \times 2 (Age: adult vs. children) within-subjects design. If children's knowledge of "the" is adult-like, we expect their use of definites to vary based on Trial type and Question, without any interaction effect with Age. Responses coded as definites include pronoun *it*, "the N" (e.g., *the box*), "the Adj N" (e.g., *the left box*), "the N PP" (e.g., *the box on the left*), and responses coded as indefinites include "a/an N" (e.g., *a box*), "one N" (e.g., *one box*), "one of the Ns" (e.g., *one of the boxes*).

6.2 Participants

The participants involved 34 children (15 males) between the ages of 3;4;15 and 5;0;23 (mean: 4;4;17). They were recruited from preschools in the greater Washington, DC, area and were included in the final sample only if they heard English during at least 80% of their waking hours. We analyzed data from trials where children responded to both questions (*What do you see?* and *What happened?*). We recruited another 23 undergraduate students at University of Maryland, College Park as adult controls.

6.3 Results

Our results indicate that children (N = 34), just like adults (N = 23), respect the presuppositions of “the”. For Question 1 (*What do you see?*), both adults and children always used indefinites in their responses, when the intended referents were unfamiliar to the listener (Figure 11).

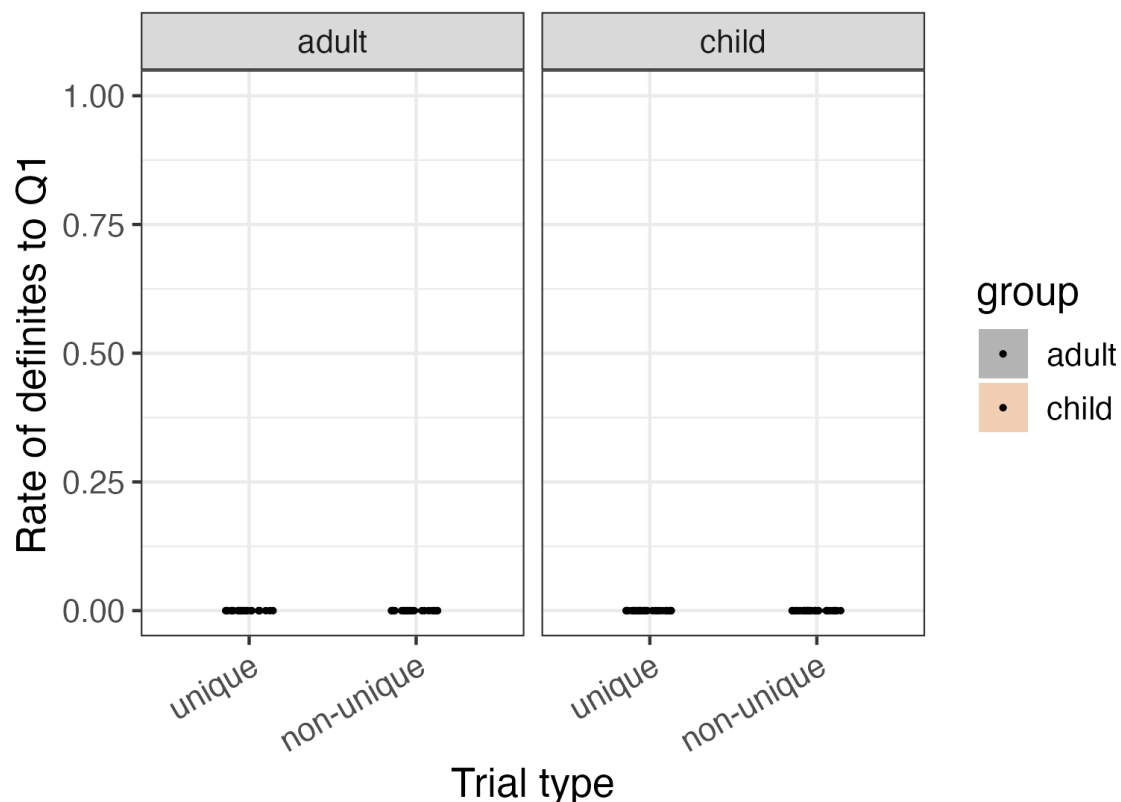


Figure 11. Rate of definites for Question 1 (adults vs. children)

For Question 2 (*What happened?*), they mostly used definites (89.2%, $SD = .262$; adult control: 99.3%, $SD = .035$) to refer to a unique referent and much less so (28.3%, $SD = .368$; adult control: 27.5%, $SD = .416$) for a non-unique one (Figure 12).

