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Syntactic and Pragmatic Factors in Children's Comprehension of Cleft Constructions

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ABSTRACT

We present a series of experiments investigating English-speaking children's comprehension of *it*-clefts and *wh*-pseudoclefts. Previous developmental work has found children to have asymmetric difficulties interpreting object clefts. We show that these difficulties disappear when clefts are presented in felicitous contexts, where children behave adultlike both in their evaluation of the truth of cleft sentences and in their response-time patterns. When the pragmatic requirements on cleft use were not satisfied, children succeeded only on some types of clefts. However, they did not uniformly show difficulties with infelicitous object clefts; rather, success correlated with the amenability of the structure to a word-order-based parsing strategy. We argue that children fail to build an adultlike representation for infelicitous clefts across the board, but pressures to carry out the task lead them to adopt interpretive means outside of what is licensed in adult grammar.

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1. Introduction

Languages make use of various prosodic, lexical, and syntactic means to express information structure. In this article, we focus on a common syntactic device used for this purpose, the cleft construction. In clefts, a complex structure involving displacement is employed primarily to mark information structural distinctions. The cleft sentences in (1a–b) make the same truth-conditional contribution as the simple transitive sentence in (2). However, in choosing to utter sentences as in (1a–b) over (2), the speaker conveys additional information concerning the discourse status of the sentence constituents, for instance, that "a dog" is new or contrastive information.

(1) a. It's a dog that is chasing the cat. *It-cleft*
b. What's chasing the cat is a dog. *Pseudocleft*
(2) A dog is chasing the cat.

The task for a child learning the English cleft construction is twofold: (i) she must identify and build the appropriate syntactic structure for cleft sentences, and (ii) she must identify the discourse-pragmatic conditions under which such sentences can be used. How does a child go about learning these two independent components of a structure in which the two go hand in hand? There are three logically possible acquisition trajectories. Children may first acquire the syntax of cleft sentences, initially not being fully sensitive to the pragmatic conditions on their use. Conversely, they may be show sensitivity to pragmatic aspects of clefts before they can build an adultlike syntax for these sentences. A final possibility is that the two components are acquired simultaneously.

In this article, we take the first steps toward understanding the development of both syntactic and pragmatic aspects of cleft sentences by investigating children's comprehension of two types of cleft

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structures: *it*-clefts (1a) and specificational pseudoclefts (1b). We show that as early as 4 years of age, children have sophisticated understanding of cleft syntax and how these sentences are employed in conversation. However, children seem unable to deploy their syntactic knowledge when the pragmatic conditions on cleft use are violated. We argue that this is not a sign of their nonadult grammar of clefts but rather of their still-developing abilities to adjust the context to accommodate an otherwise infelicitous utterance. We take children's divergent behavior on felicitous and infelicitous clefts as indication that the syntactic and pragmatic aspects of these structures are learned simultaneously by children, who, from the get-go, take the cleft construction to be a grammatical device recruited specifically to mark an informational link between the current utterance and the prior discourse context.

We will begin by providing some background on cleft constructions in Section 2. In Section 3, we discuss previous studies on the acquisition of clefts and argue that the demands imposed by the experimental tests in previous studies may well have underestimated children's competence. Sections 4 and 5 report on a series of experiments that test children's comprehension of *it*-clefts and pseudoclefts in an environment where the potential demands imposed by the felicity conditions of clefts were controlled. Section 6 presents a model of pragmatic development that explains the results from Sections 4 and 5 and considers some of the further implications of our findings.

2. Background

A cleft construction is a complex sentence structure consisting of a copular main clause and a relative or relative-like clause with an A-bar gap.[1] This gap is coindexed with the predicative argument of the copula. Throughout, we use the term CLEFT CLAUSE to refer to the relative-like clause and PIVOT to refer to the coindexed argument, as schematized in (3).

(3) a. It's [a dog] [that ___ is chasing the cat.] *It-cleft*
PIVOT CLEFT CLAUSE
b. [What ___ is chasing the cat] is [a dog] *Pseudocleft*
CLEFT CLAUSE PIVOT

Taken together, the pivot and the cleft clause express a proposition that would be expressible in the form of a simple declarative sentence. Thus, (3) and (4) may be used in the same situations, modulo cleft-specific discourse conditions, discussed in the following.

(4) A dog is chasing the cat.

One would therefore adopt the noncanonical cleft form to mark additional discourse-pragmatic features, rather than to mark truth-conditional differences. Clefts come with certain interpretive properties that set them apart from simple declaratives. The first property of relevance to this article is an existence presupposition. The second relates to certain discourse-congruence constraints. In the following we discuss both in turn.

Before doing so, we would like to note that clefts are associated with a third interpretive feature, exhaustivity, which will not be discussed in detail in this article. Cleft sentences of the form *It is x that P* conveys not only that *x* satisfies *P* but also that *x* is the only individual in the relevant contextual domain to do so. The precise nature of this inference is debated (see, e.g., Atlas & Levinson 1981; Horn 1981; Velleman et al. 2012; Büring & Križ 2013; Križ 2016), but at least intuitively, exhaustivity differs from the other two interpretive properties in that it is not a *precondition* on felicitous use of a cleft. Though we will not focus on this aspect of clefts in this article, all of our experimental items are designed in such a way that the exhaustivity inference is supported.

[1]Clefts pass standard diagnostics of A-bar movement, including island sensitivity, weak crossover effects, parasitic gap licensing, etc. (e.g., Chomsky 1977).

Clefts are associated with a semantic presupposition that the property denoted by the cleft-clause must hold for some contextually relevant entity (Akmajian 1970; Higgins 1973; Rooth 1985; Percus 1997; den Dikken 2009). To felicitously use sentences like (3), it must already be established and uncontroversial in the context that the cat is being chased by something. This existence presupposition is also taken to be behind the ill-formedness of sentences like (5), where the assertion that nobody won the lottery contradicts the presupposition that somebody did in fact win.

(5) #It's nobody that won the lottery.

A second key interpretive property of clefts concerns the distribution of old and new information within the sentence, in what we will refer to as their CONGRUENCE REQUIREMENT. The congruence requirement involves two subcomponents, in many ways inextricable from each other, that relate to focus and givenness. Clefts are focus constructions, and the main focus, expressed through prosodic prominence, falls on the pivot. Unlike in canonical English sentences, where focus placement is free (i.e., any constituent may be rendered prosodically prominent in situ), the focus structure of cleft sentences is rigid; the pivot *must* bear main focus. Examples[2] (6) and (7) illustrate this property using *wh*-questions as a probe. Following Halliday (1967) and much work since, we assume that in a question-answer pair, the constituent in the answer that corresponds to the *wh*-phrase in the question bears focus. In clefts, if the constituent corresponding to the *wh*-phrase, i.e., the one bearing focus, does *not* occupy the pivot position, the sentence is infelicitous (marked with #).

(6) Q: What is chasing the cat? (The dog or the horse?)
  a. The DOG is chasing the cat. *Simple Sentence*
  b. It is the DOG that is chasing the cat. *It-cleft*
  c. What's chasing the cat is the DOG. *Pseudocleft*

(7) Q: What is the dog chasing? (The cat or the mouse?)
  a. The dog is chasing the CAT. *Simple Sentence*
  b. #It's the dog that is chasing the CAT. *It-cleft*
  c. #What's chasing the CAT is the dog. *Pseudocleft*

The flip side of the obligatory focal status of the pivot is the obligatory *discourse-given* status of the cleft-clause. For a cleft to be felicitous, the information conveyed by the cleft-clause must be explicitly mentioned or, minimally, readily accessible in the active discourse context (Rochemont 1986; Delin 1992; Lambrecht 2001, a.o). In fact, some authors have suggested that the cleft clause is anaphoric to the current Question Under Discussion (Velleman et al. 2012; Abrusan 2016).

Though this givenness requirement is often conflated with the existence presupposition, it is independent, as can be illustrated by cases like (7).[3]

(7) A: Harvard is a great school.
  B: Yes. #It's my daughter that went to Harvard.

If all that was required for felicitous use of clefts was that the context entails the existence presupposition of the cleft clause, B's assertion in (7) should be acceptable, as anyone who knows what Harvard is surely also knows that thousands of people have attended Harvard. What the infelicity of this response teaches us is that the information conveyed by the cleft-clause must be

[2]In this article, we leave aside what Hedberg (1990) calls Topic-Comment clefts, exemplied in (i), which are licensed in different contexts altogether:
(i)Speaker A: Do you know Mary?
Speaker B: Of course I know Mary. It's Mary who introduced me to linguistics.

[3]This example is inspired by examples in Heim (1990) illustrating the anaphoricity of the additive presupposition of *too*.

presently under discussion. Thus, had speaker A instead uttered something like, "So, you have a Harvard alumni in your family." B's response using a cleft would be felicitous.[4]

For the purposes of this article, we might think of the congruence requirement as imposing constraints on the topic of inquiry or Question Under Discussion (QUD) that a cleft can address. Clefts can only be used felicitously as answers to questions that are "about" the cleft clause and exhaustively answerable by the cleft pivot (Atlas & Levinson 1981; Kiss 1998).

There is unfortunately little agreement in the literature on how to compositionally derive the aforementioned interpretive properties of clefts from their syntactic structure. Moreover, the syntactic structure of clefts is also an area of lively debate. We will briefly review three prominent lines of analyses of cleft syntax, with a focus on how acquisition data can be brought to bear on some of their predictions. It should be noted, however, that our summaries of these accounts are somewhat simplified for the sake of space; the reader is referred to Hedberg (1990) and den Dikken (2009) for detailed reviews.

One family of analyses takes the cleft pivot to originate inside the cleft-clause and then undergo A-bar movement to the specifier of a dedicated Focus position (e.g., Chomsky 1977; Kiss 1998; Drubig 2003). The landing site of movement is associated with a particular operator that encodes the semantic/pragmatic effects associated with cleft sentences. We will refer to these analyses as the FOCUS MOVEMENT approach. Importantly, the focus movement accounts apply exclusively to *it*-clefts, as the cleft-clause in pseudoclefts is transparently a free-relative, a barrier for A-bar movement. For supporters of the focus movement approach, any parallels between *it*-clefts and pseudoclefts are accidental. This aspect of these analyses leads to an important acquisition prediction that is distinct from the other two accounts we will consider: On this view, children are not necessarily predicted to show a parallel acquisition trajectory for *it*-clefts and pseudoclefts.

