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(Under)estimating preschoolers' knowledge in the acquisition of *the*

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ABSTRACT

Elicited production studies have suggested that children up to age five sometimes misuse singular definite descriptions (*the N*) in contexts where the referent is not mutually known or uniquely identifiable in the domain of reference. These errors have been variously attributed to children's developing ability to reason about the perspectives of others, an incorrect semantics for *the*, or pragmatic immaturity. To assess these claims, we first examine children's spontaneous use of *the*—its frequency, communicative outcomes, and adult-likeness—then turn to a controlled elicited production task to diagnose whether children can succeed with the requirements of definiteness. We find that in natural speech, children use *the* at comparable rates to their mothers overall, with their distribution pattern across syntactic environments largely mirroring their mothers' (Corpus Study 1), and with rare communication breakdowns (Corpus Study 2). We further find that 2- to 4-year-old children's production of *the* and *a* are highly guessable, just like that of their caregivers, suggesting that children's article choices show substantial similarities to adults' (Experiment 1). Finally, in a new elicitation task, we find that most 3- to 4-year-olds succeed in producing definite descriptions; they only use *the* when the referent is mutually known or uniquely identifiable in the context, although some differences between child and adult usage remain (Experiment 2). These findings suggest that while preschoolers make errors sometimes, they are, by and large, sensitive to the conditions that license singular definite descriptions.

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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 we use *the mug* in the sentence *Give me the mug*, our 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 (Strawson 1950; Heim 1982; Gundel et al. 1993; Roberts 2003). For children, this means acquiring two distinct but related abilities: (i) learning the licensing conditions that govern the use of *the*-phrases, and (ii) being able to accurately assess—in real time—when these conditions hold in a given conversational context and then deploying this knowledge effectively in their own speech. The emergence of these abilities should be reflected in their choice of definite versus indefinite forms in production.

Research on the acquisition of English definite and indefinite articles has consistently reported nonadult-like usage among preschool children in elicited production tasks (Maratsos 1976; Warden 1976; Emslie and Stevenson 1981; Schafer and de Villiers 2000; Schaeffer and Matthewson 2005; van Hout et al. 2010; Wexler 2011). These errors have been attributed to various sources. Children may not

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fully know the meaning of *the* (Wexler 2011). Or they do know the meaning, but struggle to recognize the differing perspectives of others (Maratsos 1974; Schafer and de Villiers 2000; van Hout et al. 2010). Or finally, even if they have both capacities, they may face difficulty deploying them as effectively or accurately as adults in real time (Munn et al. 2006; De Cat 2012; Aravind 2018). These hypotheses reflect the intrinsic complexity of producing referring expressions that are appropriate for a given context.

Yet there are reasons to reconsider this line of research and its premises. Several studies suggest that children do have the necessary ingredients for correctly producing definite descriptions, despite occasional production errors, as they demonstrate adult-like comprehension of *the*-definites (Syrett et al. 2010; Aravind et al. 2023), even before they turn two (Saylor and Ganea 2007; Choi et al. 2018). Studies with adult control groups show, moreover, that adults themselves sometimes produce definites in contexts where researchers judge them to be inappropriate (Maratsos 1976; Schafer and de Villiers 2000; van Hout et al. 2010). Therefore, even variable performance by children may not be indicative of substantially nonadult semantic knowledge or pragmatic ability. And, finally, preschoolers' patterns of article use vary significantly across different contexts of elicitation (van Hout et al. 2010), raising the question of whether the results show us more about preschoolers' ability to juggle contexts and real-time production (Emslie and Stevenson 1981; Schaeffer et al. 2018) than regarding children's linguistic knowledge (De Cat 2015).

To get a fuller picture of children's use of singular definites, we first establish essential descriptive groundwork and then turn to a diagnostic test examining children's reference production in more favorable conditions. We examine children's use of singular definites across both natural and elicited production contexts, drawing on two corpus studies, one human simulation study with adults (Experiment 1), and one elicited production study with children (Experiment 2). We find that most children use definite descriptions in the expected environments, but some minor differences between child and adult usage remain. When considered alongside previous studies, our findings suggest that preschoolers may struggle with simultaneously monitoring communicative contexts and selecting appropriate articles in real time, but when task demands are reduced, they use articles appropriately.

2. Background

English has two main types of articles: the definite article (*the*) and the indefinite article (*a/an*). The key difference between these is that definites carry certain presuppositions that indefinites do not.

When a speaker uses a definite phrase like *the N(s)*, they take for granted that their audience can identify a relevant set of things—the domain—that includes *N(s)*. The speaker then uses the definite description to talk about those particular items. For example, in using (1), the speaker assumes the listener is aware of or can infer a relevant set of boxes—perhaps the empty ones in the garage, but not the unopened ones under the Christmas tree.

(1) Did you throw out the boxes?

This assumption is often described as the Existence Presupposition of the definite: the presumption that there *are* *N(s)* to talk about. It is always understood to be assessed relative to an intended domain. Simply knowing that boxes exist somewhere is not enough for (1) to be felicitous. What matters is that the speaker and listener share awareness of some relevant group of boxes. In this paper, we highlight this restriction by referring to the joint requirement for a domain that is both nonempty and relevant as the Domain Presupposition, hoping to articulate with this term what the traditional term leaves implicit.

Domains are not fixed once and for all. They can also shift depending just on what has been said in the conversation, even when the context of the conversation is otherwise the same. Suppose Jay and Kay are moving into a new house filled with boxes. Jay says, *I emptied all the crates and some of the boxes*, and Kay responds with (1). After Jay's utterance, Kay can fairly presuppose that the empty boxes

are especially relevant and ask about these with (1). Without Jay's statement, however, the same assumption might have been infelicitous, since there would be no clear reason to focus only on empty boxes. When conditions for use of *the N* are set up in this way by a prior use of another noun phrase (NP) centered on *N*, the use is said to be anaphoric. Thus, Kay's use of *the boxes* is anaphoric, as it is made possible by Jay having said *some of the boxes*.

When the definite article is used with a singular noun, an additional presupposition seems to arise: the Uniqueness Presupposition (Russell 1905; Sellars 1954; Neale 1990; Abbott 1999). The speaker presupposes that the domain contains exactly one *N*. For example, in using (2), the speaker presupposes that the audience is aware of a relevant domain containing just one box, perhaps the domain of things in the garage.

(2) Did you throw out the box?

Use of (2) by Kay will likely be infelicitous when she and Jay first enter the new house, loaded as it is with boxes, since there is no obvious single box to pick out. But if Jay has just said, *I emptied one box and all the crates*, Kay can respond with (2), referring anaphorically to the one box Jay just mentioned.

The Uniqueness claim is controversial, however. It often relies on prejudicial application of the term "domain"; the domain is chosen in such a way that Uniqueness comes out true (Lewis 1979). But then the theory accounts for the facts only by presupposing them. For example, when Kay asks (2), she could just as well have said (3), since the full set of boxes is also relevant. Therefore, the only reason (2) satisfies uniqueness, if we say that it does, is that we choose a domain that has been restricted to fit the singular, but not the broader circumstances.

(3) The boxes will take longer to unpack.

The problem becomes clearer with (4), from Stone and Webber (1998), who extend an example from Dale and Haddock (1991). The sentence contains two singular definites: *the rabbit* and *the hat*. Yet it can be used naturally in a situation with many rabbits and many hats, as long as there is just one rabbit–hat pair.

(4) Take the rabbit out of the hat.

To preserve Uniqueness, one would have to say that the domain is just that rabbit–hat pair. But if the domain is whatever it needs to be to rationalize the speaker's utterance, the predictive force of the theory is far weaker than we might have hoped.

In response, many analysts have argued that use of a definite does not presuppose uniqueness. Instead, it presupposes only that the referent is *familiar* or *identifiable* to the audience, not that it is more objectively unique (Strawson 1950; Heim 1982; Roberts 2003, among others). Both proposals are close to saying that the Domain Presupposition alone is sufficient. Singular descriptions are used to refer to a single entity, and the audience must be aware of a relevant domain that renders this intended entity identifiable or familiar. They must know which *N* it is; but it need not be the one and only *N*.

In this paper we will not pick sides in this debate. However, for clarity, we will use the terminology of the Uniqueness theory. The core insights of its critics can be understood, for the most part, by focusing on the Domain Presupposition alone.

Calling the Domain and Uniqueness conditions presuppositions means two things. First, they concern what the *audience* is assumed to know, not just what the *speaker* has in mind (Strawson 1950, 1952; Stalnaker 1973, 1974, 2002; Lewis 1979). For example, it is not enough for Kay to be thinking of a particular box when she asks (2); Jay must also be in a position to identify the intended box, and this should be mutually understood. Second, presuppositions are not part of the content of the direct speech act—whether it is a question, assertion, or command (Frege 1892; Strawson 1950; Stalnaker 1973). When Kay asks (2), she does not ask Jay whether a single box exists and whether he threw it out.

She assumes the existence of the box and asks only whether Jay threw it away. If Jay does not initially share this assumption but is willing to adopt it, we say that he *accommodates* the presupposition (Stalnaker 1974; Lewis 1979). Otherwise, communication hits an impasse, and Jay might respond, *What box?*

Cases like (5) can be understood as a form of accommodation where the presupposed referent is not already established but is easily inferred from the preceding utterance. Alternatively, it can be seen as an indirect type of anaphora. Here, the speaker knows the listener is not already tracking a particular box but expects the utterance itself to supply the premise for an easy inference – that an online order of a single thing normally comes in a single box.

(5) I ordered shoelaces online and the box was bigger than my shoes.

These are called *bridging* inferences (Clark and Haviland 1977), which provide *inferable* referents (Prince 1992) for definite descriptions.

By contrast, indefinite NPs such as *a box* carry neither the Domain nor the Uniqueness presupposition. A speaker can ask (6) without assuming that the listener has a domain of boxes in mind, or that there is only one relevant box.

(6) Did you throw out a box?

The speaker may have a particular box in mind, and the listener might even guess which one, but this is not required. In fact, use of an indefinite often implies the “anti-presupposition” (Percus 2006) or “presuppositional implicature” (Leahy 2016), that the conditions for use of the corresponding definite are not satisfied. For example, using (6) may suggest that there is more than one box in the relevant domain, since otherwise the definite would have been used. Many scholars explain this by appealing to pragmatic competition between definites and indefinites (Hawkins 1978; Heim 1991; Gundel et al. 1993; Percus 2006; Sauerland 2008; Schlenker 2012; Leahy 2016).