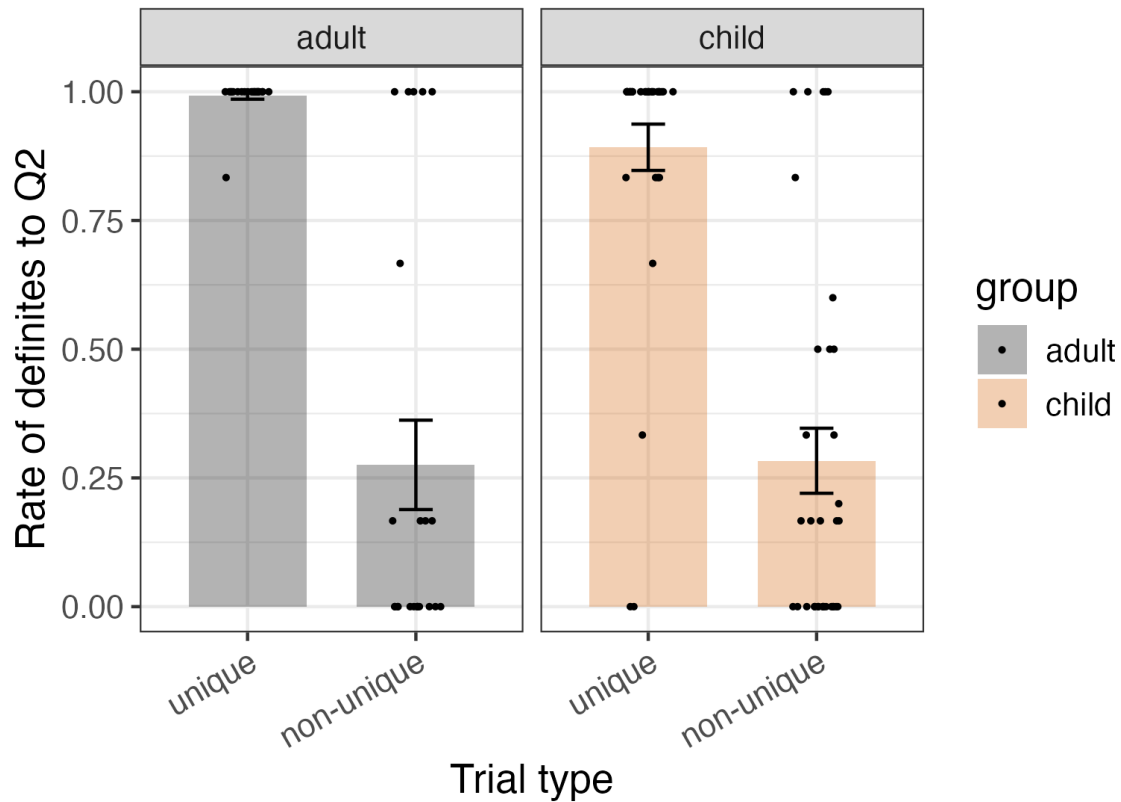


Figure 12. Rate of definites for Question 2 (adults vs. children)

A $2 \times 2 \times 2$ mixed ANOVA confirms that children as a group behave as adults in their rate of definite responses. We find significant main effects of Trial Type ($F(1, 55) = 59.8, p < .001$) and Question ($F(1, 55) = 154.365, p < .001$) but not Age. The interaction is significant between Trial Type and Question ($F(1, 55) = 59.8, p < .001$) but not with Age. To check whether there is an age difference among children, we test whether children's rates of definite responses correlate with their age in days. Our results suggest no such correlation for either unique referents (Figure 13), $r = 0.19, p = .27$, or non-unique referents, $r = -0.24, p = .168$ (Figure 14).