A second family of analyses, the PREDICATE INVERSION view, takes both *it*-clefts and pseudoclefts to be double-NP copular sentences where the underlyingly predicative argument of the copula has "inverted" (Williams 1983; Moro 1997; Heycock 1994; den Dikken 1995, 2006; Percus 1997; Mikkelsen 2005). The copula first takes a small clause complement consisting of a subject and a definite DP[5] predicate, as in (11a), and the latter raises across the underlying subject to the structural subject position (Spec, TP), as in (11b).

(11) a. *be* $[_{SC}$ $[_{SUBJ}$ The dog] $[_{PRED}$ what's chasing the cat]
b. $[_{TP}$ $[_{PRED}$ what's chasing the cat] *is* $[_{SC}$ $[_{SUBJ}$ the dog] $t_{PRED}]$

It-clefts are derived from specificational pseudoclefts after an additional movement step (Percus 1997): The cleft clause initially starts out in a definite description consisting of a null noun and a restrictive relative, as in (12a), and the relative clause undergoes extraposition (12b). The cleft pronoun *it* is the spell-out of the definite determiner and the null noun.[6]

(12) a. $[_{TP}$ $[_{PRED}$ The ∅ that's chasing the cat] *is* $[_{SC}$ $[_{SUBJ}$ the dog] $t_{PRED}]$
b. $[_{TP}$ $[_{PRED}$ It $t_{REL}]$ *is* $[_{SC}$ [the dog] $t_{PRED}]$ $[_{REL}$ that's chasing the cat]

[4]A reviewer points out that the oddity of (7) may be due to the fact that the exhaustivity inference of clefts is not satisfied: After all, it is common knowledge that many people have attended Harvard besides the speaker's daughter. To show that clefts are indeed subject to the Congruence Requirement as proposed, we will therefore need to show that sentences like (7) are odd even when exhaustivity does not come into play. It has been observed (e.g., Horn 1981) that exhaustive inferences are not usually drawn with negated clefts. For instance, upon hearing (i), we do not draw the inference that the speaker's daughter is the only individual who fails to have the property of having attended Harvard. In spite of this, the utterance is infelicitous in the same context as (7).

(i)It's not my daughter that went to Harvard.

[5]Free relative clauses are generally thought to be definite descriptions, involving a silent definite determiner (e.g., Caponigro 2003).

[6]Other analyses agree with Percus (1997) that the cleft pronoun and the cleft clause are related semantically but disagree about the syntactic origins of the cleft clause. For instance, Hedberg (2000) and Reeve (2012) take the cleft clause as being adjoined to the VP.

On the predicate inversion analysis, the existence presupposition of clefts is due to the definite determiner, and the fixed information structure of these sentences is tied to the featural content of the arguments (e.g., a *Topic*-feature on the predicate nominal).

Predicate inversion analyses diverge from the focus movement analyses in their predictions about the acquisition of pseudoclefts and *it*-clefts. Since predicate inversion analyses take the two cleft types to be derivationally related, simultaneous or near-simultaneous acquisition is expected for the two structures. If the extraposition step necessary for deriving *it*-clefts from pseudoclefts is a potential source of delay, there might be an ordering prediction: Pseudoclefts should be acquired prior to *it*-clefts. Another prediction for child language concerns the predicate-raising step. On this approach, the cleft-clause undergoes A-movement past the small-clause subject to the structural subject position, in a move that is at least descriptively parallel to what happens in passives. Passives have been found to be particularly challenging for young children, a difficulty often attributed to raising across intervening subjects (Wexler 2004; Orfitelli 2012). If clefts involve a similar configuration, we might expect children to have similar sorts of difficulties with these structures.

Finally, a third line of analysis takes cleft constructions, in particular pseudoclefts, to involve a concealed question[7] and its answer flanking the copula (Faraci 1970; Ross 1972, 1997, 2000; den Dikken, Meinunger & Wilder 2000; Schlenker 2003; Romero 2005). The starting point for these QUESTION-ANSWER PAIR analyses is certain parallels between cleft structures and genuine question answer pairs, as shown in (13). In both cases, a full answer form is taken to be syntactically present, though phonologically deleted.

(13) a. What does John like? himself.
b. What John likes is himself.[8]

Syntactically, these "self-answering questions" have been argued to be topic-comment structures, where the cleft-clause/concealed question is generated in a Topic position, linked by the copula to a full clausal "comment" (e.g., den Dikken, Meinunger & Wilder 2000).

To our knowledge, a precise formulation of how this account extends to *it*-clefts has not been explicated, but the extraposition step assumed in the predicate inversion analysis is compatible with the question-answer pair account. Thus, predictions concerning the order of acquisition of the two cleft structures may not differ between this account and the predicate inversion view. However, the question-answer pair analysis disagrees with the predicate inversion view on the issue of A-movement across an underlying subject. So, on this account, children are not expected to show the same sort of difficulties with clefts as they do on passives.

To summarize, clefts are associated with both idiosyncratic interpretive properties and noncanonical syntax, but the precise mechanisms for deriving them are debated. Despite the lack of agreement in the literature, we will make a few assumptions here as a starting point for our experimental investigations. These assumptions are basic and uncontroversial under most approaches to clefts.

- **Assumption 1**: A cleft construction and its canonical simple sentence counterpart are equivalent in their literal meaning and can describe the same situations.
- **Assumption 2**: Syntactically, cleft sentences, unlike the canonical counterpart, involve displacement. More specifically, there is A-bar movement originating inside the cleft-clause.
- **Assumption 3**: A cleft sentence, unlike the canonical counterpart, is only felicitous in contexts where their existence presuppositions and congruence requirements are met.

[7] In concealed questions, the interrogative meaning appears to be expressed by something that does not have the overt syntax of a question. In (i), for instance, the question meaning comes from the nominal phrase *the time*. There is evidence that the cleft clause in clefts are syntactically relative clauses (see den Dikken 2005 for an overview), hence the treatment of them, at least on some analyses, as a *concealed* question and not a garden-variety interrogative.
(i) I'd like to know the time. (= I'd like to know what time it is).

[8] The copula here is not intended to be the normal copular verb found in predicational sentences but an equation/identity operator relating a question to an elided form of its answer.

Before we turn to our own studies, we will review some of the earlier work on the acquisition of cleft structures.

3. Clefts in child language

In this section, we summarize some of the previous work on the comprehension of cleft structures in English.[9] We point out that previous studies have tended to overlook the complex interpretive requirements that clefts impose on the discourse, making the conclusions drawn from them suspect at the very least. We therefore conclude that some of the foundational questions about children's understanding of clefts remain open, before transitioning to the discussion of our studies, designed to address some of these questions.

3.1. *Subject-Object asymmetries*

The most robust finding from previous studies of child clefts is a pronounced difference between children's comprehension of sentences in which the clefted constituent is the thematic subject (subject clefts, henceforth) and those in which the clefted constituent is the thematic object (object clefts). The earliest studies on clefts (e.g., Bever 1970, Lempert & Kinsbourne 1980) tested children on both subject and object *it*-clefts using act-out tasks and found that the same children showing ceiling-level performance on subject clefts performed considerably less well on object clefts. The authors in both cases took this asymmetric performance to indicate that children at this stage did not have adultlike knowledge of the grammar of clefts but used a child-specific heuristic to succeed on subject clefts. Specifically, they argued that while both subject and object clefts are noncanonical in employing the more complex cleft syntax, the lexical elements in subject *it*-clefts conform to the

(14) a. It's **a dog** that is **chasing the cat**. *Subject cleft*
S V O
b. It's **a cat** that **the dog** is **chasing**. *Object cleft*
O S V

canonical SVO word order and were therefore amenable to surface word-order-based interpretive strategies. A word-order-based strategy would not work in the case of object clefts, where the arguments do not linearly correspond to the canonical word order.

Subsequent studies on *it*-clefts replicate this subject-object asymmetry. Dick et al. (2004) used a binary sentence-picture matching task to assess children's understanding of subject and object clefts and found that until around age 8, children showed lower accuracy on object clefts than subject clefts. The authors take children's success on subject clefts at face value and attribute their low performance on object-clefts to the extreme low frequency of these constructions.[10] Hirsch & Wexler (2006) report chance-level performance on object clefts from children who showed adultlike accuracy rates on subject clefts. Assuming a predicate inversion analysis of clefts, the authors argued that the same factors underlie children's difficulties with object clefts and passives, namely, an inability to carry out certain kinds of A-movement. Like some of their predecessors, the authors

[9]In this literature review, we restrict our attention to comprehension studies of clefts. A few studies have examined spontaneous and elicited production of clefts (Lobo, Santos & Soares-Jesel 2016; Hupet & Tilmant 1989) and find asymmetries between production of subject and object clefts. It is not clear to us that the same underlying factors are at the source of these asymmetries in production vs. comprehension. Unlike comprehension, the *use* of a syntactically and information-structurally marked construction is modulated by the existence of simpler competing structures. It is possible, for instance, that the increased use of subject clefts is at least in part related to the fact that subjects tend to be more resistant than objects to in situ focus (see, e.g., Hartmann and Zimmermann 2004).

[10]It should be noted that while subject clefts do occur more frequently than object clefts, they are also extremely infrequent, occurring only 40 times out of the 49,208 sentences in the Wall Street Journal corpus (Roland, Dick & Elman 2007). Thus, if frequency were the only factor at play, the high accuracy on subject clefts is also unexpected.

take children's asymmetrically adultlike performance on subject clefts to be the result of child-specific heuristics.

There are at least three ways in which we might interpret the subject-object asymmetry consistently observed in previous work. We might take the asymmetry at face value and assume a genuine two-step developmental trajectory, with object clefts lagging behind subject clefts (e.g., Dick et al. 2004). Let us call this the PARTIAL COMPETENCE hypothesis. Note, however, that none of the syntactic approaches discussed in Section 2 predict this acquisition trajectory.

It is also possible that the asymmetry is only on the surface. Perhaps children's difficulties with object clefts are the true indicator of competence, and their success on subject clefts is solely due to successful application of shallow, word-order-based strategies (Bever 1970; Lempert & Kinsbourne 1980; Hirsch & Wexler 2006). This would be a NO COMPETENCE model. There is also a third possibility, a FULL COMPETENCE hypothesis, viz., that children have an adultlike grammar of clefts but fail in deploying this knowledge in experimental settings due to extragrammatical factors. One such factor might relate to parsing. A well-established finding in adult language processing is that constructions involving object-gaps, including object clefts, take adults longer to process than those involving subject-gaps (Wanner & Marastos 1978; Gibson 1998; Warren and Gibson 2002; Tily, Federenko & Gibson 2013, a.o). Perhaps processing difficulties in adults translate to a processing breakdown in children, leading to an asymmetric low performance on object clefts.