Thus, learners face two related challenges in acquiring the definite and indefinite articles. The first lies in understanding how their use works in the first place: how the plausible domains for reference at the moment of utterance may be shaped by their relation to both the ambient situation and the preceding discourse. Learning these meanings may be difficult on its own, since article usage is sensitive to factors that may not be obvious. The second lies in applying this knowledge in real time. Both challenges require sensitivity to a speaker’s evolving attention and intentions, to the shifting content, purpose, and context of the conversation, and to what is mutually accessible between interlocutors. These demands make article use a feat even for adults and still more challenging for children. Importantly, even if children grasp the rules, this does not guarantee ease in deploying them: a learner may understand the conditions for appropriate use of articles but still struggle to execute them in conversation. The next section reviews existing research on children’s acquisition of definite and indefinite descriptions, followed by our own studies examining children’s referential production.

3. Prior research on acquisition of definite descriptions

3.1. Types of article misuse

Production studies have shown that, for some uses of articles, English-learning children perform relatively well already at age three (Maratsos 1976; Schafer and de Villiers 2000). These include nonreferential or predication uses of *a*-indefinites, such as *a net* in (7) or *a fish* in (8), respectively. These also include bridging uses of *the*-definites, such as *the lid* in (9).

(7) Otto needs a net.

(8) Wanda is a fish.

(9) Ken opened a cooler he had, and the lid broke.

However, for other uses of the articles, many studies have found frequent anomalies. We can sort these other uses into two broad categories, *introductory* and *anaphoric*, and divide the latter into *unique* and *nonunique* subcases.

An introductory use of a NP is one meant to “mention” or “refer to” something that is both new to the discourse—Discourse New (Prince 1992)—and unfamiliar to the audience—Hearer New. A possible example is (10).

(10) Jay opened a box.

Such uses are at issue in Warden (1976) and Schaeffer and Matthewson (2005), among other studies. In the former, children describe pictures of a story to a hearer who cannot see the storybook. When they used a NP to introduce a new referent, children often used *the*, 54% of the time among three-year-olds and 38% of the time among five-year-olds. These are judged to be misuses, not what adults would do. Schaeffer and Matthewson (2005) test younger children, aged two to three. In their task, the child answers a question about the story in a picture, asked by a puppet who was not attending to that picture. Here, 25% of introductory uses involve *the*, and again these are judged not to be adult-like. Similar patterns have been observed experimentally for languages with related article systems, such as French (Karmiloff-Smith 1979) and Dutch (Keydeniers et al. 2017). These studies report use of definites in introductory contexts at rates between 12% and 63%.

Anaphoric uses of a NP are not introductory. They are meant instead to “mention” or “refer to” something already present in preceding discourse. Some anaphoric uses, such as the use of *the box* in (11), are furthermore what we call unique, since the intended referent is the sole relevant N. Others are nonunique, like the use of *a box* in (12): the speaker refers to one N among several Ns already mentioned antecedently.

(11) Jay opened a crate and a box. But he only emptied the box.

(12) Jay opened several crates and boxes. But he only emptied a box.

Typically such uses are elicited using story-completion tasks. In Maratsos (1976), for instance, children aged three and four are presented with stories like (13), ending with a question.

(13) Once there was a lady. She had a boy and a girl. They were very noisy, and they kept her awake all the time. One night she went to bed. She told them to be very quiet. She said, ‘If anyone makes any noise, they won’t get any breakfast tomorrow.’ Then she went to bed. But do you know what happened? One of them started laughing and giggling. Who was laughing and giggling like that?

The normative response is a singular definite description, *the boy* or *the girl*, meant to refer to the unique relevant boy or girl. But children often underuse definites in such contexts (Chondrogianni and Marinis 2015; Schafer and de Villiers 2000; van Hout et al. 2010; for Dutch; Schaeffer et al. 2018). For instance, three-year-olds used definites only 55% of the time. Near-adult mastery emerged only at age four. Later studies found similar results in these contexts, except that behavior was still not adult-like at age five (Schafer and de Villiers 2000; van Hout et al. 2010). To elicit nonunique anaphoric uses, Maratsos (1976) presents (14) instead of (13).

(14) Once there was a lady. She had lots of boys and girls, four girls and three boys. They were very noisy, and they kept her awake all the time. One night she went to bed. She told them to be very quiet. She said, ‘If anyone makes any noise, they won’t get any breakfast

tomorrow.’ Then she went to bed. But do you know what happened? One of them started laughing and giggling. Now let’s see, there were four girls and three boys. Who was laughing and giggling like that?

Here it would be appropriate to use either a simple indefinite, *a boy/girl* or instead a partitive, *one of the boys/girls*, to refer anaphorically to one member of the plurality already mentioned. The use of a definite, *the boy* or *the girl*, would not be felicitous. Yet children did produce definites, at a rate of 17% for three-year-olds and 58% for four-year-olds. Other studies using similar methods found rates around 50% in these contexts (Zehler and Brewer 1982; Schafer and de Villiers 2000; van Hout et al. 2010).

3.2. Possible factors in misuse

At least four sorts of factors have been proposed to explain children’s behavior, sometimes in combination. These are deficits in semantics, pragmatics, social cognition or language processing.

The first possible factor is a deficit in semantics. Children might not know what *the* means. In particular they may not know that its use when N is singular requires that there be a single relevant N in the context (Wexler 2011). This would directly explain the observed nonunique anaphoric uses of *the* N, when there are multiple relevant Ns.

The second possible factor is trouble with pragmatics. Children might not have adult-like sensitivity to discourse dynamics and hence apply the principles wrongly in several ways. When the intended referent is new to the hearer, they might be too cavalier in assuming their audience will accommodate its existence, and consequently use *the* when they should use *a* (Aravind 2018).¹ Or when the intended referent is one of several Ns already in the context, they might be too quick to regard it as uniquely relevant, taking the uniqueness presupposition to be satisfied when in fact it is not (De Cat 2012; Munn et al. 2006; for evidence from French, see Royle et al. 2018). Or, inversely, they may fail to use *the* despite knowing that its presuppositions are actually satisfied, because they do not register the competition between articles (cf. Aravind 2018). Consider (15) and (16) as an example.

(15) Sam fed the dog cheese.

(16) Sam fed a dog cheese.

Imagine a context where use of (15) is both felicitous and true. In that context (16) will also be true. But in general one should not then choose it over (15), since doing so might imply something false. It might imply that (15) would not in fact be felicitous—hence that the intended dog is not unique or familiar in the context—since otherwise (16) is what one would have said. This reflects a defeasible preference called *Maximize Presupposition*² among expressions that are otherwise equivalent, one should use the one that triggers the strongest presupposition (Hawkins 1978; Heim 1990; Gundel et al. 1993). And if children fail to appreciate this, they might use an indefinite in contexts where adults expect a definite.

The third, closely related factor is social cognition. Several accounts attribute children’s errors in using articles to deeper, nonlinguistic limitations in attributing mental states to others—that is, in “Theory of Mind”—or in taking perspectives that differ from their own (Maratsos 1976; Karmiloff-Smith 1979). Schaeffer and Matthewson (2005), for example,

¹For instance, when the intended referent is in the shared visual field, they may expect the hearer to identify it: in their linguistic input, first-mention definites sometimes function as a stylistic device in storytelling to draw attention to a central character (Emslie and Stevenson 1981).

²Maximize Presupposition is akin to the Gricean prescription to *say as much as is required*, but it pertains to what is presupposed and not what is said. For this reason, it does not derive as clearly from general principles of rational cooperation.:

propose that children lack the “concept” that speaker and hearer assumptions are independent. More often than adults, therefore, they will wrongly take a private perspective to be shared when in fact it is not. As a result, they will sometimes take an intended referent to be identifiable to their audience when it is not, leading to an infelicitous use of the definite.³ According to Schafer and de Villiers (2000), immature Theory of Mind might also explain why children sometimes use an indefinite in contexts where they could use a singular definite. Use of *the N* may be felicitous even in a context with multiple Ns, so long as a single N has antecedently been mentioned, perhaps through use of *an N* or *one of the Ns*. After *Sam approached a dog*, for example, one can refer to the dog she approached using *the dog*, even if she is surrounded by other dogs. Antecedent use of the indefinite, *a dog*, narrows the domain of reference. For Schafer and de Villiers, this effect is the result of a conversational implicature (Grice 1975), and understanding implicatures of course requires understanding the minds of others, their goals, and communicative intentions. Children with an immature Theory of Mind will therefore fail to understand the domain-narrowing effects of using an indefinite, and will consequently fail, in subsequent contexts, to use *the N* when it would be the best choice. The result is overuse of the indefinite, *an N*.

The fourth possible factor is processing. Some aspects of child behavior might be explained just by cognitive load. This idea was hinted at in early work (Maratsos 1974; Emslie and Stevenson 1981) and has been more fully developed in recent years (De Cat 2012; 2015; see Table 1 for error rates reported in representative studies that manifest children’s processing limitations). However, these proposals are at best incomplete. Drawing these threads together, two processing components work alongside linguistic decisions in article choice: tracking common ground and remembering the discourse record. The first component involves taking stock of what is and what is not shared between interlocutors. This requires representing two distinct perspectives, both the interlocutor’s and one’s own, and may be challenging even for children with mature Theory of Mind, due to difficulty with *inhibitory control* (Nilsen and Graham 2009; De Cat 2015). When presented with visual prompts (Warden 1976; Emslie and Stevenson 1981; Schaeffer and Matthewson 2005), children might have difficulty inhibiting their own perspective, and therefore act as if it is shared by others, using *the* infelicitously for referents that are not familiar or perceptible to their audience. In experimental work, the tasks may make the inference of distinct perspectives quite demanding. Maintaining the distinct perspective of an interlocutor may also be challenging when the child is preoccupied with other tasks. In some experiments, a child was asked to narrate the story of a picture-book. Engrossed with this challenge, they might neglect the perspective of the hearer, and as a result misuse a definite introductorily for something the hearer cannot see. In some other cases, children might simply fail to understand the conceit of a story-telling task (Maratsos 1974; Schafer and de Villiers 2000) and assume that in fact the characters are already familiar to the hearer (the experimenter), using a definite when the experimental pretense requires an indefinite. The second component concerns memory for the discourse record, that is, what referents have been mentioned so far. Without visual support for discourse referents (Maratsos 1974; Schafer and de Villiers 2000; van Hout et al. 2010), children may struggle to remember what has already been mentioned or made uniquely relevant. And if they do, they may wrongly use an indefinite when they could use a definite (Maratsos 1974; De Cat 2012; Chondrogianni and Marinis 2015; Schaeffer et al. 2018).

³These errors may mask children’s semantic knowledge and give the false impression that they do not know that *the* requires shared knowledge. Not every language has the English contrast between a class of referential noun phrases that requires shared knowledge, and another class that does not. For example in St’át’imcets, a Salish language of British Columbia, the contrast is just in whether the speaker intends to refer to a specific object. Schaeffer & Matthewson propose that English and St’át’imcets represent the only two possibilities for the *Parameter of Article Semantics*: either definites are licensed by presuppositions about the common ground (shared beliefs), as in English, or they simply encode speaker beliefs, as in St’át’imcets. English-learning children, on their account, have correctly acquired that English opts for the common ground type of article system. This contrasts with accounts that interpret children’s optional misuses as reflecting a temporary resetting of the parameter from a St’át’imcets type to the correct English type before full convergence.