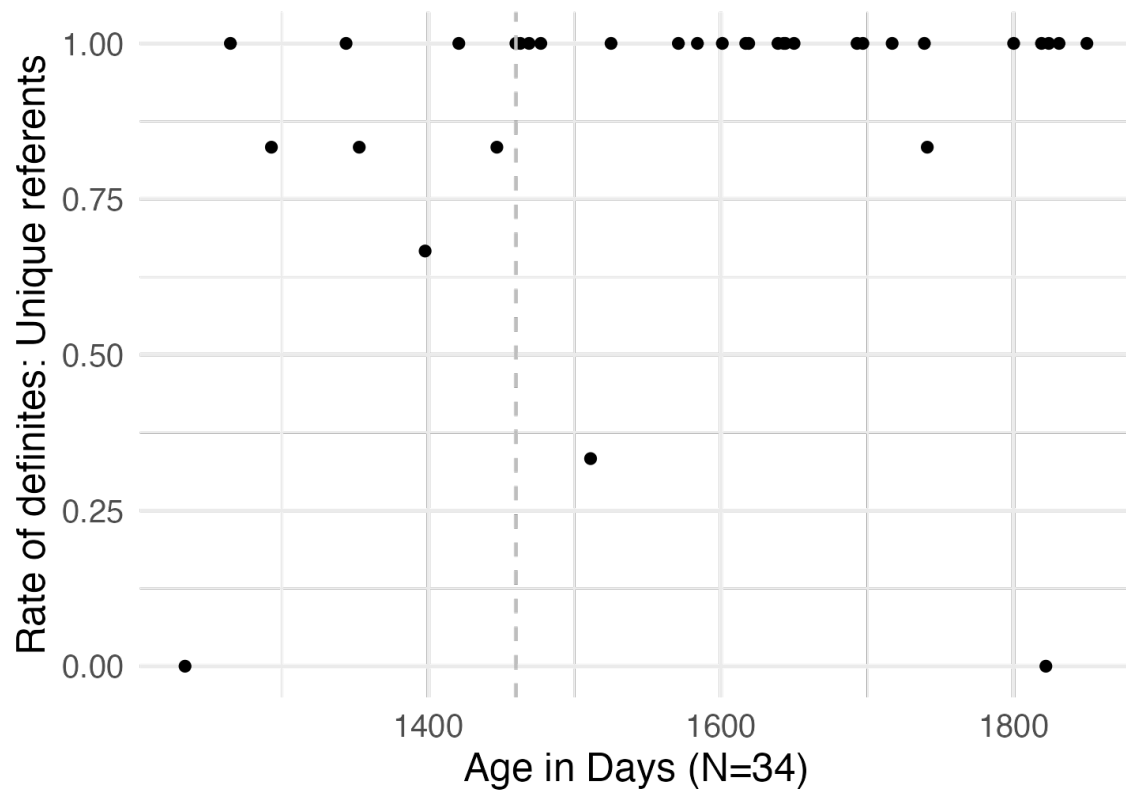


Figure 13. Rate of definites for unique referents by age in days (dashed line separates the data points for 3-year-olds and 4-year-olds to indicate group distinction)

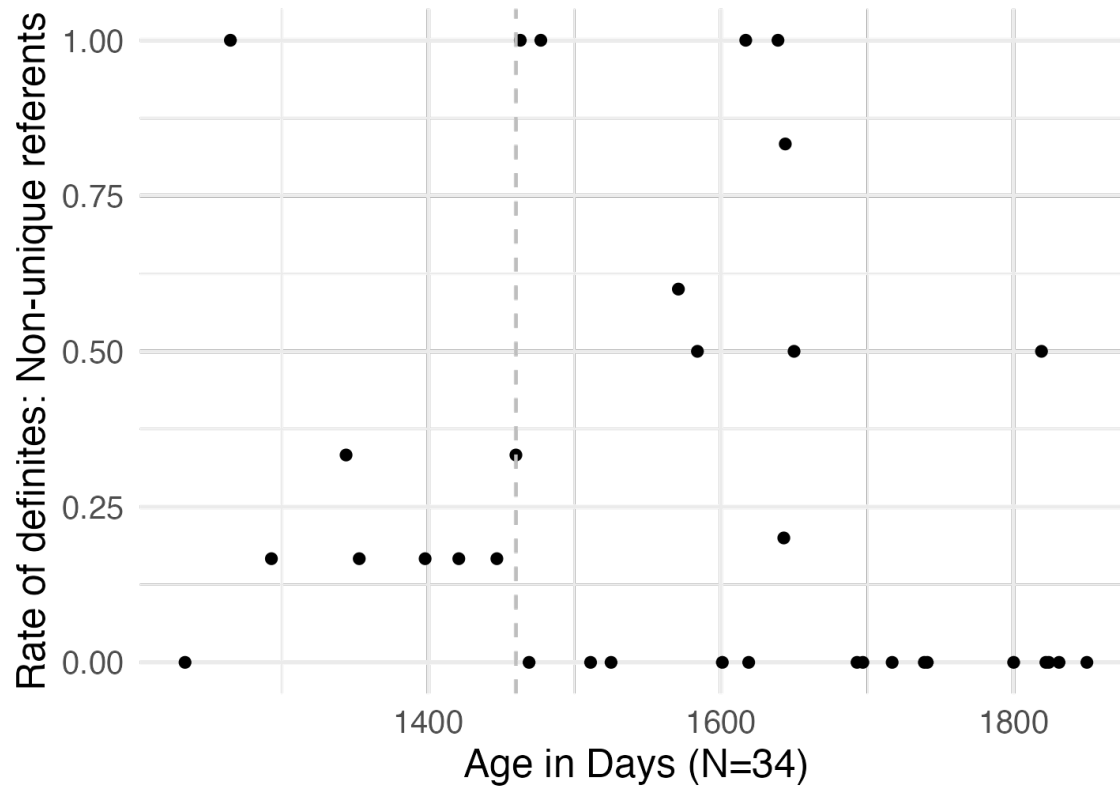


Figure 14. Rate of definites for non-unique referents by age in days (dashed line separates the data points for 3-year-olds and 4-year-olds to indicate group distinction)

Children's specific responses to Question 1 and 2 confirm that their choice of referring expressions depends on both the type of the question and the uniqueness of the referent. For Question 1 (*What do you see?*) asking children to introduce two unfamiliar referents, they predominantly used singular forms for unique referents but plural forms for non-unique ones (Figure 15).