An important next step for developmental investigations of clefts, then, should be to adjudicate among these three possibilities. As it stands, however, this is not possible. As mentioned, all of the previous studies fail to properly attend to the discourse-pragmatic properties of clefts, making it difficult to conclude that the observed discrepancy between child and adult behavior indicates a difference in underlying competence. In the following subsection, we discuss these methodological issues in more detail and identify the features of a fairer test of knowledge of clefts.

3.2. *Methodological issues*

Recall from Section 2 that cleft sentences are felicitous only in contexts that meet certain conditions. First, the existence presupposition of the cleft, namely that there is some contextually relevant entity for whom the property described by the cleft clause holds, must be supported. Second, the main focus must fall on the pivot, and the cleft clause, conversely, must be given. One or both of these requirements are violated in the tasks employed in previous studies with the result that the tasks involve much more than just interpreting a cleft sentence.

(15) It's a truck that the wagon is bumping.

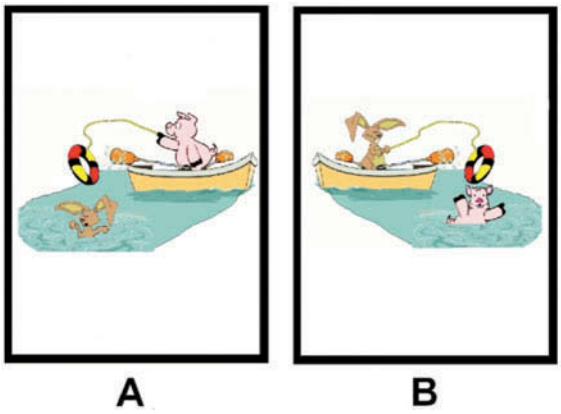
Let us first consider what goes wrong in the act-out tasks employed by Bever (1970) and Lempert & Kinsbourne (1980). For concreteness, let us take the sample cleft from Lempert & Kinsbourne in (15). The child was provided with a toy truck and toy wagon and asked to act out this sentence.

There are a number of problems with this task. First, the existence of some entity that the wagon is bumping is not established prior to the utterance, and therefore the presuppositional requirement of the cleft is not met. This is highly problematic. Many theories of presupposition defend the idea that sentences involving a presupposition failure cannot be assigned a truth-value unless one first accommodates the presupposition (von Fintel 2008). Roughly speaking, presupposition accommodation is a repair mechanism where the listener silently adds the presupposition to the context and then interprets the sentence relative to this *adjusted* context. Presumably, adult participants in this task can accommodate the existence presupposition, but it is unclear whether children are able to do this (see, e.g., Schulz 2003). Even if the child were able to carry out this type of accommodation, the fact that the sentence is presented out of context means that the congruence requirement is not met. Since the information presented by the sentence is all new, it is not obvious that the main focus should fall on the pivot. Moreover, the lack of preceding discourse means that

the cleft clause cannot be given. Since information structure in clefts is conventionalized and predictable, adult participants may be able to use their knowledge of the distribution of focal and given information in the structure to accommodate an appropriate background question, e.g., "What is the thing that the wagon is bumping?" But this involves sophisticated metalinguistic reasoning and contextual adjustment that may be beyond the capacities of the young child.[11] Thus, what appears to be a simple comprehension task evidently implicates accommodation abilities and the ability to deploy one's metalinguistic knowledge to fix an otherwise infelicitous discourse.

The binary picture-matching tasks (Dick et al. 2004; Hirsch & Wexler 2006) suffer from similar problems. For illustration, consider an example from Hirsch & Wexler (2006). The child is given the sentence in (16) accompanied by pictures A and B and asked to choose the picture that matches the sentence.

(16) It's a rabbit that a pig is helping.



It can be argued that the existence presupposition of the cleft sentence is supported, given that there is at least one scene where the pig is helping someone. But the lack of preceding discourse once again means that the congruence requirement cannot be met. One must still reason backwards from the cleft sentence to identify the question under discussion. The visual context does not help in this respect, as it raises a number of different questions, including: *Who is the pig helping? Who is helping the rabbit? Who is the rabbit helping? Who is helping the pig?* In the absence of supportive discourse context, the leading cue for identifying the relevant question at hand is the information structure of the cleft itself. In this respect, the binary picture-matching task is a highly stringent test of cleft competence, as a child who does not have the syntax of clefts would not be able to succeed on the task. However, a child's inability to perform accurately on this task does not entail that she lacks the syntax of clefts; she might simply find it challenging to utilize her knowledge of cleft syntax to reason which question is relevant to the task at hand.

3.3. *Motivation and hypotheses*

In light of these concerns about the previous studies, we conducted a series of experiments designed to provide a fairer diagnostic of clefts acquisition and, in turn, a better understanding of the observed subject-object asymmetry. We investigate children's comprehension of two types of cleft structures

[11]Of course, we must not exclude the possibility that an experienced adult participant may choose to forego these repairs for a pragmatically infelicitous sentence altogether and carry out the task based solely on the truth-conditional meaning of the sentence. This behavior is perhaps made possible by the artificiality of the experimental context itself. However, this involves an explicit decision by the participant based in part of their knowledge of linguistic experiments, and we find it implausible that the child should do the same.

in English: *it*-clefts and pseudoclefts. As in previous studies, both subject and object clefts were included. To isolate the potential role of pragmatic infelicity in children's performance, we directly varied whether or not the sentences were couched within contexts that satisfied the discourse-pragmatic constraints on cleft use.

If the aforementioned problems with the experimental tasks in previous studies contributed to children's asymmetric performance, we might find improved performance on object clefts for felicitous clefts in our study and thus a disappearance of the asymmetry. This would be most consistent with a FULL COMPETENCE view, which attributes children's failure on object clefts to extragrammatical factors like processing difficulties. It might be that the additional processing costs associated with object clefts, in conjunction with task-related difficulties, overwhelmed the child's processing capacities. In addition to making the sentence felicitous, supportive contexts have been shown to considerably reduce processing costs associated with object-extractions (e.g., Yang, Mo & Louwerse 2013), so it is plausible that children find it less difficult to give a parse for the felicitous object clefts.

If, on the other hand, children's knowledge of clefts is genuinely nonadult, we do not expect a significant effect of our felicity manipulation. The PARTIAL COMPETENCE view would continue to predict asymmetric performance on subject and object clefts irrespective of felicity, since it takes children's knowledge of object clefts to be nonadult. The NO COMPETENCE view also predicts a subject-object asymmetry. On this view, children's high performance on subject *it*-clefts is the result of child-specific heuristics and their chance-level performance on object *it*-clefts as the true marker of their nonadult grammar. On the assumption that children can rely on the same heuristics irrespective of felicity, we expect to replicate the asymmetry with both felicitous and infelicitous *it*-clefts.

With pseudoclefts, however, the predictions made by the PARTIAL COMPETENCE view and the NO COMPETENCE views diverge. The word-order-based strategy claimed to be responsible for children's high performance on subject clefts would only apply to subject *it*-clefts and not subject pseudoclefts, as the linear order of the lexical items do not correspond to the canonical English word order. The strategy *is* applicable, however, to object pseudoclefts, as shown in (17). Thus, while the PARTIAL COMPETENCE view predicts similar patterns for both *it*-clefts and pseudoclefts, the NO COMPETENCE view predicts asymmetries in the inverse direction for pseudoclefts, with *object* clefts showing greater accuracy rates.

(17) a. It is **the dog** that is **chasing a cat**. *Subject it-cleft*
b. What **the dog** is **chasing** is **a cat**. *Object pseudocleft*
S V O

We test these predictions in two parts. First, we examine children's comprehension of *it*-clefts over the course of two experiments, after which we turn to pseudoclefts.

4. Acquisition of *It*-clefts

Experiments 1 and 2 investigate children's comprehension of *it*-clefts. Two main factors were manipulated: pragmatic felicity and extraction site. All of the target sentences were preceded by visual and linguistic context. In half of the items, the preceding context made a cleft follow-up felicitous by meeting the semantic and pragmatic requirements of the sentence. In the other half, the context raised a different question from the one answered by the cleft follow-up, making the discourse irrecoverably incongruent. We intended this felicity manipulation to serve two roles. The inclusion of fully felicitous items allows us to carry out a fairer test of children's underlying knowledge. The inclusion of infelicitous items serves as a comparison point to the previous studies and allows us to better understand children's sensitivity to the pragmatic properties of *it*-clefts.

Another methodological improvement over previous studies is our inclusion of response time (RT) data. The inclusion of RTs as a dependent measure was crucial given our research questions. We

reasoned that children's adultlike representation for clefts should correspond to adultlike processing patterns. To the extent that this is correct, RTs might be revealing, particularly in those places where error rates are uninformative. For instance, we might be able to ascertain whether the child is adopting a nonadult parsing strategy based on whether or not their response-time patterns differ significantly from those of adults. RTs also serve as a useful measure for determining whether the issue of processing difficulties associated with object extraction plays a role in children's performance.

4.1. *Experiment 1*

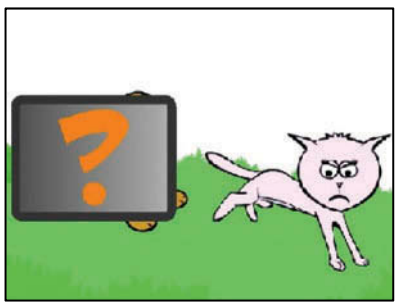
4.1.1. *Participants*

Forty-eight preschool and primary school aged children (ages 4–7, mean 5;11) and 48 adults participated in this study. Children were recruited from local preschools, the Children's Museum, and the Museum of Science, all in the Boston area. Adult participants were recruited via Amazon Mechanical Turk. Data from all 48 child participants were included in the analysis. Data from 45 adults were included in the analysis, after excluding those participants who displayed accuracy rates lower than 70% on filler items.