Table 1. Nontarget-like use of definite noun phrases (NPs) reported in the literature (underlined studies use tasks with visual prompts; number of subjects indicated in parentheses).

Study	2 y.o.	3 y.o.	4 y.o.	5y.o.	Adults
Introduction contexts					
% of definite in indefinite-favoring contexts (<i>N</i>)					
Warden (1976): Exp3		54% (<i>N</i> = 16)		38% (<i>N</i> = 20)	0% (<i>N</i> = 10)
Emslie and Stevenson (1981): Exp2	10% (<i>N</i> = 10)	8% (<i>N</i> = 10)	14% (<i>N</i> = 10)		18% (<i>N</i> = 10)
Schafer and de Villiers (2000): Cond3		0% (<i>N</i> = 12)	0% (<i>N</i> = 7, 9)	0% (<i>N</i> = 9)	3% (<i>N</i> = 10)
Schaeffer and Matthewson (2005): B context	25% (<i>N</i> = 26)				2% (<i>N</i> = 38)
Nonunique contexts					
% (of definite in indefinite-favoring contexts (<i>N</i>))					
Maratsos (1974): Exp1		17% (<i>N</i> = 19)	58, 2% (<i>N</i> = 9, 11)		
Schafer and de Villiers (2000): Cond8		49% (<i>N</i> = 12)	53, 41% (<i>N</i> = 7, 9)	56% (<i>N</i> = 9)	30% (<i>N</i> = 10)
van Hout et al. (2010): Exp1		50% (<i>N</i> = 25)			17% (<i>N</i> = 6)
van Hout et al. (2010): Exp2		26% (<i>N</i> = 19)			24% (<i>N</i> = 20)
Anaphoric contexts					
% of nondefinite responses in definite-favoring contexts (<i>N</i>)					
Maratsos (1974): Exp1		45% (<i>N</i> = 19)	6, 3% (<i>N</i> = 9, 11)		
Schafer and de Villiers (2000): Cond7		15% (<i>N</i> = 12)	28, 24.5% (<i>N</i> = 7, 9)	31% (<i>N</i> = 9)	6% (<i>N</i> = 10)
van Hout et al. (2010): Exp2		27% (<i>N</i> = 19)			4% (<i>N</i> = 20)

Any of these four factors, or their combinations, might explain the observed misuse of articles by young children. Yet the hypotheses themselves pose a puzzle. Other findings in the literature suggest that the posited deficits—in semantics, pragmatics, social cognition, or processing—may not be as great as is often assumed. Preschoolers have been shown to recognize inappropriate uses of definite descriptions (Syrett et al. 2010) and expect the referent of a definite description to be uniquely identifiable for the audience (Aravind 2018). They also understand that plural definites (*the Ns*) refer to all things denoted by *N* within the relevant domain (Munn et al. 2006). Comprehension studies show that even infants can take the perspectives of others (Luo and Baillargeon 2007) and apply this skill when interpreting referring expressions (Saylor and Ganea 2007; Choi et al. 2018; Moll et al. 2008). By around age three, children can already tailor their referring expressions to the knowledge state of their interlocutor, using more informative NPs when the interlocutor lacks visual access to the intended referent (Matthews et al. 2006). Additionally, children’s rates of “egocentric” errors, where they seem not to appreciate perspectives that differ from their own, do not correlate with their performance on Theory-of-Mind tests (De Cat 2013). So a question arises. Why would children be misusing definite descriptions, when they otherwise seem to have the skills required to use them well?

With this in mind, we have two general goals in this paper. One is to get a better sense of children’s spontaneous production of indefinite and definite descriptions, outside of experimental contexts. The second is to elicit productions in an experimental context that is simple enough to let their semantic and pragmatic competence shine through.

Toward the first goal we present two corpus studies. These show that in natural speech, children generally follow their mothers’ patterns of article use. They also suggest that genuinely problematic article misuses—those leading to overt breakdowns in communication—appear to be rare. Using a variation of the Human Simulation Paradigm (Gillette et al. 1999), Experiment 1 then shows that

adult subjects, presented only with limited linguistic context, can guess the choice of article in natural conversations between a child and their caregiver, equally well for speakers of either age. Finally in Experiment 2 we target our second goal with a new elicitation task. Our hope is to avoid complications that may have masked children's linguistic knowledge in previous studies. And we find that most children do succeed in choosing definites in accord with adult standards. Together, across four studies, our findings suggest that children's difficulties with *the*-expressions may be less concerning than previously assumed. Nevertheless, residual differences between child and adult production remain an open question for future research.

4. Corpus study 1: Overall distribution of *the*-definites in natural production

Corpus Study 1 provides a descriptive profile of children's spontaneous use of singular definite descriptions, outside of lab-elicited contexts. Prior corpus work (De Villiers and De Villiers 1973; Rozendaal and Baker 2008) noted that children aged one to three sometimes use articles differently from adults. However, these studies did not report usage rates specifically for the definite article *the*, leaving open how children's uses of *the* should be characterized. To address this gap, we adopt a first-step, distributional approach to characterize children's spontaneous production patterns. We compare the use of singular definites (*the N*) in children's speech against their mothers' baseline. Specifically, we ask: (i) how frequently do children produce singular definites relative to their mothers, and (ii) are these definites used at comparable rates by children and mothers across different syntactic environments?

This descriptive baseline helps situate children's spontaneous usage before we look further into other aspects of their usage pattern. Given prior experimental reports of overuse, one might expect this to surface as a higher overall rate of *the* in children's natural speech. If children were to produce *the* at substantially higher rates than their mothers, this would be one potential signal of atypical usage at a broad level. Note that if children's usage rate is comparable to their mothers,' this would not necessarily mean that children's use of definite descriptions is adult-like, as the contexts in which misuse has been observed experimentally may be too infrequent or subtle to be detected by broad distributional measures in corpus data.

4.1. Method

We based our distributional analysis of singular definites 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;0–4;11), consisting of a total of 912,530 words and 254,753 sentences. We focus on 1-, 2-, 3-, and 4-year-olds to test whether broad differences in using *the* between children and mothers can be detected at any age in early development. This age range covers ones from previous studies that examined article choice in natural production (De Villiers and De Villiers 1973; Rozendaal and Baker 2008) and ones displaying atypical article choice in production tasks (Maratsos 1974).

Our analysis targets children's and their mothers' use of singular definites with count nouns, as these contexts require a choice between the definite and indefinite article (*the N* vs. *a/an N*). We restrict the comparison to *the* and *a* because they represent minimally contrastive alternatives that signal whether a referent is uniquely identifiable in the context. Demonstratives are excluded because reference with demonstratives can be established deictically without assessing the hearer's familiarity with the referent. Plural NPs are also excluded for simplification, as they can refer to a set of entities, or be used generically, making the discourse conditions for article choice less clear-cut than with singular, specific referents. For instance, indefinite plurals (e.g., *Dogs are friendly*) often do not refer to specific entities in the discourse.

To characterize children's use of singular definites, we use mothers' speech as a baseline and compare the proportion of *the N* produced by the two groups. This proportion is calculated as the

number of *the N* tokens divided by the combined number of *a/an N* and *the N* tokens. By focusing on this contrast, we ask whether any broad differences in article use between children and mothers are detectable in spontaneous speech.

4.2. Results

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

Specifically, children use the definite article (as opposed to the indefinite one) about half of the time, whereas mothers use it more frequently, in around 60% of their utterances. This pattern is also present when we examine individual dyads. Across all four age groups, mothers consistently produced a higher proportion of definite articles than their children. A Kruskal–Wallis test confirmed this difference, showing that mothers ($M = 0.570$, $SD = 0.095$) used significantly more definites than children ($M = 0.432$, $SD = 0.156$), $\chi^2(1) = 15.16$, $p < .001$. One-sample t -tests further revealed that mothers showed an above-chance preference for definites, $t(31) = 4.183$, $p < .001$, whereas children’s rates of definite use fell below chance, $t(31) = -2.480$, $p = .019$. In other words, while mothers produced definites more often than indefinites, children in this sample produced indefinites more often than definites in their natural speech. Therefore, this coarse-grained analysis indicates that children do not use definites at higher rates than their mothers in natural speech.

The fact that children do not use more definites than their mothers does not, on its own, imply adult-like competence. It may instead reflect accidental properties of the interactions recorded in the corpus, where opportunities to use a definite may have been more frequent for caregivers than for children. The higher usage of *the N* by mothers may simply reflect their more dominant role in the relevant environments in directing the child’s attention to previously mentioned or familiar entities during conversations. For this reason, more fine-grained measures are needed to better understand children’s article choice in natural speech.

One way we can refine our measure is to examine whether children adjust their definite usage in response to pragmatic differences across syntactic environments within a single clause type: namely, subjects versus objects versus fragments (NPs used in isolation) within a declarative clause. In English, subjects tend to refer to entities mentioned earlier in the discourse (Prince 1992); therefore, we expect caregivers to use more definites in subject positions. If children do not yet understand that definites pick out referents familiar from prior discourse, their usage of definites might be insensitive to this subject–object distinction. To test this, we conducted further analyses to examine whether this finer-grained measure would reveal differences between children and mothers in their article use.

Across syntactic positions (i.e., subjects vs. objects vs. fragments) in declarative clauses, we again find no atypical patterns when examining children’s article use (see Figure 1).

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).

A possible concern is that children’s rate of definites might be underestimated relative to their mothers’ due to young children frequently producing NPs without determiners (e.g., Hyams 1996). If

Table 2. Overall use of definites and indefinites by children and mothers in corpus study 1.