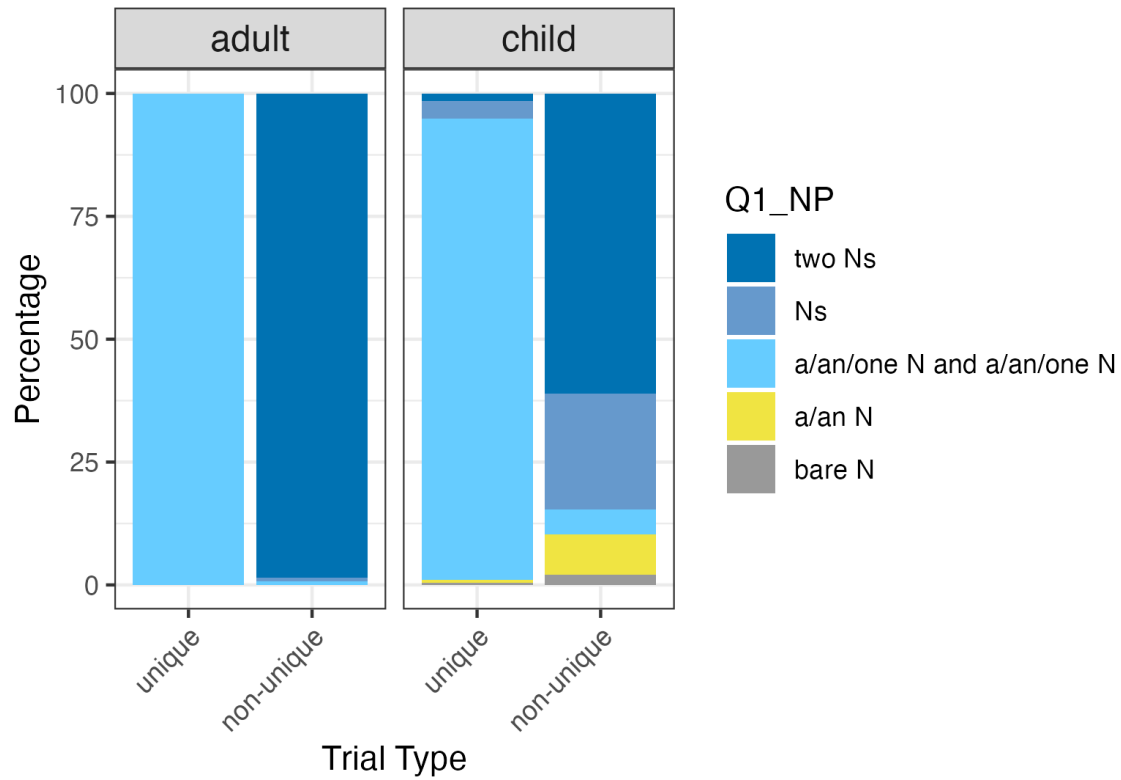


Figure 15. Percentage of NP forms to Question 1 by Group and Trial Type

For Question 2 (*What happened?*) asking children to refer to one of the two referents, children used *the*-definites 82.2% of the time (162 out of 197 utterances) for unique referents. However, this usage dropped to 13.8% (27 out of 195 utterances) for non-unique ones (Figure 16).