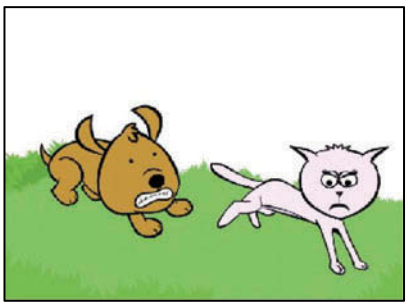
4.1.2. *Materials and methods*

A timed variant of the Truth-Value Judgment Task (Crain & McKee 1985; Crain & Thornton 1998) was employed. Adult participants saw the auditory stimuli presented as text, but prerecorded audio was used in the child experiment. A native speaker of English was instructed to produce the sentences as naturally as possible, while minimizing prominence on any one constituent. Visual and auditory stimuli in the child experiment were presented over a computer using the OpenSesame presentation software. Participants were first introduced to an on-screen cartoon character, who made statements about the scenarios. They were asked to indicate whether the character said something right or wrong about the scene by pressing one of two marked keys on the keyboard. Before the experimental items were presented, the child saw four training trials involving simple transitive sentences. Feedback was provided during the training phase. For adult participants, stimuli were presented via Ibex Farm experiment presentation tool (Drummond 2011). Accuracy and response times were collected from both groups.

Each test item was composed of two distinct phases. During the Context phase, the participant saw a scene depicting a partially occluded event and heard a prompt calling attention to the occlusion (Figure 1a). In the Test phase, the occlusion is removed and the participants heard a cleft sentence



(a) Look! Something is chasing the cat,
I wonder what it is!



(b) It's a dog that is chasing the cat.

Figure 1. Sample test item, Experiment 1.

Table 1. Conditions, Experiment 1.

	Subject Cleft	Object Cleft
Felicity: Match	(C1) *Something is chasing the cat. I wonder what it is.* It's a dog that is chasing the cat.	(C2) *The dog is chasing something. I wonder what it is.* It's a cat that the dog is chasing.
Felicity: Mismatch	(C3) *The dog is chasing something. I wonder what it is.* It's the dog that is chasing a cat.	(C4) *Something is chasing the cat. I wonder what it is.* It's the cat that a dog is chasing.

intended to describe the scenario (Figure 1b). All of the items involved two animate entities engaged in a reversible transitive action.

Context, which could call attention to either the thematic Agent, as in Figure 1a, or the Patient, was a between-subjects factor. Extraction site and Contextual Felicity were included as within-subjects factors. Subject and object extracted clefts were included. Felicity involved two levels (Match/Mismatch) based on whether or not the cleft sentence was appropriate given the context. Table 1 represents the four conditions that were tested; gray cells represent Patient Context.

Our Match items had the following properties that set them apart from experimental items used in previous studies. First, the existence presupposition of the cleft was satisfied in the context, as the context phase both visually represented and linguistically reinforced the existence of, e.g., something that is chasing the cat in (C1). Second, the question explicitly raised during the context phase ensured that the congruence requirement was met: (i) the information conveyed by the cleft clause had already been mentioned in the preceding discourse; and (ii) the cleft pivot conveyed the relevant new information that answered the question, making its focal status congruent.

In our Mismatch conditions, these preconditions on cleft use were deliberately violated. Consider (C3). In the context phase, what is established, visually and linguistically, is that a dog is chasing something. However, the existence presupposition of the cleft that follows requires that the context entails the existence of something that is chasing the cat, a requirement that is not met in this situation.[12] Moreover, the question raised in context phase concerns the identity of the *chasee*, the answer to which is not provided by the cleft pivot. Instead, this new piece of information is contained within the cleft clause, making it so that the cleft clause is not fully given. Thus, the Mistmatch items also fail to meet the congruence requirement. To felicitously respond to the Mismatch cleft sentences, then, participants would have to ignore the preceding context and accommodate a different question based on the cleft sentence that they heard. That is, upon hearing the cleft sentence in (C3), a participant would effectively have to pretend that the identity of the cat-chaser was the matter at issue.

There were 4 items per condition, resulting in a total of 16 experimental items. Since Context was a between-subjects factor, each participant saw eight target items. A full list of target items is provided in Appendix A. All of the target items were True, in the sense that the sentence described accurately what was depicted in the scene, but Truth was counterbalanced within the experiment overall. False cleft sentences (eight in total) were included but excluded from the analysis, since it was not possible given our materials to create False items that were neither infelicitous nor uninformative (e.g., a felicitous False cleft like *It's a bird that the dog is chasing* may be deemed false upon hearing *a bird* since there are no birds in the pictured situation). The false clefts included were infelicitous, as illustrated in (18).

(18) FALSE OBJECT CLEFT (MISMATCH)
Context: Something is chasing the cat. I wonder what it is.
Cleft: It's a dog that a cat is chasing.

Additionally, each child participant saw 4 simple transitive filler sentences (all felicitous), and adults saw 40 noncleft filler items counterbalanced for Felicity.

[12]Note, however, that as in the binary picture-matching task, the visual scene during the Test phase does support the presupposition.

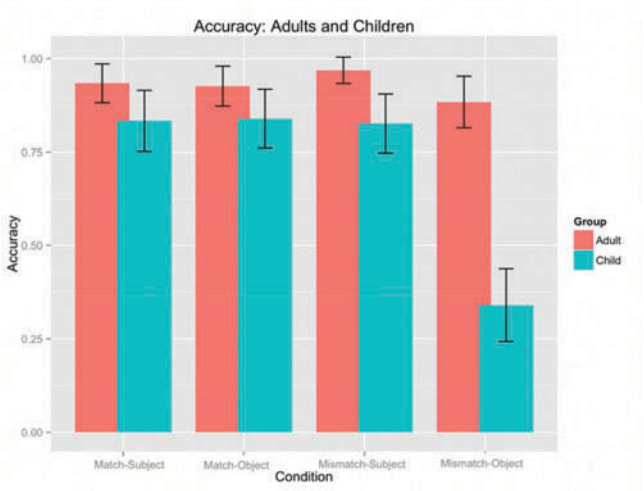


Figure 2. Accuracy and 95% CIs: Children and adults, Exp. 1.

4.1.3. *Results and discussion*

Figure 2 summarizes the Accuracy results from Experiment 1, for both adults and children. Unsurprisingly, adults showed high accuracy across the board on all conditions. Children's responses were adultlike on both Match subject and object conditions, at rates of 84% and 83% respectively. Children were also highly accurate on Mismatch subject clefts, at a rate of 82%. However, their accuracy dropped to just 34% for Mismatch object clefts.

Results from children and adults were analyzed separately using two logistic mixed-effects regression model with Felicity and Extraction-Type as fixed effects and Participant and Item as random effects.[13] Age was also included as a copredictor in analyses of the child data. There were no statistically significant differences across conditions for adults. With children, we found a significant interaction between Felicity and Extraction-Type ($p = .005$): (In)felicity was a significant predictor of success, but only with object clefts. There was no significant effect of Age.

Next, we turn to the Response Times, given in Figure 3. Since errors could have been produced for a number of reasons that we cannot adequately tease apart (genuine failure, failure to pay attention, etc.), only accurate trials were considered in the analyses. All RTs below 500 ms were also eliminated prior to analysis; prior to analysis, we log-transformed the RTs to fit the assumptions of the parametric tests used. Both adults and children took longer to respond to object clefts than subject clefts. Infelicitous clefts also resulted in longer RTs than felicitous ones. Furthermore, these effects are evidently additive: Both adults and children took the longest in responding to infelicitous object clefts.

Confirming these trends, statistical analyses (using linear mixed-effects regressions) revealed effects of both Felicity and Extraction-type but no interaction. The effect of Felicity was statistically significant for children ($p < .001$) and adults ($p = .006$). The effect of extraction-type was significant for adults ($p < .001$) and marginal for children ($p = .06$). Age was also found to be a significant predictor for children ($p < .001$), with older children showing lower RTs overall than younger ones.

These results reveal an important role played by pragmatic felicity on children's comprehension of *it*-clefts. Children displayed adultlike accuracy rates with object clefts when their presuppositions and information-structural constraints are met. Moreover, they reproduce adult processing signatures, taking longer to respond to object clefts than subject clefts, which suggests that they gave adultlike parses to

[13]Since a fully specified model with interacting random slopes did not converge, the reported results come from a model with noninteracting random slopes of subjects and random intercepts of items.

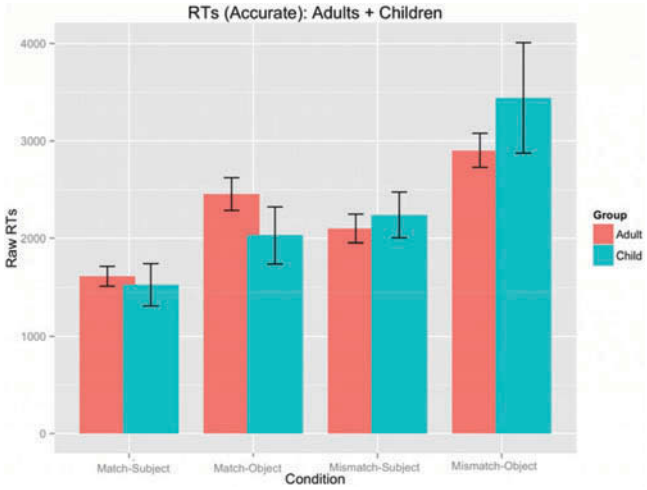


Figure 3. RTs and 95% CIs: Children and adults, Exp. 1.

felicitous clefts. The subject-object asymmetry reported in earlier studies rears its head, but only in the Mismatch conditions. Mismatch subject clefts incurred longer RTs, but error-rates were overall low. Performance on Mismatch object clefts, on the other hand, was nonadult, and when children did respond accurately, they took a very long time to do so. Together, these results teach us two things:

(i) Children's abilities with *it*-clefts, in particular object *it*-clefts, is more adultlike than previously thought.
(ii) The asymmetric performance observed in previous studies directly relates to the infelicitous experimental items employed.

Before we attempt to refine these generalizations, we report on a baseline experiment designed to rule out alternative explanations of our findings. Our methods and materials varied considerably from those employed in previous studies, in addition to our critical felicity manipulation. It might be that the high performance on felicitous object clefts in this experiment was simply due to our task being less demanding overall than act-out or picture-matching tasks. We therefore ran a control study to ensure that we replicate results from previous studies if the target sentences are not preceded by supportive contexts.