Age group	Speaker	Count (definites)	Count (indefinites)	Definites %
1.5 years	Child	420	468	47
	Mother	1,720	929	65
2 years	Child	2,362	3,545	40
	Mother	7,010	4,646	60
3 years	Child	2,435	3,068	44
	Mother	3,141	2,305	58
4 years	Child	1,412	1,682	46
	Mother	1,025	905	53

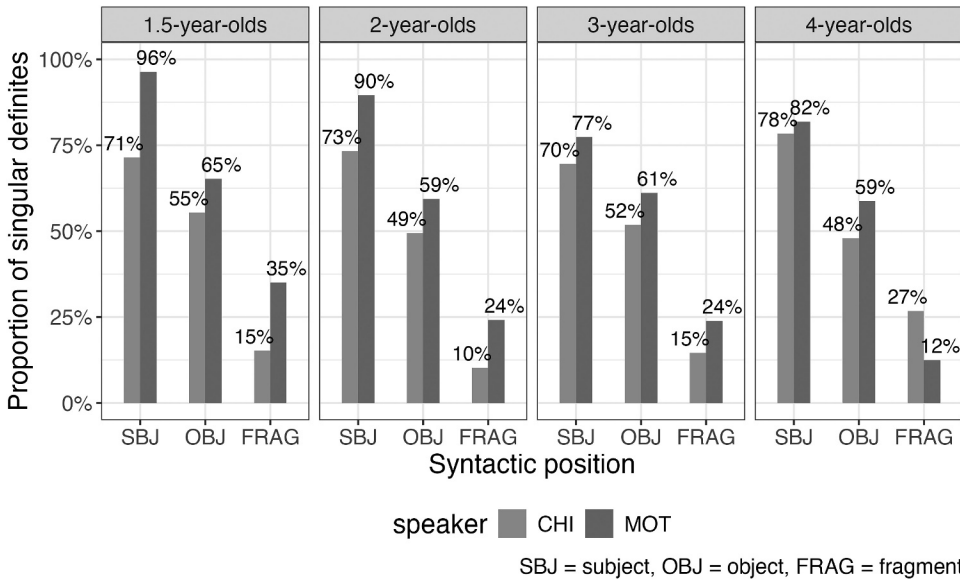


Figure 1. Proportion of singular *the*-definites across syntactic positions in corpus study 1.

they 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 3).

If we consider all null determiners as potential definites, the revised rates of definites for 1-, 2-, 3-, and 4-year-olds increase to 82.1%, 74.7%, 64.5%, and 60.4%, respectively, higher than their mothers' rates of 66.5%, 60.2%, 61.4%, and 59.1% in the same corpora. However, this assumption would lead us to overestimate children's definite usage, as some of these null determiners are clearly used as indefinites, whether grammatically (17) or not (18).

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

(18) 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. The logic is that if a child omits a determiner in a particular position, the likelihood that the intended determiner was *the* (rather than *a*) should correspond to how often the child uses *the* in that position when determiners are produced. 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 (20), namely, based on the rates of definites produced in subject ($\text{rate}_{\text{def-sub}}$) and object ($\text{rate}_{\text{def-obj}}$) positions (19).

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

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

Table 3. Revised rate of definites (excluding fragment noun phrases [NPs]) in corpus study 1.

Age (year)	#Def	#Ind	#Null	(Def+Null)%	(Def+Null-as-def)%
1	209	166	550	82.1	58.2
2	1,364	1,342	2,599	74.7	52.1
3	1,701	1,535	1,094	64.5	52.8
4	956	976	531	60.4	49.7

The revised rates of definites for 1-, 2-, 3, and 4-year-olds then become 58.2%, 52.1%, 52.8%, and 49.7%, respectively, all lower than their mothers' rates of 66.5%, 60.2%, 61.4%, and 59.1% in the respective corpora. Therefore, under this finer-grained estimate, children do not appear to use excessively more definites than their mothers in natural speech.

In summary, we find that children do not use *the* at higher rates than their mothers in natural speech. Children do not use *the* more frequently than *a*, nor do they use *the* more frequently than their caregivers. Across syntactic positions, children's distribution of singular definites also closely mirrors that of their mothers: they use more definites in subject than in object position, aligning with the pattern observed in adults. Thus, we find no positive evidence that children overuse *the*. However, as noted earlier, only the detection of a higher rate of *the* by this frequency-based measure would suggest broad differences in article choice between children and adults. The absence of such a difference in the dimensions targeted in Corpus Study 1 could be due to these broad frequency measures not being sensitive enough to capture the usage differences emphasized in the literature, where the child seems insensitive to the perspective of their interlocutor. To gain a clearer picture, we turn to discourse contexts, where child–adult differences may become more apparent in how children's definites function in communication. We focus on communication breakdowns in specific discourses to probe potential differences in children's use of definites.

5. Corpus study 2: Rate of *the*-driven miscommunications in natural production

In this study, we evaluate the felicity of children's use of *the*-definites from the perspective of their addressee, by asking whether their uses give rise to observable communicative breakdowns. If children were to use *the* in contexts where its presuppositions are not met, this might lead to difficulty in identifying the intended referent. Here, miscommunication is defined narrowly as cases where we see evidence that the addressee has failed to identify or accommodate the intended referent of the speaker. The available evidence is explicit expression of confusion or requests for clarification.

The aim of this study is exploratory: to sketch how frequently miscommunication involving definites arises across conversational settings. To this end, we focused on the same age range (age 1 to 4) to be consistent with Corpus Study 1. We calculated rates of *the*-driven miscommunications for 1-, 2-, 3-, and 4-year-olds in caregiver-child conversations, which allows us to see if the communicative impact of different error types varies with age. For a complementary perspective, we also examined adult–adult telephone conversations as a reference point. These two datasets are not directly comparable—adults in these telephone conversations lack shared visual context—but they provide a complementary perspective. Considering them together allows us to ask whether miscommunication-prone uses of definites are unique to children or whether they also arise in adult interactions.

It is worth noting that Corpus Study 2 relates only indirectly to the issue of overuse of definites. Not every misuse of *the* will result in detectable miscommunication: caregivers may tolerate unclear references from young children and may often repair or infer the intended meaning without flagging a problem. As a result, our coding likely underestimates the frequency of potentially problematic uses. As a result, rather than directly measuring overuse rates, Corpus Study 2 simply compares how often miscommunication arises across different developmental stages using a unified scheme. The frequency of these breakdowns offers a lower bound on how often children's article choices genuinely confuse their addressees. If such breakdowns are common, that would suggest fundamentally erroneous usage. If breakdowns are rare, this cannot be taken as evidence that children's use of definites is mostly felicitous. It suggests instead that children's use of definite articles in natural conversation is often interpretable to or accommodatable by their caregivers.

5.1. 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).⁴ To capture a more comprehensive picture of miscommunication, we examined both singular and plural definite descriptions across datasets. In the CHILDES corpora, sentences containing *a/an N* or *the N* were extracted using CLAN commands and functions. For the CALLHOME corpus, which consists of adult–adult telephone conversations, a Python script was used to extract sentences containing the same expressions.⁵

To identify potential cases of communication breakdowns, we searched the transcripts for question marks occurring within one to three lines after a target line containing a definite description, treating these as possible signs of clarification requests. This automated step provided a practical—though imperfect—proxy for detecting overt miscommunication. We then manually reviewed these candidate cases, expanding the surrounding context to confirm whether they indeed represented clarification requests triggered by the hearer’s difficulty in identifying intended referents.

Each confirmed case was also coded for type of misuse: unfamiliar reference or nonunique reference. Unfamiliar reference occurs when a speaker uses *the N* as if the hearer already knows the referent, but the hearer does not recognize the domain in which the intended entity is to be found. Nonunique reference occurs when a speaker uses *the N* in a context where the domain is identifiable, but multiple candidates exist within it, so the hearer cannot tell which specific entity is intended. Diagnostic cues were used to distinguish the two types: for clarification questions from mothers, *What N* typically signals unfamiliar reference, and *Which N* signals nonunique reference. (21) shows an unfamiliar reference, and (22) a nonunique reference.

- (21) CHILD: I wanna go on the platform.
MOTHER: What platform?
CHILD: The platform at the circus.
(Valian 1991, 02;04;26)
- (22) 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)

5.2. Results

Table 4 presents the rates of *the*-driven communication breakdown across corpora. Overall, the rate of communication breakdown driven by *the N* in mother–child interactions is low and comparable to that found in adult–adult interactions, both being well below 1%. This suggests that children’s use of definites rarely leads to explicit clarification requests from their addressees as an obvious sign of

Table 4. Rates of *the*-driven communication breakdown in different corpora in corpus study 2.

Corpus	#word-by-speaker	#communication breakdown	#[the N]	Rate of communication breakdown (%)
1-year-olds	23,850	0	425	0
2-year-olds	158,880	15	2,715	0.55
3-year-olds	134,793	7	2,819	0.25
4-year-olds	88,949	8	1,742	0.46
Adult	301,805	4	3,121	0.13

⁴The 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.

⁵Many thanks to Weihang Wang and Sathvik Nair for helping with the script.

communication breakdown. Importantly, such breakdowns are not limited to face-to-face caregiver-child interactions: adults also occasionally produce them over the phone.

The low rates of communication breakdown here should be interpreted with caution, especially for 1-year-olds. Several factors may contribute to the apparent floor effect in 1-year-olds. First, very young children may not produce enough definite NPs for communication breakdown to be detectable. Second, caregivers may adjust their expectations for precise reference, or they may accommodate silently, drawing on their intimate knowledge of the child and the situation, without showing explicit signs of referent-locating difficulty. While these factors point to a limitation of our method for nonvideotaped corpora—in capturing implicit repairs, corrections, or nonverbal cues that can compensate for article misuse—the approach nonetheless provides a feasible and systematic way of identifying overt miscommunications across large datasets, which would otherwise be difficult to detect manually.

Table 5 illustrates the frequencies of communication breakdowns by type. Breakdowns due to unfamiliar reference continue to be observed in 2-, 3-, and 4-year-olds, while those due to nonunique reference become much less detectable by age 3. It is possible that children’s command of the uniqueness requirement for *the* may have improved by age 3. In adult–adult telephone conversations, all observed cases stemmed from unfamiliar reference. (23) is one example.

- (23) 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.

This pattern suggests that even adults with target meanings of *the*-definites sometimes use definites for specific referents that are not easily accommodatable by their addressees. The absence of nonunique referential breakdowns in adult interactions, however, may reflect the nature of telephone conversations, where the potential for multiple competing referents might be limited.

In sum, our findings show that children’s use of *the* rarely leads to communication breakdowns in natural production. From the perspective of their hearers, most child uses of definites in real life are mostly felicitous or at the very least, accommodatable without difficulty. Notably, the conversations in our corpora involve parents, who share substantial common ground with their child and may thus be especially prone to accommodate otherwise unclear references. Thus, while children’s use of definites appears largely felicitous in these contexts, a fuller evaluation requires testing with naïve adults outside the interaction, who know little about these children and are thus less likely to accommodate the presuppositions of children’s definites.

6. Experiment 1: Guessing determiners

In Experiment 1, we test whether children’s use of articles aligns with adult patterns by conducting a determiner-guessing experiment based on Dieuleveut et al. (2022) adaptation of the Human Simulation Paradigm (Gillette et al. 1999). Dieuleveut et al. show that this method is sensitive enough

Table 5. Types of *the*-driven miscommunication in different corpora in corpus study 2.

Corpus	Unfamiliar referent (%)	Nonunique referent (%)
1-year-olds	0	0
2-year-olds	7 (0.26)	8 (0.29)
3-year-olds	6 (0.21)	1 (0.04)
4-year-olds	7 (0.40)	1 (0.06)
Adults	4 (0.13)	0

to detect children's ability to distinguish between subtly contrasting modals (a necessity modal *must* vs. a possibility modal *might*). Here, we extend it to article choice, assuming it will likewise reveal whether children use definite (*the*) and indefinite (*a*) descriptions in ways that are predictable from the surrounding context.