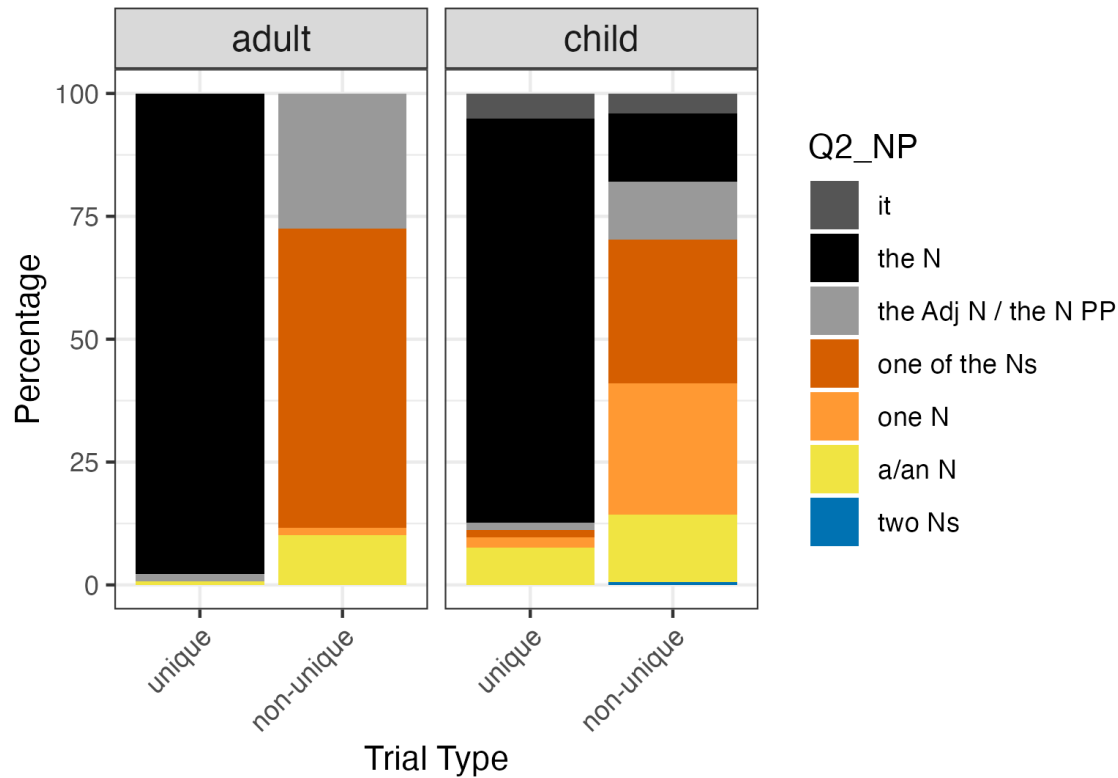


Figure 16. Percentage of NP forms to Question 2 by Group and Trial Type

When we look closer at individual data, systematic misuse of “the N” was limited only to 3 children (out of 34) in the sample (Figure 17).⁶ This suggests that most children know that using “the N” is inappropriate to pick out non-unique items.

⁶ Unlike other children who produced much fewer errors, these three children showing systematic overuse of *the*-expressions seemed to represent narrower, non-holistic domains of reference. That is, they have restricted the domain to a singular object, as their responses to Question 1 (*What do you see?*) at a scene with two non-unique objects (e.g., *two boxes*) were oftentimes a singular NP (e.g., *a box*) or conjoined NPs (e.g., *a box and a box*). This is consistent with the idea that failure in identifying the target domain maybe responsible for children’s overuse of *the*-expressions in prior studies.

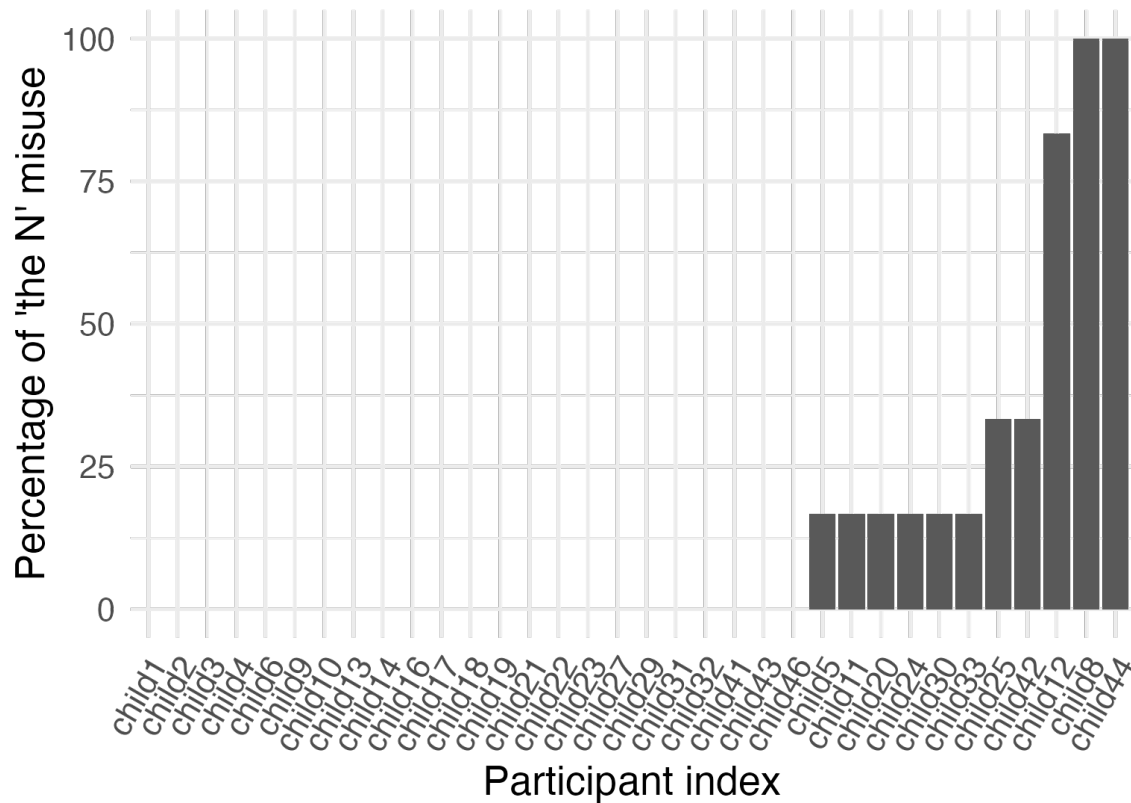


Figure 17. Percentage of misuse of “the N” by individuals for non-unique referents

In sum, our results suggest that like adults, children respect the presuppositions of *the*-expressions and use *the*-definites appropriately in an elicited production task with better controlled setup and domain of reference than in previous studies. They consistently used indefinites to introduce two unfamiliar referents to a conversation, and when referring to one of the two referents, they used *the*-definites only when the intended referent was uniquely identifiable within the domain of reference.