4.1.4. *Comparison with baseline*

We ran a baseline study to ensure that we can replicate the generalized subject-object asymmetry using our task and stimuli. A separate group of 26 children ages 4–7 (mean age 5;03) provided these baseline data. We provided children with the same materials as in Experiment 1, with the crucial difference that the preceding context was replaced with a neutral prompt: "Look!" This manipulation allowed us to make our items effectively comparable to the out-of-context clefts employed in earlier works. All of the cleft sentences in the baseline were infelicitous: The information presented was all new, making the adoption of a cleft structure, with prescribed positional correlates for focal and given information, inappropriate. If children's success on felicitous object clefts in Experiment 1 was due to the presence of a supportive discourse context, we expect performance on the very same items to worsen when this contextual support is removed.

Results, presented in Figure 4 alongside those from Experiment 1, reveal that these expectations were met. When tasked with interpreting out-of-context cleft sentences, children seem to have

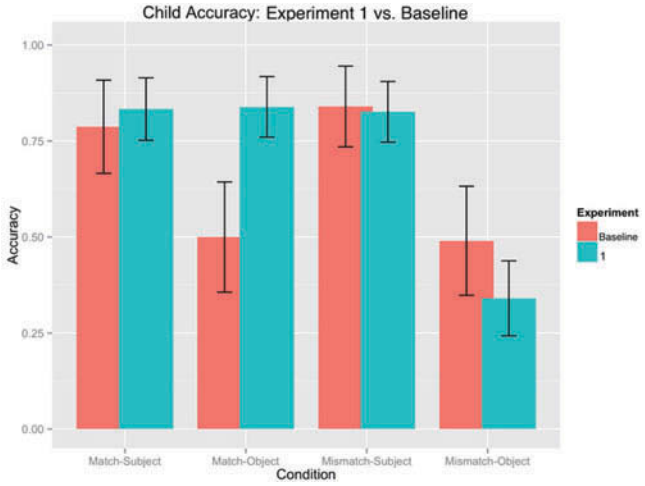


Figure 4. Accuracy and 95% CIs: Experiment 1 vs. baseline.

asymmetric difficulties with object clefts. They were above chance—at rates of 77% and 78%—for subject clefts, but at chance—at 50% and 49% accuracy—for object clefts. The crucial comparison is between Match object clefts in the two experiments: Children were well above chance in Experiment 1 but appear to be just guessing on the very same items in the absence of supportive context.

4.2. *Experiment 2*

All of the critical items in Experiment 1 were ones that could be judged "True" relative to the situation. It is sometimes thought that when faced with assessing the truth of a challenging sentence, children have a bias towards "Yes" or "True" responses. In including only true items, we risk having inflated the rate of adultlike "True" judgments because of such biases. Experiment 2 sought to correct this methodological defect by including experimental items that were truth-conditionally false.

4.2.1. *Participants*

Participants were 32 children ages 4–7 (mean age 5;04), recruited from preschools and museums in the Boston area.

4.2.2. *Design, materials, and procedure*

In order to construct nontrivial false items, we modified the visual stimuli to include two pairs of characters participating in two separate events of the same kind (Figure 5). The methodology and materials were otherwise identical to Experiment 1. Moreover, the linguistic stimuli for the True items were the same as in Experiment 1. A full list of false items is presented in Appendix B.

As before, participants were assigned at random to Agent or Patient contexts. Within subjects, we crossed Felicity, Extraction site, and Truth. Table 2 presents the resulting eight conditions (shaded cells represent Patient context as before).

Since no changes were made to the linguistic stimuli with True items, we expected to replicate Experiment 1 for these conditions. That is, we expected to find a Type by Felicity interaction in Accuracy rates and main effects of both factors on RTs. All things being equal, we also expected to find parallel effects for False items.

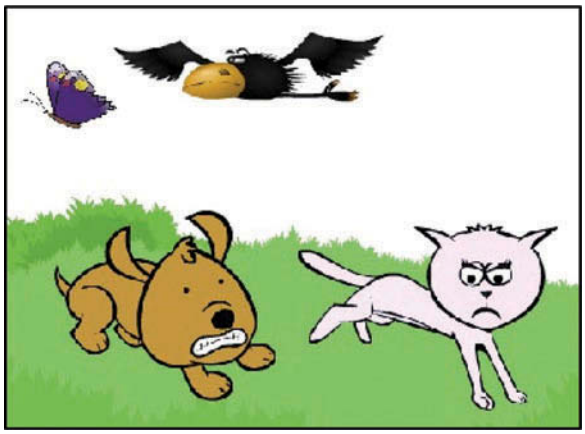


Figure 5. Sample scenario, Experiment 3.

Table 2. Conditions, Experiment 2.

	True Items		False Items	
	Subject Cleft	Object Cleft	Subject Cleft	Object Cleft
Felicity: Match	*Something is chasing the cat.* *I wonder what it is.* It's a dog that is chasing the cat.	*The dog is chasing something.* *I wonder what it is.* It's a cat that the dog is chasing.	*Something is chasing the cat.* *I wonder what it is.* It's a bird that is chasing the cat.	*The dog is chasing something.* *I wonder what it is.* It's a butterfly that the dog is chasing.
Felicity: Mismatch	*The dog is chasing something.* *I wonder what it is.* It's the dog that is chasing a cat.	*Something is chasing the cat.* *I wonder what it is.* It's the cat that a dog is chasing.	*The dog is chasing something.* *I wonder what it is.* It's the dog that is chasing a butterfly.	*Something is chasing the cat.* *I wonder what it is.* It's the cat that a bird is chasing.

4.2.3. *Results and discussion*

In keeping with our expectations, we replicated Accuracy trends from Experiment 1 for the True conditions in Experiment 2 (Figure 6). Performance was at 86% accuracy on Match subject clefts and 88% accuracy on Match object clefts. On the Mismatch conditions, we replicated the subject-object asymmetry: Children were well above chance at 85% success on Mismatch subject clefts, but accuracy was reduced to 51% on Mismatch object clefts. On the False conditions, however, children were consistently well above chance, even on Mismatch object clefts (Figure 7). We evaluated the significance of these differences using a logistic mixed effects regression and found a three-way interaction of Felicity, Extraction site, and Truth: Felicity affects performance on object clefts, but only for the true subset.

We turn next to the RT results. The patterns, for both true and false items, resemble those found in Experiment 1 and are shown in Figures 8 and 9. Children took longer to respond to infelicitous clefts than to felicitous ones, a difference found to be statistically significant using a linear mixed effects regression ($p < .001$). Though RTs for object clefts were numerically greater than those for subject clefts, the effect of Extraction site was not statistically significant.

Our predictions for Experiment 2 were not fully borne out. Most strikingly, we observed a difference in accuracy rates between True and False items when it came to Mismatch object clefts. Whereas children performed at chance levels on *true* infelicitous object clefts, they were adultlike on the *false* counterparts. We find it implausible that the same child who struggles to give an adultlike representation for true, infelicitous object clefts would be successful with a reversal of truth. So we examined individual trends to better understand these patterns. Table 3 summarizes the distribution of individual responses for True and False incongruent object clefts.

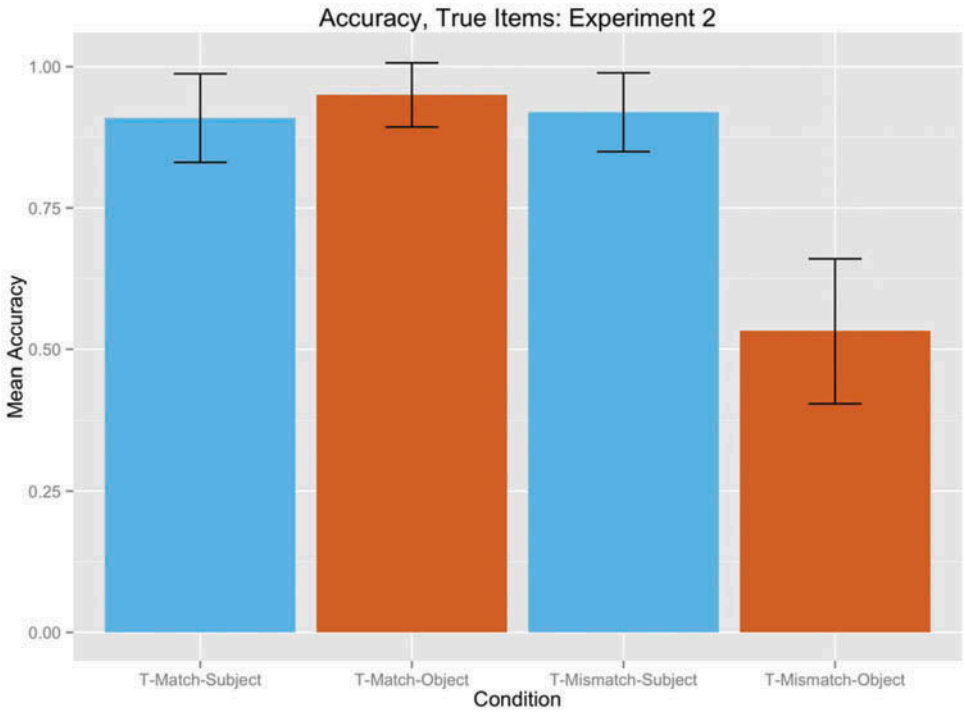


Figure 6. Accuracy and 95% CIs for true items, Experiment 2.