We present adult participants with excerpts from mother–child conversations in which a determiner has been removed and ask them to choose between definite *the* and indefinite *a* for the missing slot. Can adults accurately guess mothers' use of definites without visual context? Success would indicate that the conversational context, together with adults' knowledge of article semantics, provides sufficient cues for identifying the articles being used. By contrast, if children's article choices were to differ systematically from adult patterns, adults should perform worse at guessing children's choices. Specifically, if children were to use *the* in contexts where adults would use *a*, then adults encountering those same contexts should be more likely to choose the indefinite option, leading to an overall lower accuracy for guessing children's definites. Conversely, if children's article choices are predictable from the context in the same way as adults', adults' accuracy should not differ between guessing children's and mothers' choices.

6.1. Methods

6.1.1. Procedure

Participants were recruited via Amazon Mechanical Turk (AMT), and each experiment was conducted over PClbex farm (Zehr and Schwarz 2018) for approximately 15 to 20 minutes. Before starting the experiment, participants would learn through two practice trials that they would (i) press the spacebar for each line of a conversation to reveal, (ii) choose between two options for a blank at the end of each conversation (Figure 2), and (iii) answer a following yes-no comprehension question occasionally (8 out of 40 trials) to ensure they understood the context (e.g., *Was a car mentioned in the conversation?* for the trial in Figure 2a).

Participants then completed 40 trials/conversations (20 test trials: 10 *the*-items and 10 *a*-items; 20 filler trials: 10 *this*-items and 10 *that*-items) presented in random order. To ensure a variety of test items, 10 test items for each article were randomly drawn from a pool of 20 conversations extracted from the corpus, yielding 184,756 possible combinations of test items. Test trials always presented a binary choice between *the* and *a*, whereas filler trials involved either two demonstratives (*this* vs. *that*) or a mixed pair (e.g., *the* vs. *this*).

CHILD: Yeah..	MOTHER: They sure did.
MOTHER: Yeah?	MOTHER: Real wet.
MOTHER: I'll go get it.	CHILD: Did they get hurt?
MOTHER: Here, let's put the car back where it belongs.	CHILD: Did she get her hair wet?
MOTHER: Okay.	MOTHER: Yeah.
CHILD: No!	MOTHER: Doesn't it look like it?
MOTHER: You don't wanna put the car there?	MOTHER: And even her hat fell off.
MOTHER: Okay.	MOTHER: It's on the policeman's head.
CHILD: No.	MOTHER: See?
CHILD: Wanna play with it and read __ book, okay?	MOTHER: Don't they look funny in __ puddle?



Figure 2. A sample test trial with children's (a) and mothers' (b) articles during experiment 1.

6.1.2. Conditions

Article (*the* vs. *a*) was tested within subjects, while Speaker (child vs. mother) and Age (2-year-olds vs. 3-year-olds vs. 4-year-olds corpora) were manipulated between subjects.

6.2. Materials

The materials consisted of snippets from conversations between 23 mother–child pairs (children aged 2;1;4 to 4;11;2) randomly drawn from Gleason’s corpora in CHILDES (80,347 words; Menn and Gleason 1986).⁶ We focused on this age range because one-year-olds do not yet produce a sufficient number of articles in the corpora for a reliable random sampling of conversational snippets. To maximize the chance of detecting misuse, we restricted materials to cases where both *the* and *a* were viable options for the following noun, ensuring that adults’ responses would depend on contextual cues rather than structural or lexical biases. To achieve this, we excluded items biased toward either article. Specifically, items were excluded if they contained: (i) repetitions (e.g., echoes, speaker disfluencies, and sentence completions), which often cue copying an article from the preceding text; (ii) idiomatic expressions or collocations (e.g., *wait a minute*) or collocations, where the article is fixed by convention; or (iii) plural or uncountable nouns, which constrain article choice by grammatical necessity.

6.3. Results

6.3.1. Participants

A total of 240 participants (127 males and 105 females; age range: 20–72; mean age: 41.3) were recruited via AMT. Data from 211 participants (109 males, 94 females, and 2 unspecified; age range: 23–72; mean age: 41.9) were included in the analysis.⁷ Participants who scored below 75% on the comprehension questions were excluded from the final dataset.

6.3.2. Accuracy against chance

We first examined participants’ overall accuracy in guessing articles used by mothers. Participants performed significantly above chance for both definite (*the*) and indefinite (*a*) articles across all age groups (Wilcoxon signed-rank tests, all mean accuracies > 0.5). Turning to children, participants’ guesses were also above chance for both articles across all age groups. See Figure 3 for the plot and Table 6 for a summary of mean accuracies and nonparametric tests against chance by article (*the* vs. *a*) and condition (Age*Speaker).

6.3.3. Between-speaker comparison

To initially examine whether participants were generally more accurate guessers of articles used by mothers than by children, we conducted a series of Mann–Whitney U tests for each combination of Age (2, 3, and 4 years) and Article (definite, indefinite).⁸

As Table 7 shows, participants did not perform significantly better at predicting mothers’ use than children’s for either article. Notably, guessing accuracy for mothers’ definite articles was lower than that for children’s in the 4-year-old corpora. A closer look at the data reveals that one definite test item from mothers—*you wanna read the story with me?*—had an error rate of 84.2%, much higher than the

⁶The 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.

⁷The participants’ wide age range means they come from diverse backgrounds and life experiences. This diversity makes it highly improbable that any group-level success in guessing children’s article use could be attributed to a shared familiarity with children, rather than a general understanding of the linguistic principles involved.

⁸The 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 nonparametric tests were used, as the data did not follow a normal distribution.

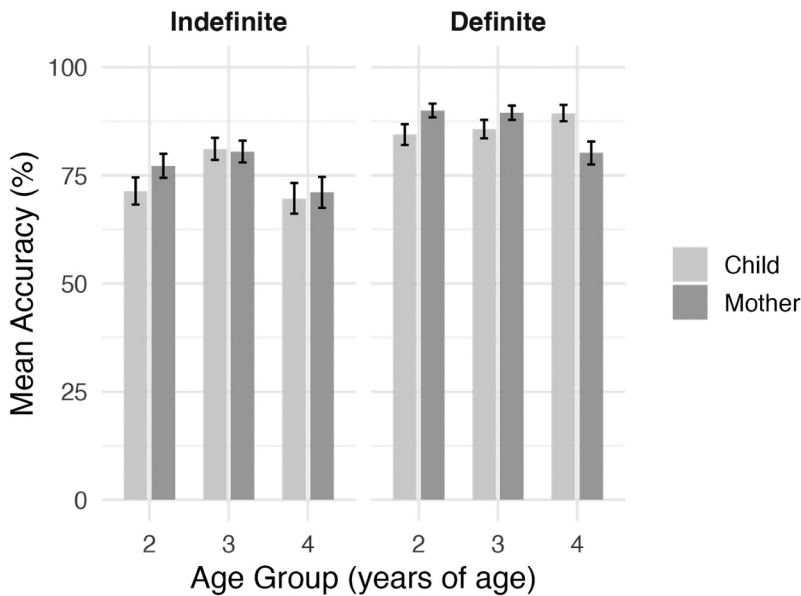


Figure 3. Mean accuracy for guessing articles (indefinite *a* and definite *the*) by speakers (child vs. mother) for different age groups (2, 3, and 4 years of age) in experiment 1.

Table 6. Accuracy and Wilcoxon signed-rank tests by article and condition in experiment 1.

Age	Speaker	Mean accuracy % (SE)		Wilcoxon signed-rank test (against chance)	
		Definite	Indefinite	Definite	Indefinite
2-year-olds	Mother	90.0 (0.016)	77.2 (0.028)	$p < .001^{***}$ 95% CI [0.85, 0.95]	$p < .001^{***}$ 95% CI [0.75, 0.85]
	Child	84.4 (0.024)	71.4 (0.031)	$p < .001^{***}$ 95% CI [0.80, 0.90]	$p < .001^{***}$ 95% CI [0.65, 0.80]
3-year-olds	Mother	89.5 (0.016)	80.5 (0.025)	$p < .001^{***}$ 95% CI [0.85, 0.95]	$p < .001^{***}$ 95% CI [0.75, 0.85]
	Child	85.7 (0.021)	81.1 (0.026)	$p < .001^{***}$ 95% CI [0.85, 0.90]	$p < .001^{***}$ 95% CI [0.80, 0.90]
4-year-olds	Mother	80.2 (0.027)	71.1 (0.036)	$p < .001^{***}$ 95% CI [0.80, 0.90]	$p < .001^{***}$ 95% CI [0.65, 0.80]
	Child	89.4 (0.019)	69.7 (0.035)	$p < .001^{***}$ 95% CI [0.85, 0.95]	$p < .001^{***}$ 95% CI [0.65, 0.80]
Total	Mother	87.1 (0.012)	76.8 (0.017)		
	Child	86.5 (0.013)	74.1 (0.018)		
All	Mother	82.0 (0.011)			
	Child	80.3 (0.012)			

$n = 211$.

Table 7. Mann-Whitney U tests: Comparison of guessing accuracy for mothers' versus children's article choice by age (2 vs. 3 vs. 4 years) and article (definite vs. indefinite) in experiment 1.

	2 years	3 years	4 years
Definite	$p = .124$, $W = 780$	$p = .212$, $W = 794$	$p = .006^{**}$, $W = 289$
Indefinite	$p = .160$, $W = 771$	$p = .819$, $W = 662$	$p = .943$, $W = 482$

others. In this excerpt, the intended referent (*the story*) lacks a clear antecedent in the text beyond *you wanna take a look at this?*—but this might have been clear from the broader conversational or environmental context, which would have allowed participants to guess correctly if they had access to it. This suggests that the lower accuracy for guessing mothers' definites may be driven by a specific item rather than a systematic difference between speakers, indicating that this pattern is unlikely to reflect a meaningful speaker-based effect. To formally investigate potential interactions between factors and control for subject-level variability, we next turn to a mixed-effects model analysis.

6.3.4. Mixed-effects model analysis

We fitted a generalized linear mixed-effects model, with Speaker, Article, and (child) Age as fixed effects and Subject as random factors. This model provides a unified analytical framework to go beyond the isolated comparisons and test our hypotheses directly. Main effects of Speaker ($\beta = 0.50$, $SE = 0.46$, $p = .279$), Article ($\beta = 0.09$, $SE = 0.43$, $p = .825$), and Age ($\beta = -0.03$, $SE = 0.10$, $p = .741$) were not significant. However, the Speaker*Article interaction ($\beta = 1.36$, $SE = 0.64$, $p = .034$) and Speaker*Article*Age three-way interaction ($\beta = -0.48$, $SE = 0.21$, $p = .021$) were significant, indicating that the speaker effect on accuracy of guessing depended on article type and child age. Post-hoc contrasts clarified these interactions: for the 2-year-old corpora, participants were more accurate in guessing mothers' *the* than children's (Odd Ratio = 0.516, $p = .004$), but this advantage disappears in the 3-year-old corpora (Odd Ratio = 0.940, $p = .672$). This echoes findings from Corpus Study 2 suggestive of a potential developmental shift from age two to age three. It also marks the first indication in our paper of a detectable difference between children and adults in their use of definites. Notably, this difference is only detected at age two but no longer detectable by age three.