7. Discussion

Our findings across four studies offer converging evidence that children consistently use *the*-definites in an adult-like manner. Despite our best efforts, we found no systematic misuse of singular definites in children’s production in either natural or elicited settings, contrary to previous claims about overuse (Maratsos, 1976; Schaeffer & Matthewson, 2005; Schafer & de

Villiers, 2000; van Hout et al., 2010; Warden, 1976; Wexler, 2011). In natural speech, children generally do not use singular definites more frequently than their mothers; instead, their use of definites and indefinites aligns closely with their mothers' across various clause types and syntactic environments. Notably, the rate of miscommunication driven by *the*-definites in child-mother interactions is extremely low, comparable to that observed in adult-adult conversations. Additionally, naïve adults are equally accurate in guessing *the* or *a* used by children and their mothers, given snippets of mother-child conversations. Finally, in an elicited production task with a better controlled setup and domain of reference, even 3- and 4-year-olds behave adult-like in producing referring expressions, using *the*-definites only when the intended referent was uniquely identifiable within the domain of reference.

Our findings caution against over-interpreting production errors observed in children as evidence of flawed knowledge. When comparing the rates of misusing *the*-expressions in our study to those in the literature, we found that our rates of misuse were the lowest both for unfamiliar referents (Figure 18) and for non-unique referents (Figure 19).