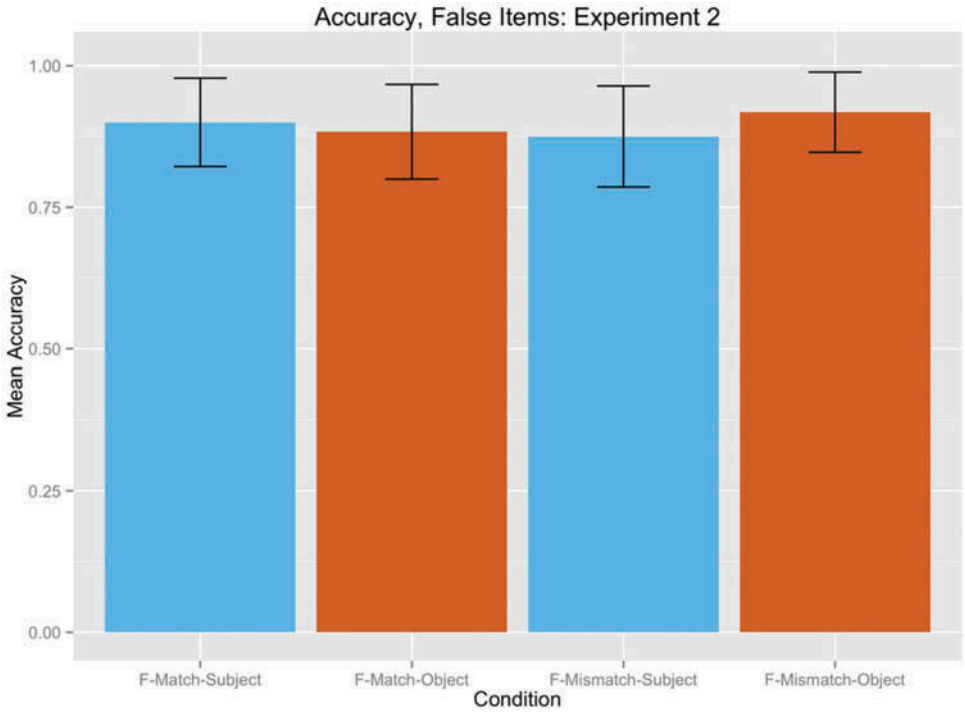


Figure 7. Accuracy and 95% CIs for false items, Experiment 2.

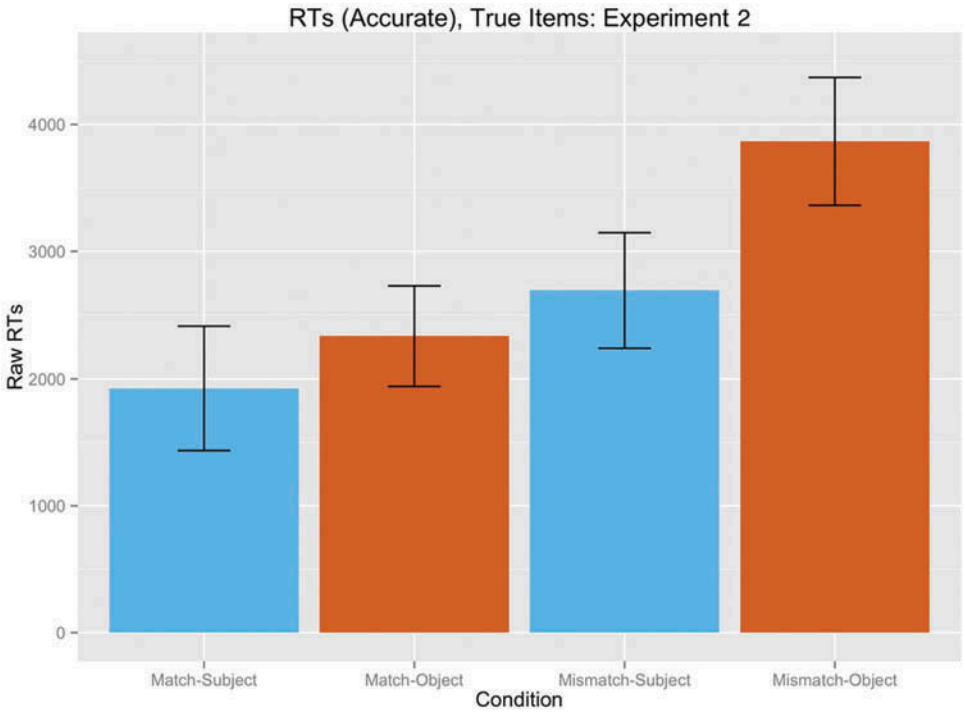


Figure 8. RTs and 95% CIs for true items, Experiment 2.

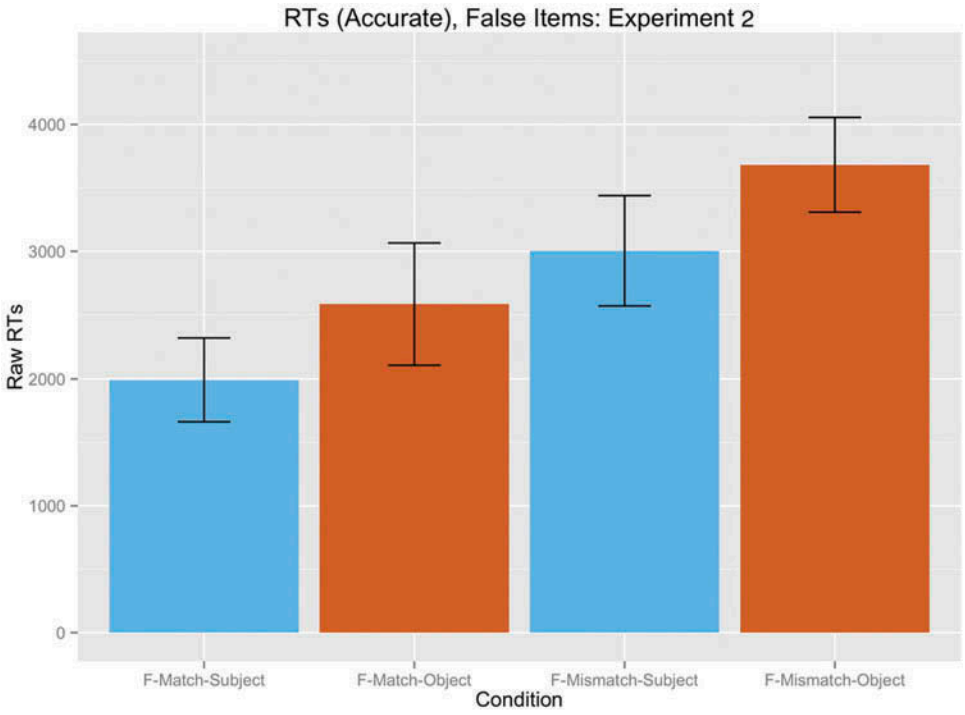


Figure 9. RTs and 95% CIs for false items, Experiment 2.

Table 3. Correct responses on incongruent object Clefts.

	Number (Percentage) Correct				
	0	*1*	*2*	*3*	*4*
True-Incongruent *n = 16*	5 (31.25%)	2 (12.5%)	2 (12.5%)	2 (12.5%)	5 (31.25%)
False-Incongruent *n = 16*	1 (6.25%)	0 (0%)	1 (6.25%)	2 (12.5%)	12 (75%)

With True Incongruent object clefts, we find a population of children who accurately respond "True" on all four items; we may conclude that these children have developed adultlike abilities to deal with these infelicitous sentences. Among the children who are not perfectly adultlike, we find one group that responds "False" on all four items and a group of "guessers" whose responses oscillate between "True" and "False." It seems to us that both of these groups have difficulties with these sentences. However, the strategies adopted by the two groups in carrying out the task at hand vary: Whereas one group resorts to guessing, the other, upon recognizing that something was awry, decides that the odds are in favor of falsity. Turning now to the False items, notice that the group of children who are biased toward saying "False" for incongruent sentences will get these items right for False incongruent items, though not necessarily for the right reasons. For this reason alone, we might expect accuracy on False incongruent items to be around 31% greater than their True counterparts. Another potential source of the unexpected high accuracy on False items is an artifact: Merely keeping track of the fact that the two referents in the sentence are never coparticipants in the same event might be enough to prompt a false—and in this case, accurate—response.

4.3. *Discussion: Experiments 1 and 2*

Two experiments explored young children's knowledge of the syntactic and interpretive properties of English *it*-clefts. Previous literature on children's comprehension of these structures had observed an asymmetry between subject and object clefts and concluded that object clefts, at least, were not acquired by children until around age 7. We raised objections against this conclusion based on the fact that previous studies overlooked a host of pragmatic properties that constrain how clefts can be appropriately used. Results from Experiments 1 and 2 reveal that these objections were on the right track. It is not the case that children have difficulties with object clefts generally. Object cleft sentences whose presuppositions and information structural constraints are satisfied in the context are as easy for children to comprehend as subject clefts. Neither the NO COMPETENCE nor the PARTIAL COMPETENCE perspectives can straightforwardly explain this result.

Children did not behave in an adultlike fashion across the board, however. While we failed to find a subject-object asymmetry in accuracy with felicitous clefts, we did find asymmetric performance on infelicitous clefts. On our Mismatch conditions, where we deliberately violated the pragmatic requirements on cleft use, children showed high accuracy on subject clefts. In other words, with these constructions, they were able to make adultlike judgments of truth irrespective of the pragmatic infelicity. In contrast, children were shown to have difficulties with infelicitous object clefts: In situations where the cleft was preceded by a nonsupportive context (Experiments 1 and 2) or no context at all (Baseline), performance on object clefts was at chance. This type of asymmetry is precisely what we expect if the results from previous studies were due to the infelicitous experimental items used. Of course, this does not mean that the puzzle of the subject-object asymmetry is solved. Rather, it is simply recast as follows: When confronted with infelicitous cleft sentences, why do children asymmetrically fail on object clefts? Put differently, why do children asymmetrically succeed on subject clefts, despite their being infelicitous?

There are at least two views that can explain with some plausibility why this is so. One possibility, which returns to the role of processing, is that infelicitous object clefts exhaust children's more limited computational capabilities. Response time data from both adults and children, as well as previous work on the processing of A-bar dependency constructions, suggest that object extraction and infelicity are

independently costly. These costs, when aggregated, might overwhelm the child parser, effectively leading to a processing breakdown. A second possibility turns to a suggestion offered by advocates of the NO COMPETENCE view, but cast in a new light given the revised picture at hand. Perhaps children cannot assign adultlike representations for infelicitous clefts of *any* type but successfully apply a shallow word order based strategy to parse subject clefts. This would entail mapping the lexical material (the verb and its arguments) to a simpler structure, perhaps a simple declarative, and evaluating that structure as opposed to the infelicitous cleft structure.[14] Presumably, this mapping is possible only when the order of the constituents in the given sentence corresponds to the order of constituents in a canonical declarative.

These two possibilities cannot be teased apart for *it*-clefts. Object *it*-clefts are associated with both greater processing costs and noncanonical word orders and are therefore predicted to show lower accuracy rates on either view. Fortunately, the two factors do come apart in pseudoclefts, which we turn to next.