6.4. Interim summary

Adult participants' guesses were accurate, above chance, for both mothers' and children's use of definite (*the*) and indefinite (*a*) articles. Overall accuracy did not differ by speaker when collapsing across article types. But for *the* specifically, a guessing advantage for mothers' over children's use appeared in the youngest group (2-year-olds). Thus, a detectable difference between children and adults is present at age two but disappears by age three. These findings suggest that by age three, children's article use in our randomly sampled conversational snippets is as predictable from context as adults'—at least for the distinctions captured by this guessing task. In other words, we see no signature of discourse misuse in natural production.

7. Experiment 2: Use of *the*-definites in interactive elicited production

The first three studies showed that in spontaneous speech, children's usage patterns align with adults at multiple levels – including syntactic distribution and the types of contexts where definites occur – with few overt signs of incorrectly attributing their assumptions to the interlocutor. While naturally occurring data provide valuable insights, they have certain limitations. In mother–child interactions, the common ground is relatively stable and predictable, making it easier for children to track what their interlocutor knows. As a result, children's appropriate uses might be limited to mostly “easy cases” that arise naturally, leaving subtler aspects of definiteness hidden.

Experiment 2 addresses this gap by testing children in a controlled but conversationally natural setting. We designed an interactive elicited production task that directly targets the licensing conditions of definites under favorable conditions, which minimized processing demands in the context so that factors outside of linguistic competence will not interfere with our ability to detect that competence. In this paradigm, participants use referring expressions to respond to genuine information-seeking questions from their interlocutor, thus engaging participants as informants in a conversation rather than as quiz-takers.

7.1. Method

7.1.1. General description

Participants interact with Kermit the frog, who cannot see objects hidden behind a wall, while they can, so Kermit needs their help to find out what is behind the wall (Figure 4). Each scene presents two hidden objects unfamiliar to Kermit, which creates an introduction context for participants to use indefinites. In some trials, both objects are identical (e.g., two boxes), creating a nonunique context for them to later refer back to one of the objects using an indefinite. In the other trials, the objects are distinct (e.g., a bottle and a mug), creating an anaphoric context where it's appropriate for later use of a definite to refer to one of them.

7.1.2. Procedure

The experimenter and the participant sit together in front of a laptop. The experimenter explains that Kermit the frog needs help, which serves to encourage participants to be cooperative interlocutors. Throughout the task, the experimenter uses a presentation clicker to control the slides on the screen, reinforcing the impression of a spontaneous conversation. To ensure that participants understand the procedure and are comfortable with the setup, three practice trials precede the main task, each involving just one object behind the wall. In the first two trials, Kermit asks *What do you see?* After the participant responds, Kermit says *Okay, thanks*. In the third trial, Elmo appears after the participant answers the question, removes 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. Kermit then follows with another question, *What happened?*, so that the participant knows what question to expect during the test trials. After practice, the experimenter explains he has work to do and will not join the conversation, and then he turns sideways to prevent the participant from being distracted, ensuring the participant solely engages with Kermit's perspective.

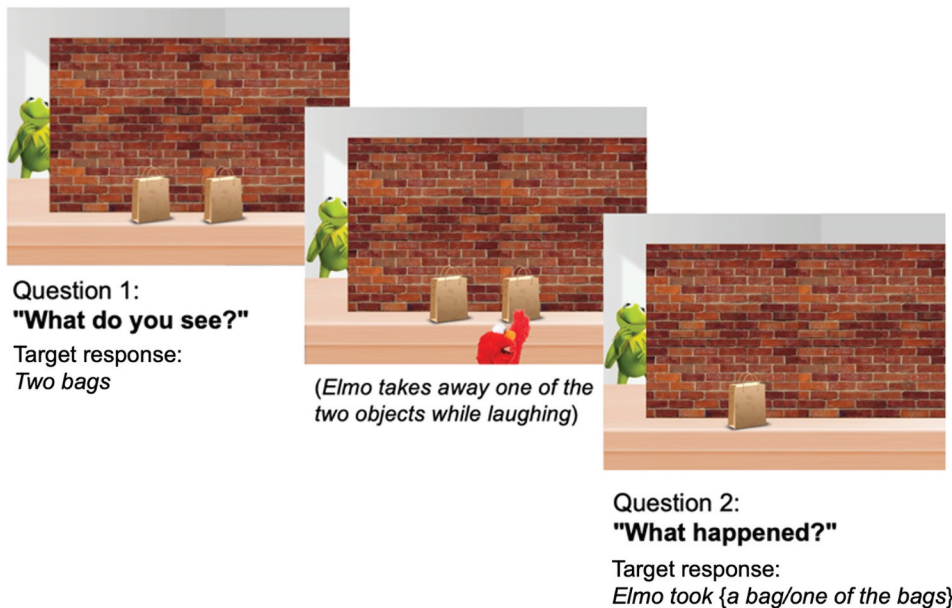


Figure 4. Setup of experiment 2.

7.1.3. Test trials

Each test scene presents two objects hidden from Kermit, either identical (nonunique) or distinct (unique). Kermit first asks, *What do you see?* (Question 1). Because the referents are new to him and outside the shared visual ground, we expect indefinite responses (e.g., *a bottle and a mug* or *two bags*). This introduction also helps participants register the referents in the discourse for later reference (cf. Maratsos 1974). Next, Elmo appears in front of the wall and removes one object, while laughing. Kermit then asks *What happened?* (Question 2). Here, we expect definites for unique referents (e.g., *Elmo took the mug*, when there was only one mug) but indefinites for nonunique referents (e.g., *Elmo took a bag/one of the bags*, when there were two bags). Two trial orders were created, with the six unique trials and six nonunique trials pseudo-randomized (see Appendix for referential contexts of the trials).

7.1.4. Motivation

Our elicitation experiment seeks to build upon existing insights from broader developmental work to ease the demands on children in (i) modeling the knowledge state of their interlocutor and (ii) tracking the domain of reference. First, we incorporate a physical barrier (a wall) to provide a clear, visual marker of differing knowledge states between speaker and hearer—an approach shown in previous research to support perspective-taking even in infants (Luo and Baillargeon 2007; Choi et al. 2018; Brezack et al. 2021). Second, the area in front of a wall provides a bounded, easy-to-track domain for a small set of discourse referents, and the task of introducing the referents by themselves serves to reinforce children’s memory of them. The setup also addresses two factors suggested in the literature that may pose challenges to children: (i) visual salience—the referent is already visually absent when Question 2 (*What happened?*) is asked, which serves to reduce interference from visual information with article choice (Karmiloff-Smith 1979; van Hout et al. 2010); and (ii) prompt bias—*What happened?* targets the event, without asking children to identify a particular entity (e.g., *Who was laughing?*), thus it minimizes participants’ assumptions about their interlocutor’s knowledge about any referents (Maratsos 1976; De Cat 2012).

7.1.5. Conditions

We employ a 2 (Trial Type: unique vs. nonunique) $\times$ 2 (Question: 1 vs. 2) $\times$ 2 (Age: adults vs. children) design, with Trial Type and Question within subjects.

7.1.6. Predictions

Table 8 summarizes the predictions for children’s performance in Experiment 2 according to different factors.

For factors that attribute children’s errors to semantic limitations (i.e., not knowing that *the* requires a uniquely identifiable referent in the context), children are expected to struggle with their article choice in nonunique anaphoric contexts even under favorable conditions, resulting in chance-level accuracy. As for factors that attribute errors to pragmatic immaturity (e.g., difficulty inferring

Table 8. Predictions of major factors for Experiment 2 by experimental contexts.

Factors	Introductory context	Anaphoric context	
		Nonunique	Unique context
Semantics		Chance-level accuracy (overuse of <i>the</i>)	
Pragmatics	Above-chance accuracy	Above-chance accuracy	Chance-level accuracy (underuse of <i>the</i>)
Social cognition	Chance-level accuracy (overuse of <i>the</i>)	Chance-level accuracy (overuse of <i>the</i>)	Chance-level accuracy (underuse of <i>the</i>)
Processing	Above-chance accuracy	Above-chance accuracy	Above-chance accuracy

Above-chance performance is defined as 5 or more felicitous out of 6 trials, 4 or more out of 5 trials, or 3 or more out of 4 trials, depending on the number of valid trials a child produced.

what domain is relevant or abiding by Maximize Presupposition), children may succeed in some contexts but not others depending on the pragmatic inference involved. In our test scenario with explicit perspective-taking features, this class of hypotheses predict that children should show above-chance accuracy in both introductory contexts and nonunique anaphoric contexts; however, under the hypothesis that children struggle with evaluating alternative forms (e.g., *the* vs. *a*) that differ only in presuppositional strength, we would expect them to show chance-level accuracy in unique anaphoric contexts.

If limitations in social cognition (i.e., egocentrism, difficulty differentiating speaker and hearer knowledge) pose fundamental challenges for children, their correct usage is expected to be at chance level for both introductory and nonunique anaphoric contexts. Additionally, if social cognitive limitations, Theory of Mind in particular, further hinder children from understanding the implicature of an indefinite (e.g., failing to recognize that *a* signals a new referent), then we would expect them to be at chance in unique anaphoric contexts. However, if processing limitations (e.g., working memory, maintaining distinct perspectives, inferential demands) are mainly responsible for errors, then we would expect them to perform above chance across all three contexts, as our task provides favorable conditions with minimized cognitive demands.

7.2. Results

7.2.1. Participants

A total of 34 children (15 males) between the ages of 3;4;15 and 5;0;23 (mean: 4;4;17) 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 the University of Maryland, College Park, as adult controls.

7.2.2. The-*N* responses

Our results indicate that, as a group, children, like adults, respect the presuppositions of *the*-definites. Figure 5 shows the percentage of *the N* responses to the two test questions by trial type. For introduction contexts following Question 1 (*What do you see?*), neither adults nor children used *the N* when the intended referents were unfamiliar to the hearer. For anaphoric contexts following Question 2 (*What happened?*), participants primarily used *the N* to refer back to a unique referent (children: 81.9%, $SD = 0.321$; adult controls: 97.8%, $SD = 0.057$), but for nonunique contexts, they rarely used *the N* for a nonunique referent (children: 13.3%, $SD = 0.275$; adult controls: 0%).⁹ A paired-samples *t*-test confirmed that children produced significantly more *the N* responses in unique than in nonunique trials, $t(33) = 10.78$, $p < .001$, 95% CI [55.60, 81.46], mean difference = 68.53%. Notably, systematic misuse of *the N* for nonunique contexts was limited only to 3 children (out of 34) in the sample.¹⁰ This suggests that the vast majority of children know that using *the N* is inappropriate for picking out nonunique referents.