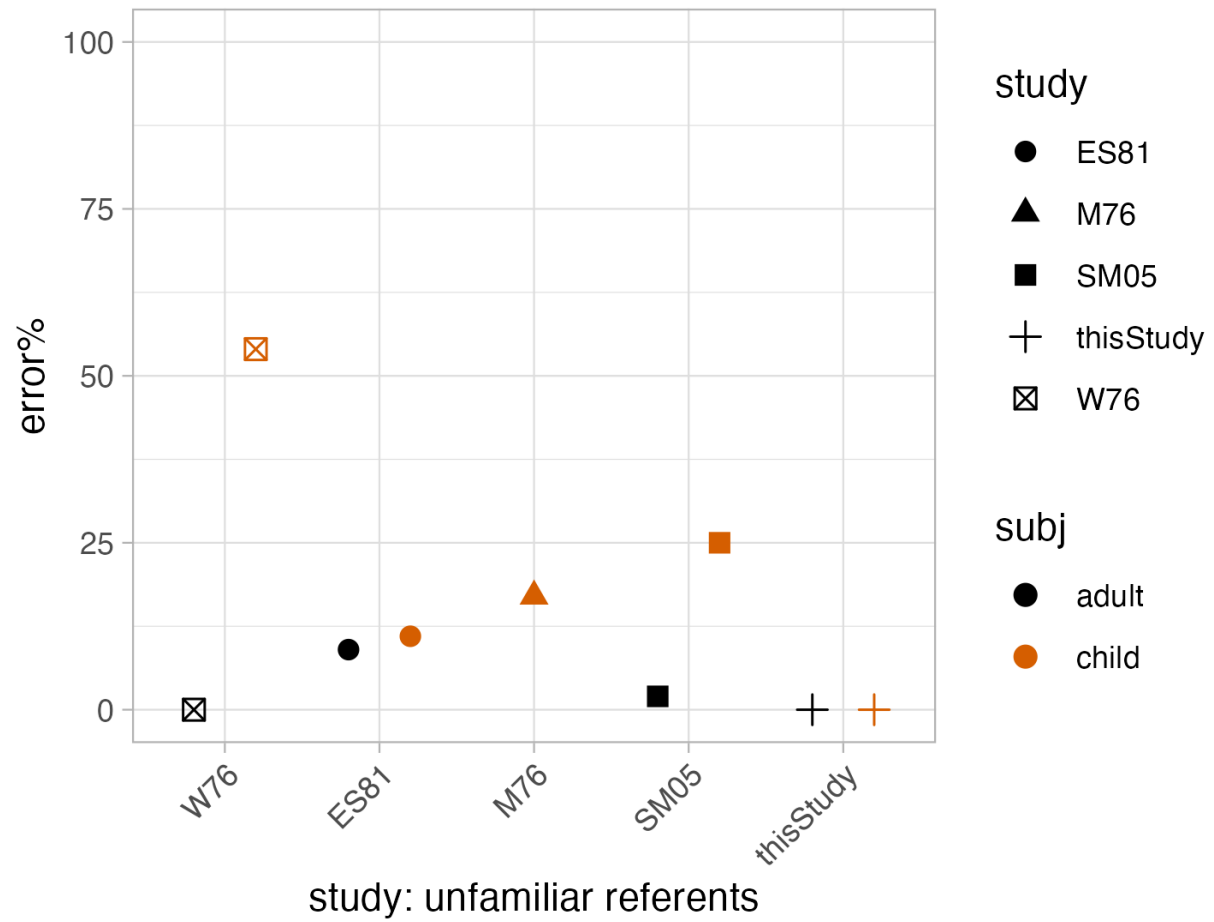


Figure 18. Percentages of “the N” errors across studies for unfamiliar referents

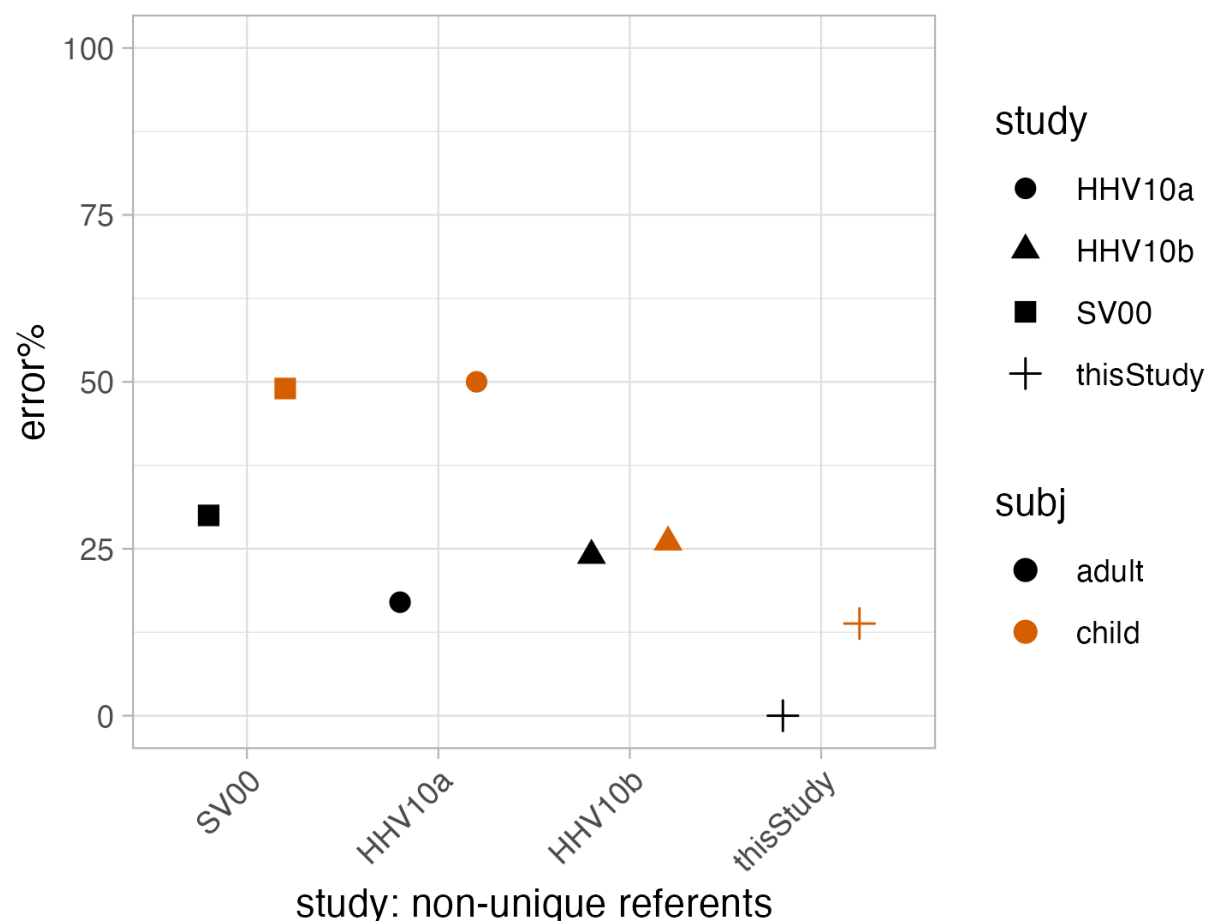


Figure 19. Percentages of “the N” errors across studies for non-unique referents

Previous research has often attributed children’s misuse of singular definites across studies to systematic immaturity, suggesting that children are egocentric (Karmiloff-Smith, 1979; Maratsos, 1976), linguistically immature (Matthewson et al., 2001; Schafer & de Villiers, 2000; van Hout et al., 2010; Wexler, 2011), or pragmatically incompetent to differentiate between interlocutors’ knowledge states or to integrate shared knowledge into their use of referring expressions (Schaeffer & Matthewson, 2005). However, what has been largely overlooked is the influence of task demands, which might have caused children to behave differently than they would in more natural setups and even led to variable performance in adult control groups. Precise methodologies are crucial in uncovering young learners’ linguistic competence.