5. Acquisition of pseudoclefts

As mentioned, children's behavior on pseudoclefts could help disentangle the potential contributions of two factors that are confounded in *it*-clefts: object-extraction and canonicity of word order. The two types of cleft structures differ in the relative ordering of the pivot and the cleft clause, with the consequence that object pseudoclefts (19a) and not subject pseudoclefts (19b) are amenable to a word-order-based strategy.

Thus, children's performance on infelicitous subject and object pseudoclefts could tell us whether they have difficulties in experimental settings with structures that involve object extraction or those that do not lend themselves to word-order-based heuristics.

(19) a. [What **the dog** is **chasing** ___] is **a cat**. *Object pseudocleft*

b. [What ____ is **chasing the cat**] is **a dog**. *Subject pseudocleft*

This rationale presupposes that children acquire pseudoclefts and *it*-clefts at around the same time and that their acquisition trajectories proceed similarly, an assumption that is only justified under some theoretical analysis of cleft structures. Children's performance of felicitous pseudoclefts will consequently serve as a baseline, informing us as to whether children show parallel behavior on the two types of cleft structures in the first place. In part because of the disagreement among theories as to the relationship between *it*-clefts and pseudoclefts, we believe that the question of how children

Table 4. Conditions, Experiment 3.

	True Items		False Items	
	Subject Pseudo-Cleft	Object Pseudo-Cleft	Subject Pseudo-Cleft	Object Pseudo-Cleft
Felicity: Match	*Something is chasing the cat.* *I wonder what it is.* What's chasing the cat is a dog.	*The dog is chasing something.* *I wonder what it is.* What the dog is chasing is a cat.	*Something is chasing the cat.* *I wonder what it is.* What's chasing the cat is a bird.	*The dog is chasing something.* *I wonder what it is.* What the dog is chasing is a butterfly.
Felicity: Mismatch	*The dog is chasing something.* *I wonder what it is.* What's chasing a cat is the dog.	*Something is chasing the cat.* *I wonder what it is.* What a dog is chasing is the cat.	*The dog is chasing something.* *I wonder what it is.* What's chasing a butterfly is the dog.	*Something is chasing the cat.* *I wonder what it is.* What a bird is chasing is the cat.

[14]We assume that even the adoption of a shallow, word-order-based strategy involves the building of a structure, however rudimentary, so that it can be interpreted compositionally and evaluated for truth.

fare with pseudoclefts is of theoretical significance independently: Developmental data might serve as evidence for or against giving the two constructions a uniform treatment.

5.1. *Experiment 3*

5.1.1. *Participants*

Thirty-six 4- to 7-year-olds (mean age 5;04) and 48 adults participated in this study. The child participants were recruited from Boston-area preschools and museums, and adults were recruited via Amazon Mechanical Turk. Data from all 36 children and 47 of the adults were included in the final analysis (one adult participant was excluded due to low (< 70%) accuracy on the filler items).

5.1.2. *Design, materials, and procedure*

The methodology was the same as in Experiments 1 and 2. Children saw pairs of pictures and sentences presented via OpenSesame and were asked to press a key to indicate whether the sentence they heard was true or false. Stimuli were presented to adult participants using Ibex Farm. Much of the visual stimuli were identical to those used in Experiment 2. However, due to an idiosyncrasy of English in disallowing *who*-pseudoclefts, items previously involving human participants were replaced. A complete list of stimuli for Experiment 3 is presented in Appendix C. Felicity (Match/Mismatch), Extraction site (Subject/Object), and Truth (True/False) were crossed in a 2 x 2 x 2 design. Conditions are represented in Table 4.

As discussed, children's knowledge of pseudoclefts may differ from their knowledge of *it*-clefts, so it needs to be established first that preschool-aged children can succeed on felicitous subject and object pseudoclefts, as seen with felicitous *it*-clefts, before we can move onto infelicitous clefts. If *it*-clefts and pseudoclefts show comparable acquisition trajectories, we can expect the following patterns concerning infelicitous clefts. We expect a subject-object asymmetry as in Experiments 1 and 2, but the direction of this asymmetry is predicted to vary depending on which factor—object-extraction or amenability to a word-order based strategy—is at play. If children's difficulties with infelicitous object *it*-clefts in Experiments 1 and 2 related to the processing costs associated with object extraction, we expect them to have comparable difficulties with object pseudoclefts. On the other hand, if children were asymmetrically successful on infelicitous subject clefts by their use of word-order-based heuristics, we expect the pattern to reverse, with children succeeding on infelicitous object pseudoclefts and not subject ones.

5.1.3. *Results*

Adults performed at ceiling across the board, as expected. As with *it*-clefts, children were adultlike on Match items, showing accuracy rates of 87% and 86% for true subject and object clefts and 79% and 93% for the false counterparts. Performance on Mismatch items was asymmetric. Mean accuracy on true Mismatch object clefts was above chance, at a rate of 73%. However, accuracy on true Mismatch subject clefts did not differ from chance, at only 53%. With False Mismatch items, we see an overall improvement in performance, but the asymmetry, while less pronounced, is still present: Children showed an average accuracy rate of 93% on false object pseudoclefts and only 79% on subject pseudoclefts.

We examined the trends statistically by fitting a logistic mixed effects model. Felicity, Extraction site, and Truth were included as fixed effects and participants and items as random effects; Age was included as a copredictor. We found a significant three-way interaction of Felicity, Type, and Truth (p = .04): Felicity had an effect on performance on *subject* clefts, but only for true items. Additionally, Age was found to be a significant predictor of Accuracy (p < .001), with older children showing higher overall accuracy rates.

The pattern we see with infelicitous pseudoclefts (Figure 10) is thus the reverse of what we see with *it*-clefts: Children seem to have asymmetric difficulties with subject pseudoclefts. We looked at the

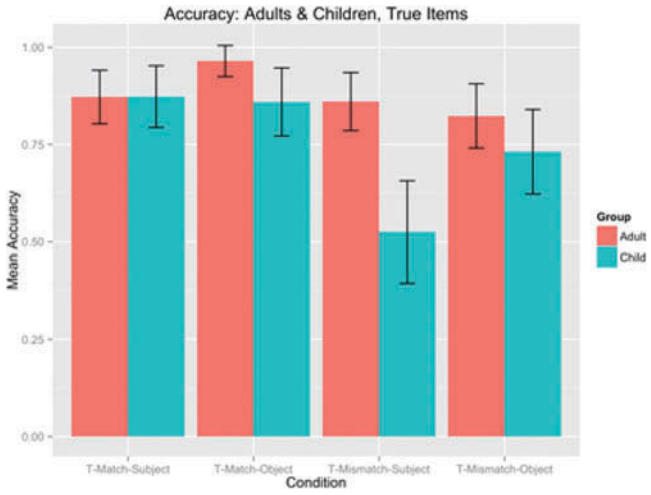


Figure 10. Accuracy and 95% CIs for true items, Experiment 3.

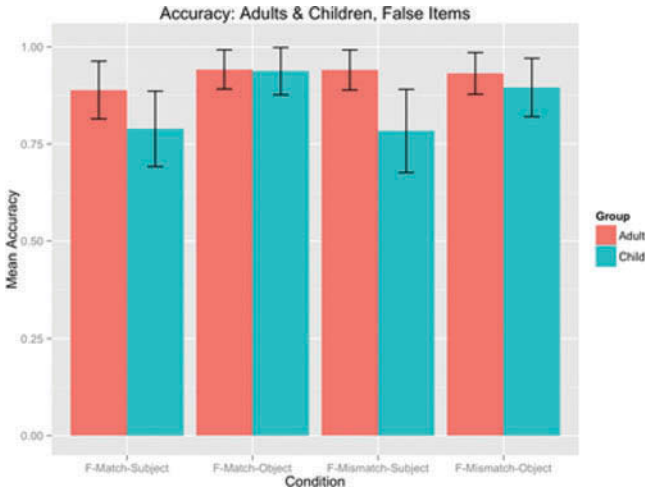


Figure 11. Accuracy and 95% CIs for false items, Experiment 3.

distribution of individual responses on Mismatch subject clefts (Table 5) to see whether participants can be partitioned into groups based on their response patterns. Recall that with *it*-clefts, we found three populations: those who were adultlike, guessers, and consistent "nay"-sayers. With pseudoclefts, children's response patterns on true-incongruent subject pseudoclefts seem to be distributed across the scale, with over two-thirds of the children getting at least one item wrong. This is consistent with guessing

Table 5. Correct responses on incongruent subject pseudoclefts.

	Number (Percentage) Correct				
	0	*1*	*2*	*3*	*4*
True-Incongruent	3	5	4	2	3
n = 17	(17.6%)	(29.4%)	(23.5%)	(11.7%)	(17.6%)
False-Incongruent	1	4	2	4	5
n = 18	(5.5%)	(22.2%)	(11.1%)	(22.2%)	(27.8%)

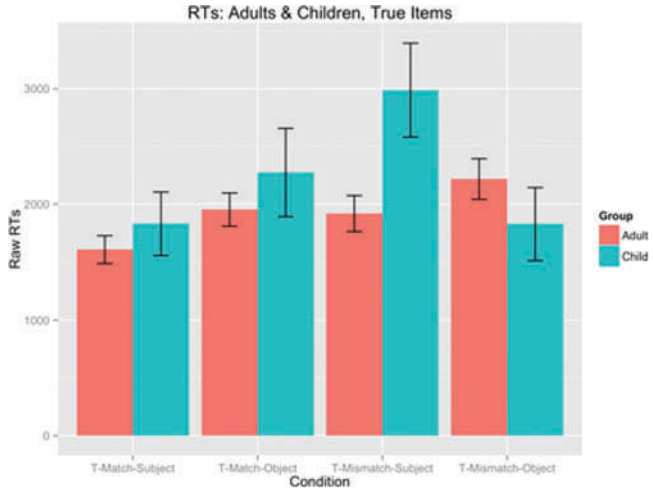


Figure 12. RTs and 95% CIs for true items, Experiment 3.