7.2.3. Felicitous responses

Both adults and children produced felicitous responses at rates significantly above chance across trial types (Table 9).

⁹Children rarely had memory issues with recalling the unique object that Elmo removed (5.6%; 11/197). For the 9 children who ever had memory issues, this either happened only once (7 children) or twice (2 children).

¹⁰Unlike other children who produced much fewer errors, the three children (all at age 4) showing systematic overuse of *the*-definites seemed to represent nontarget-like domains of reference already in the initial setup. This is indicated by their responses to Question 1 in scenarios with two nonunique referents (e.g., *two boxes*), in which they used either 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 may be responsible for children's overuse of *the*-expressions.

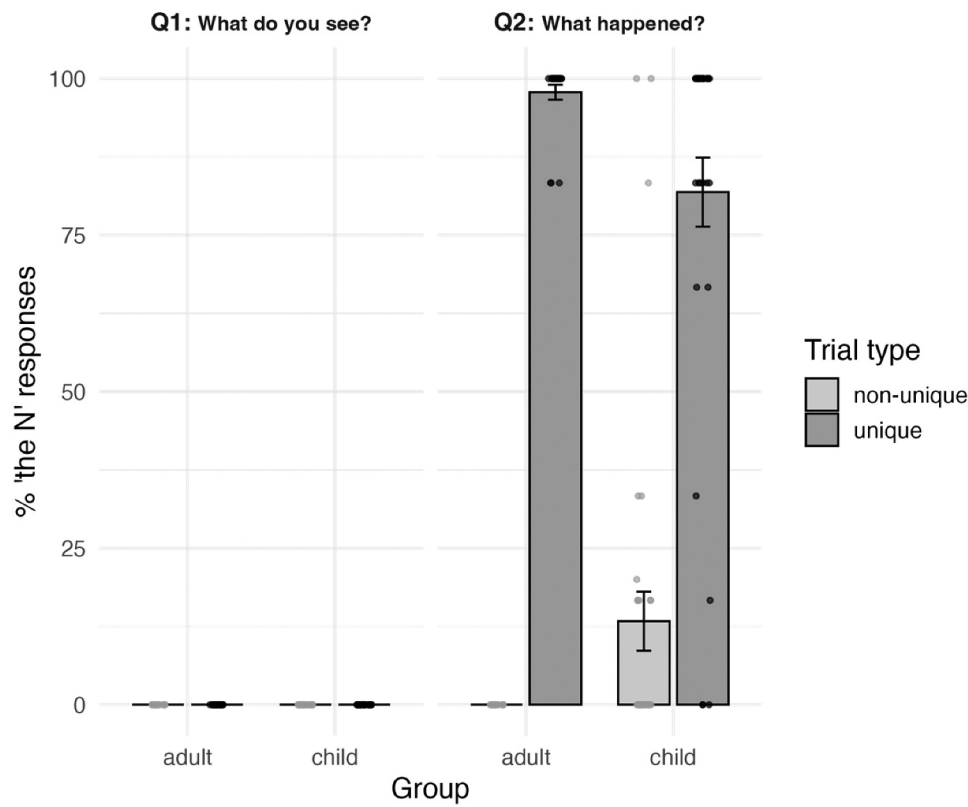


Figure 5. Percentage of the *N* responses to Q1 (*what do you see*) and Q2 (*what happened*) by trial type in experiment 2.

Table 9. Participants' percentage of felicitous responses in experiment 2 and one-sample t-tests.

Group	Trial type	Question	n	M (%)	SD	One-sample t-test against chance	Notes
Adult	Unique	Q1	23	100.0	0	NA	ceiling
		Q2	23	99.3	0.035	$p < .001^{***}$ 95% CI [97.8, 101]	
	Nonunique	Q1	23	99.3	0.035	$p < .001^{***}$ 95% CI [97.8, 101]	
		Q2	23	100.0	0	NA	
Child	Unique	Q1	34	98.9	0.044	$p < .001^{***}$ 95% CI [97.4, 100]	ceiling
		Q2	34	84.8	0.327	$p < .001^{***}$ 95% CI [73.4, 96.2]	
	Nonunique	Q1	34	85.0	0.287	$p < .001^{***}$ 95% CI [75.0, 95.1]	
		Q2	34	82.0	0.302	$p < .001^{***}$ 95% CI [71.4, 92.5]	

A linear mixed-effects model indicated that children produced fewer felicitous responses than adults ($b = -14.23$, $SE = 5.57$, $t(211) = -2.55$, $p = .011$), with no significant effects of trial type (unique vs. nonunique), question (Q1 vs. Q2), or their interaction. On a closer look, most children performed above chance for both questions and across trial types (see Figure 6), suggesting that children overall grasp the core semantics and pragmatics of definite descriptions. Children's infelicitous responses were randomly scattered across contexts and children. These errors could reflect experimental noise, or remaining challenges with the task. It might be, for instance, that children find it more difficult than

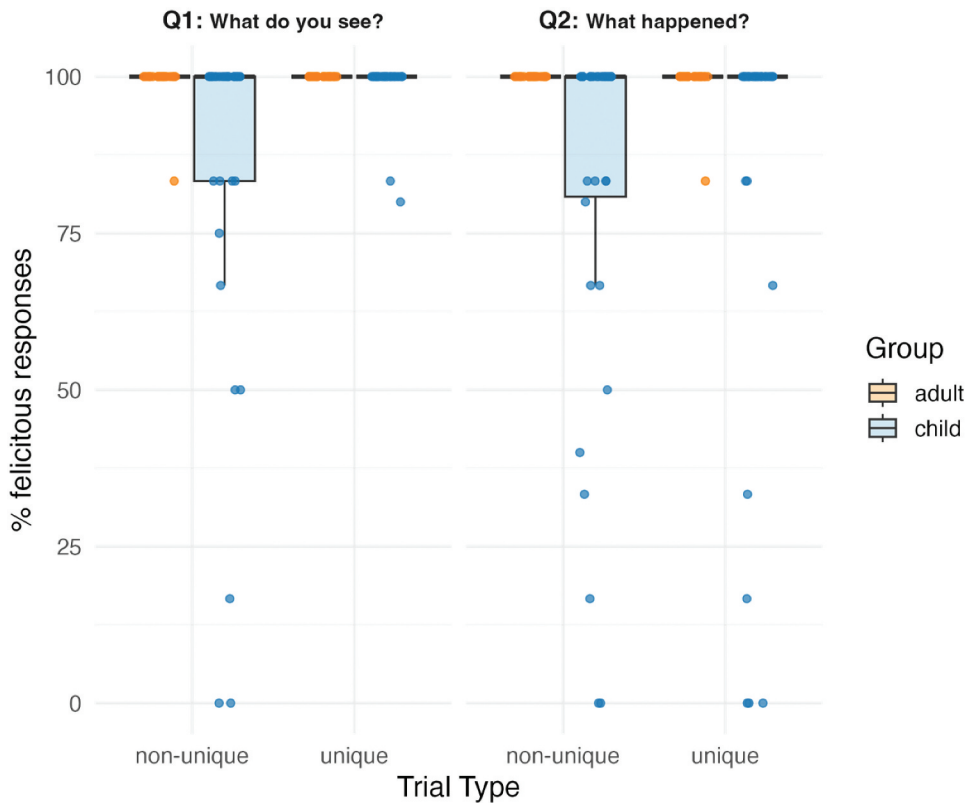


Figure 6. Boxplot of the percentage of felicitous responses to Q1 (*what do you see*) and Q2 (*what happened*) by trial type in experiment 2.

adults to select the single most appropriate way to refer to the intended referent, among several possible choices.

A child-by-child analysis was conducted to examine individual variation. For Question 1 (introductory contexts), the proportion of children with above-chance performance was 100% (34/34) for unique referents and 82.4% (28/34) for nonunique referents. For Question 2 (anaphoric contexts), the proportion of children with above-chance performance was 82.4% (28/34) for unique referents and 76.5% (26/34) for nonunique referents.

These results indicate that most children succeeded in the task, confirming that the group-level findings reflect the population as a whole. These results are broadly consistent with processing factors underlying previous findings of article misuse (which predict above-chance performance across contexts) but are difficult to reconcile with factors predicting chance-level performance—specifically, semantic limitations (nonunique anaphoric contexts), pragmatic immaturity (unique anaphoric contexts), and conceptual limitations (all contexts).

7.2.4. Age effects

For Question 1, Spearman correlations suggest that children's percentage of felicitous responses did not correlate with age (in days) for either unique referents ($\rho = -0.107$, $p = .549$) or nonunique referents ($\rho = 0.192$, $p = .277$). For Question 2, Spearman correlations suggest that children's percentage of felicitous responses correlated with age (in days) for nonunique referents ($\rho = 0.356$, $p = .039$) but not for unique referents ($\rho = 0.110$, $p = .537$). Thus, children's felicitous responses appeared stable with age for both unique and nonunique referents in introductory contexts, but in anaphoric contexts, older children showed more felicitous responses specifically in nonunique trials.

7.2.5. Choice of NP forms

Children’s responses to Question 1 and 2 confirm that their choice of referring expressions depends on both the question and the uniqueness of the referent. For Question 1, *What do you see*, which asked children to introduce two unfamiliar referents, they predominantly used conjoined indefinite singular NPs (*a/an/one N and a/an/one N*: 93.9%, 185/197) for unique referents, but indefinite plural NPs (*two Ns*: 61.0%, 119/197; *Ns*: 23.6%, 46/197) for nonunique ones (Figure 7).

For Question 2, *What happened*, which required children to refer back to one of the two referents, children used mostly *the N* (82.2%, 162/197) anaphorically for unique referents, and they correctly switched to indefinite NPs (*one of the Ns*: 29.2%, 57/197; *one N*: 26.7%, 52/197; *a/an N*: 13.8%, 27/197) or modified definite NPs (*the Adj N*: 11.8%, 23/197, e.g., *the other bag*, *the first book*) for nonunique ones (Figure 8). Children’s choice of NP forms was notably more variable than adults,’ especially when introducing or referring back to nonunique referents anaphorically. For instance, in the anaphoric cases, while some children consistently produced *one of the Ns*, like most adults did, others opted for *one N*—a shorter counterpart that omits the restrictor *of the Ns*—potentially reflecting processing demands (De Cat 2012) or a developing command of partitive constructions. While children show this greater variability in NP form compared to adults, most of the forms are context appropriate and do not seem to reflect a misunderstanding of the semantics or pragmatics of these expressions.