Two key factors are likely to have contributed to children's overuse of singular *the*-expressions reported in the literature: 1) unnatural setups for perspective-taking, and 2) unclear domains of reference.

Regarding unnatural setups, many prior tasks did not provide children with clear motivations for perspective-taking. For instance, storytelling tasks (Emslie & Stevenson, 1981; Warden, 1976) are not suited for perspective-taking. The goal of the task is for children to narrate the story for a listener. However, the task is not conversational in nature and does not enforce perspective-taking. As a result, children may narrate the story without considering the listener – not because they lack the cognitive ability to take another's perspective, but because the task itself does not provide the motivation to do so. Similarly, story completion (Maratsos, 1976) is not a natural task for perspective-taking. The experimenter often leaves the last bit of a story for a child to complete, creating an abrupt and unnatural shift from the role of a storyteller to that of a listener for the experimenter. To motivate perspective-taking, our task creates a natural setup, where visual perspective-taking is a clear component of the task, and where speaker-hearer roles are clearly defined and consistent. With the setup controlled for, we show that even 3-year-olds take the perspective of the listener in choosing determiners.

Unclear domains of reference may also have led to higher rates of misuse. In some tasks, the intended referent is highlighted visually (e.g., through touching in Karmiloff-Smith, 1979) or through discourse (e.g., Schafer & de Villiers, 2000), which can lead children to narrow the domain of reference to a singular referent, boosting their use of definites. Additionally, unclear domains of reference may also arise in tasks that require children to track or memorize quantities in a story without visual support (Schafer & de Villiers, 2000), or ones that present a picture with multiple items, making it difficult for children to restrict the target domain for reference (van

Hout et al., 2010). To reduce these potential demands on identifying the domain of reference, our task presents a clear and consistent domain of reference, namely the area in front of a wall. Moreover, participants have visual access to the dynamics of just two objects (e.g., two boxes) within that domain, which greatly minimizes their memory load in representing the domain. When we address these concerns about the domain of reference, our results suggest that like adults, 3- to 4-year-olds consider the unique identifiability of the intended referent in producing definite descriptions.

When considered more broadly, our findings suggest that while children have the necessary pragmatic competence, they may be prone to production errors when a task lacks key elements of genuine communication. In less interactive contexts – where there is no clear addressee or motivation to be a cooperative speaker – children might be less inclined to tailor their referring expressions to the listener’s needs, as the fine-tuning of referential forms requires additional effort. However, as Study 4 has shown, their performance improves in communicative contexts. Similar improvements have also been observed in other areas of language use. In comprehension, 2-year-olds demonstrate adult-like understanding of pronouns when engaged in a conversational context (Moyer et al., 2015). In production, children could adjust the informativeness of their event descriptions based on what their listener could see, but only when both the child and the listener were actively engaged in a collaborative game (Grigoroglou & Papafragou, 2019). This communicative boost also extends beyond language to cognitive abilities such as Theory of Mind (Buttelmann et al., 2009). Together, these findings highlight the critical role of task design in assessing children’s pragmatic competence, emphasizing the need for interactive and socially meaningful contexts to reveal their full knowledge.

Our research also provides new insights into how abstract meanings develop in children, particularly in relation to their cognitive abilities. Children’s knowledge of “the” grows fast. By 11 months, they have perceived the forms of determiners (Shi et al., 2006); a few months later, they use them to categorize novel nouns (Mintz, 2006); by 19 months, they have learned to use speaker knowledge to restrict the domain of reference (Choi et al., 2018). Our work adds another piece to the puzzle, showing that by age two, children demonstrate adult-like usage of “the” and “a” in natural production, and by age three, they show adult-like use of referring expressions in elicited production. They are capable of considering the knowledge state of their listeners and adapting their referential choices accordingly across various contexts. Unlike previous studies that report frequent misuse of singular *the*-definites by children, we observed a very low incidence of such misuse in our production study. Even when examining individual data, these errors were confined to very few participants. This suggests that the pragmatic competence required to navigate presuppositions triggered by *the*-definites, often subtle and backgrounded, is present from an early age for most children. This also aligns with other research indicating children’s early ability to engage in perspective-taking, both in non-linguistic (Luo & Baillargeon, 2007) and linguistic contexts (Saylor & Ganea, 2007).

Taken together, our work provides consistent evidence that children produce singular *the*-definites in an adult-like manner, both in natural and elicited speech. To do so successfully, they must assess the knowledge states of their listeners and select an appropriate referential form for listeners to identify the intended referent within a specific context. By creating a natural setup and a clear domain of reference, we find that even 3- to 4-year-old children demonstrate an adult-like understanding of *the*-definites. This implies, contrary to prior overuse claims in the

literature, that there is little reason to believe that children have the wrong meanings for *the*-definites or lack the pragmatic capacity to use it properly.

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