7.3. Summary

In an elicited production task designed to support perspective-taking and discourse tracking, pre-school-age children, like adults, generally respected the presuppositions of *the*-definites. More broadly, their use of referring expressions was largely similar to adults, though more variable. Use of *the N* for introducing referents was not observed, consistent with the idea that children can reliably differentiate between perspectives and do not overextend presuppositions based on their own visual information when their interlocutor clearly lacks that information. Children predominantly used *the N* for uniquely identifiable referents in the discourse, consistent with the possibility that prior reports of underuse in similar anaphoric contexts may reflect processing limitations in maintaining the discourse for subsequent article choice; most children show pragmatic preference for a definite over an indefinite when the presuppositions of a definite are satisfied. Crucially, in minimally different

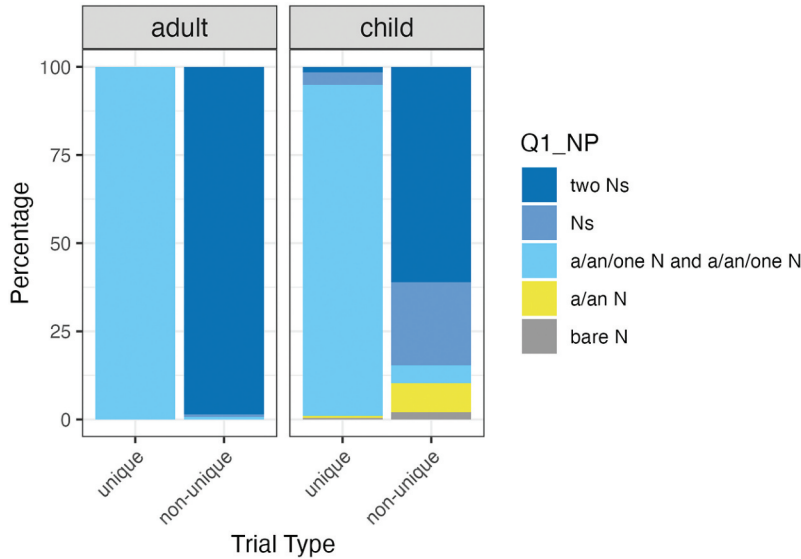


Figure 7. Percentage of noun phrases (NP) forms to Question 1 by group and trial type in experiment 2.

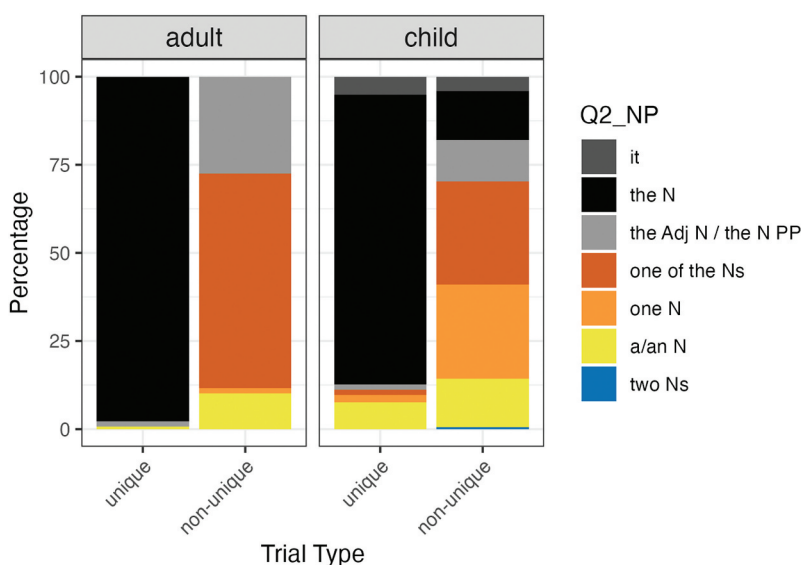


Figure 8. Percentage of noun phrases (NP) forms to Question 2 by group and trial type in experiment 2.

anaphoric contexts with nonunique referents, they correctly produced indefinites or modified definites instead, which is compatible with the view that prior reports of *the*-misuse in such contexts may be less likely to reflect incomplete semantic knowledge of definites. Overall, these findings seem to point to children's early linguistic competence, while also suggesting that residual differences between children and adults are, by and large, attributable to ongoing convergence on adult-like preferences among the range of contextually appropriate NP forms, rather than to a lack of semantic or pragmatic knowledge.

8. General discussion

This paper set out to identify the source of children's reported production errors with the English definite article *the*. Do children have the right meaning for *the*? Do they know the licensing conditions that govern its use? Do they have the nonlinguistic capacities required to assess whether those conditions hold? And can they deploy these capacities to accurately assess whether those conditions are met in a given discourse context? In a series of four studies examining children's article production in both natural and elicited contexts, we found little evidence that children lack the relevant knowledge of the meaning of *the*. While some minor differences between children and adults remained, their source awaits further investigation.

We conducted two corpus studies and one experiment aimed at characterizing children's natural article production. These studies showed very little evidence that children have difficulty with the abilities underlying appropriate article usage. In our first corpus study, we found that children do not use singular definite NPs more than their parents do. Their rate of definite NP usage was in fact lower than that of their mothers. When we looked at more specific syntactic environments that might reveal specific discourse challenges, we again did not observe a higher rate of *the* in children's speech. In our second corpus study, we probed the frequency of miscommunication driven by children using *the* in environments where it would be unexpected. We found that communication breakdowns due to article misuse appear to be as rare for children talking to adults as for adults talking to each other. In our third corpus-based experiment, we asked whether adults would be better at guessing the intended determiner produced by mothers than by children. We found that adult participants were equally good at guessing children's and adults' article uses from age three. Thus, across these three studies we find

little evidence of systematic differences in article use between children and mothers. While such corpus work cannot definitively show that children have all of the semantic, pragmatic and conceptual tools required to support appropriate usage, it nonetheless raises the possibility that the experimental contexts in which children were asked to produce articles may pose extra challenges to their performance.

To assess this possibility, we conducted an experiment aimed at eliciting definite and indefinite articles. The elicitation contexts we provided had two critical features. First, the contexts were embedded in a conversation where the children were participants. Second, they were stripped down to their semantic and pragmatic bare bones. These minimal conversational contexts contained just the information that children would need to reveal whether they had the relevant linguistic and non-linguistic tools in place. In creating these contexts, we aimed to reduce contextual challenges in order to better understand what children can do under conditions with minimized cognitive demands. Here again, we found that children overwhelmingly used indefinite NPs in indefinite-eliciting contexts and definite NPs in definite-eliciting contexts. Children's patterns of performance were overwhelmingly consistent with knowledge of the licensing conditions of definites. In this light, production errors may largely reflect performance issues that are amplified in experimental contexts.

One ability often thought to support article use is theory of mind. The acquisition of semantics and pragmatics depends importantly on theory of mind, from the earliest stages onward (Papafragou 2001; Luo and Baillargeon 2007; Kovács et al. 2010, 2017; Tomasello 2010; Dudley 2017; Rubio-Fernández 2021; Hacquard and Lidz 2022). It would not be possible for children to acquire the use of *the* unless they could follow the communicative intents and shared perspectives of their interlocutors as conversations around them unfold. Consistent with related prior work (Saylor and Ganea 2007; Dudley et al. 2015, 2017; Lewis et al. 2017; Hacquard and Lidz 2019), we have found no support for the view that this mastery is gated by a deficient theory of mind. Already at age four, and possibly sooner, children largely know when to use *the*.

While children may represent presuppositional information as being shared between conversational partners, they may nonetheless show difficulty in identifying that common information in certain situations. Recent reviews of presupposition development have similarly concluded that preschoolers possess considerable presuppositional abilities, though they continue to show difficulties when the identification of shared information becomes cognitively demanding (Giunta and Pouscoulous 2026). In the case of definite articles, this difficulty may manifest as child–adult differences in the ease of monitoring communicative contexts, contributing to variations in article choice across production contexts. Prior elicitation contexts—such as story-telling (Warden 1976; Emslie and Stevenson 1981), story completion (Maratsos 1974; van Hout et al. 2010), and question-after-story tasks (Schafer and de Villiers 2000)—each valuably illustrated specific challenges children face in article production. At preschool age, they likely struggle in generating a narrative, tracking referents through extended discourse, or implicitly inferring the experimenter's knowledge state. In this light, we created a context with minimized cognitive and inferential demands in our final study. We helped support the identification of what is shared and what is not shared by providing a clear cue to the visual perspective of the interlocutor (namely, the wall that separated the child from their interlocutor). This feature of our study allowed us to see how the child understood the discourse conditions on the use of *the* without interference from visual perspective-taking. Similarly, by limiting the domain of reference to a set of only two objects that was both visually and linguistically established, children were able to correctly evaluate that domain for referent uniqueness at different points in the discourse, without the interference of memory demands. In addition, with a neutral elicitation prompt (*What happened?*) from the interlocutor that signaled genuine ignorance, children were less likely to presuppose shared knowledge when producing articles.

Our results highlight a methodological point that has been emphasized by a diverse set of researchers: creating contexts with clear social and communicative goals can make it easier for researchers to identify young children's knowledge. This point has been made in literature examining pragmatic development (e.g., Moyer et al. 2015; Grigoroglou and Papafragou 2019), syntactic

development (e.g., Hamburger and Crain 1982), theory of mind (e.g., Buttelmann et al. 2009), and altruism (e.g., Warneken and Tomasello 2006; Warneken 2016).

Taken together, our findings provide new evidence that children's knowledge of the licensing conditions on the use of definite determiners is squarely in place by age four. This said, small differences remained between children and adults in our task and fewer than 10% of the children in our study showed systematic misuse. This 10% may reflect some of the factors identified in previous studies, or it may reflect experimental noise. Only future work can tell. These results raise questions for subsequent research: if children possess the relevant linguistic knowledge, what accounts for the residual differences observed in natural and elicited contexts? And under what conditions do those differences emerge or disappear? By reducing contextual demands and pushing children's limits in a task they have consistently struggled with, this work advances our understanding of what children can do and where their difficulties with definites potentially lie. Nonetheless, children's difficulties with definites does not seem to be rooted in erroneous linguistic representations.

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No potential conflict of interest was reported by the author(s).

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Data availability statement

The data that support the findings of this study are openly available on the OSF (Open Science Framework) at this link: https://osf.io/65ps7/?view_only=44643c82d51043fb83164892277dbfca.

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Appendix. List of referential contexts in experiment 2

Unique referent contexts (the object taken away in bold)	Nonunique referent contexts (one of the two objects taken away)
A bottle and a mug	Two bags
A ball and a car	Two boxes
An orange and an apple	Two bananas
A bear and a duck	Two books
A carrot and a hat	Two boats
A truck and a cake	Two bowls