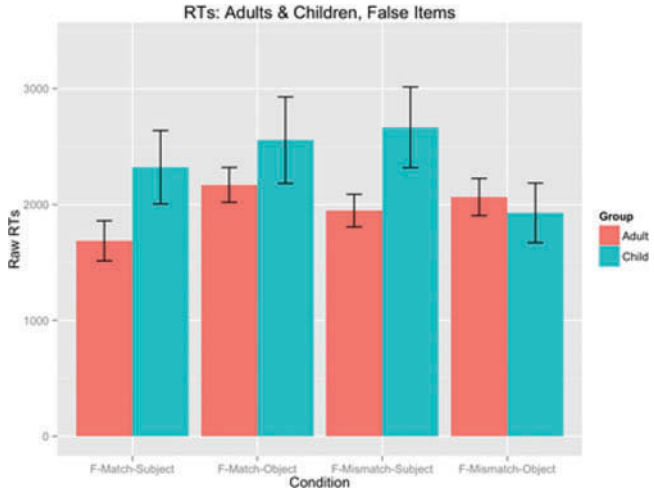


Figure 13. RTs and 95% CIs for false items, Experiment 3.

behavior. With false-incongruent clefts, children tend to make fewer mistakes overall, but around half of the children make at least one mistake. Thus, unlike in Experiment 2, children's behavior in this experiment did not offer an obvious way of sorting them into groups based on response patterns. In particular, we do not find a subgroup of children whose strategy is to take the oddity they recognize as a signal of falsity. This could be because of fundamental differences between *it*-clefts and pseudoclefts, calling for distinct interpretive strategies, or simply because of intergroup variability.

We also collected response-time data from both groups, presented in Figures 12 and 13. Before we consider the child data, let us turn first to adults' response-time patterns. For the true conditions, adults took longer to respond to object pseudoclefts than subject pseudoclefts and to infelicitous ones than felicitous ones. With false clefts, adults took longer on object clefts only with Match items. With Mismatch items, there was no difference based on extraction site. Accordingly, a linear mixed-effects

regression reveals a significant three-way interaction ($p = .04$): We find main effects each of Felicity and Extraction site with true items, but an interaction of the two factors on false items.

When we compare adults' reaction time patterns with those of children, we see both commonalities as well as important differences. Children, like adults, took longer to respond to object pseudoclefts in the Match conditions, and this difference based on extraction site is robust across truth. However, in the Mismatch conditions, we find a pattern reversal. Children take *less* time to respond to infelicitous object pseudoclefts than subject ones. In fact, they are faster on infelicitous object pseudoclefts than on the felicitous counterparts, an entirely counterintuitive pattern. On the other hand, infelicitous subject clefts incur the longest RTs overall. A linear mixed-effects model showed a significant three-way interaction ($p < .001$), confirming the following patterns:

(i) Extraction site and Felicity interact, with object clefts showing longer RTs in the Match conditions, but subject clefts showing longer RTs in the Mismatch conditions, and
(ii) This interaction is more pronounced for True items than False ones.

5.2. *Discussion: Experiment 3*

Results from Experiment 3 reaffirm the conclusions based on Experiments 1 and 2 that children do not have difficulties comprehending cleft sentences when they are used felicitously. In addition to their adultlike accuracy rates, children showed similar response time patterns with felicitous pseudoclefts as adults, taking longer to process object pseudoclefts than subject pseudoclefts. These findings reassure us that children's behavior on *it*-clefts and pseudoclefts are comparable, allowing us to now address the next set of questions concerning Mismatch items.

Our main goal in testing children's understanding of pseudoclefts was to disambiguate between two potential sources of the subject-object asymmetries with infelicitous clefts: Does it have to do with the fact that some sentences match the canonical English word order, or does object-extraction incur additional costs that, when compounded with infelicity, lead to a processing failure? Findings from Experiment 3 allow us to give a plausible, if not decisive, answer to this question. As with *it*-clefts, we found that when confronted with infelicity, children succeeded on some types of cleft sentences but failed on others. Crucially, whereas infelicitous object clefts were previously found to be problematic for children, infelicitous *subject* clefts proved to be challenging in the case of pseudoclefts. It cannot be, then, that differences based on processing costs underlie the asymmetries in performance, since subject clefts have been observed to be the *less* costly of the two types. Children's unexpected success on object pseudoclefts and failure of subject pseudoclefts is predicted, however, on a view on which children adopt word-order-based interpretive heuristics when they can. In object pseudoclefts, the linear string consisting of the lexical material follows the canonical SVO order, whereas subject pseudoclefts do not. The response time data support this idea. Children's response times on object pseudoclefts were suspiciously short—shorter, in fact, than the felicitous counterparts—suggesting that they were indeed building a different sort of representation for these constructions.

6. General discussion

The main objective of the present article was to better understand how children acquire various syntactic and pragmatic aspects of cleft sentences. We found that children as young as 4 possess sophisticated knowledge of the structure and interpretation of two different types of cleft structures. Three pieces of experimental evidence support this claim. First, children were able to respond accurately to felicitous cleft sentences at rates well above chance. Second, they showed the same processing asymmetries as adults on felicitous clefts, suggesting that they were assigning the adultlike syntactic representation for these sentences. Third, they behaved categorically differently on

(19) **Common ground**: Set of background information mutually assumed by the discourse participants.

Assertions are made against the background of a topic of inquiry or Question Under Discussion (QUD), defined in (20), which may be explicitly raised or implicit in the context.

(20) **Question Under Discussion (QUD)**: A question or set of questions that the discourse participants are mutually committed to resolving at a given point in the time.

felicitous and infelicitous clefts, indicating an early sensitivity to the presuppositionality and information structure of clefts.

When confronted with infelicitous cleft sentences, children succeeded only on some types of clefts. Success was found to correlate with the amenability of the structure to child-specific parsing strategies, specifically a word-order-based one. Children were able to successfully evaluate the truth of infelicitous cleft sentences where the constituent order corresponded to SVO, raising the possibility that they were adopting a noncleft syntax for these items. We take these findings to indicate that subject-object asymmetries in children's comprehension of clefts are only superficial. Children fail to build an adultlike representation for infelicitous clefts across the board, but pressures to carry out the task may lead the child to adopt interpretive means outside of what is licensed in adult grammar. Crucially, in the case of clefts, these strategies are only selectively successful, leading to asymmetric results.

These findings allow us to make two generalizations about children's comprehension of cleft sentences:

(1) Children are capable of building the appropriate syntactic structure and evaluating the truth of cleft sentences, as they clearly do so in felicitous contexts.
(2) Children are unable to recruit this ability when faced with infelicity, at which point they build and interpret nonadult forms, or interpretation fails altogether.

Why should this be so? We argue that children's failure to represent infelicitous cleft sentences is the result of how the semantic and pragmatic properties of clefts interact with children's developing skills at building a coherent discourse. A cleft sentence whose semantic and pragmatic preconditions are not met cannot be evaluated as true or false (as the TVJT demands) without making moves to first satisfy these conditions. We suggest that most of the children in our studies are in a developmental stage where they can recognize unsatisfied pragmatic requirements but may not know how to remedy the situation. This idea is explicated in the following subsection.

6.1. *Developmental path*

Our proposal draws on standard assumptions about how communication unfolds (e.g., Stalnaker 1973, 1974; von Fintel 1994; Roberts 1996, 2012; Büring 2003). Following Stalnaker (1973, 1974) and Roberts (1996, 2012), we assume that the purpose of a dialogue is collaborative inquiry about the way things are, based on a common fund of information about the world that is enriched as the conversation proceeds. For our purposes, the mutually shared background knowledge can be modeled using Stalnaker's (1974) notion of the *common ground*, defined in (19). When a speaker makes an assertion, she is proposing that the common ground be updated with the conveyed information.

In a well-formed discourse, an assertion must at least partially address the QUD. An important initial step in a child's pragmatic development is to have a notion of these building blocks and

	Time	QUD	Common Ground	Dialogue
(a)	t_1	*What is happening?*	{}	Look, the dog is chasing something. I wonder what it is.
	t_2	*What is the dog chasing?*	{The dog is chasing something.}	It's a cat that the dog is chasing.
(b)	t_1	*What is happening?*	{}	Look, the dog is chasing something. I wonder what it is.
	t_2	*What is the dog chasing?*	{The dog is chasing something.}	It's the dog that is chasing a cat.

what constitutes a coherent discourse.[15] This knowledge serves as a foundation to all subsequent pragmatic learning.

The interpretive particularities of cleft sentences, discussed in Section 2, impose further constraints on both the common ground and the QUD. The presuppositional nature of clefts demands that it is shared knowledge, i.e., part of the common ground, that there is a contextually relevant entity for which the property denoted by the cleft clause holds. The congruence constraints on clefts restrict the QUD to those that are understood to be about the cleft-clause and whose answer corresponds to the cleft pivot. These are additional, cleft-specific discourse requirements that a child acquiring these structures must come to learn. Our findings suggest that as soon as the child can build a syntactic structure for clefts, they also know the interpretive preconditions for their use, suggesting a tight link between syntax and pragmatics in the development of these structures.

Of course, communication does not always proceed smoothly; it can evolve in ways that violate the rules. Presuppositional sentences are sometimes uttered when the common ground does not already entail the presupposition. Speakers may utter non sequiturs or propositions that do not target the established QUD. Discourse participants have repair strategies to address these unlicensed moves before it leads to a communication breakdown. For instance, upon noticing a presupposition failure, one might simply add the presuppositional information to the common ground, that is, one might accommodate the presupposition, as long as nothing in the discourse situation stands in the way. Or, upon noticing that a speaker's utterance does not fit comfortably into the discourse, one might go along by accommodating a different QUD than the one previously assumed. We thus have another acquisition step that needs to be made, namely, recognizing that there are exceptions to fully cooperative communication and various repair mechanisms that can come in and save the day. We suggest that this is a later stage in development. The source of children's nonadult behavior with infelicitous cleft sentences may relate to their lack of familiarity with the kind of repair strategies recruited by adults to deal with an incoherent or incongruent discourse.

In light of the assumptions laid out about discourse well-formedness, let us consider more carefully how the felicitous and infelicitous items in our studies differ. To start, let us assume that each item involves a small-scale "conversation." Example (20) schematizes how the conversation unfolds for both our Match (a) and Mismatch (b) items. Strictly adhering to the idea that all sentences are uttered as answers to questions, we take the discourse-initiating QUD to be an overarching one like "What is happening?" The set of information that has already been established at any given point of utterance is represented in curly brackets. For the purposes of this illustration, we assume that this is the empty set at the outset of the conversation (though in reality, it might consist of, e.g., world knowledge or other contextual information).

(20)

[15]We discuss these notions in terms of *linguistic* abilities, but it is possible that these types of coherence principles are part of general social-cognitive skills and innate (see Tomasello & Carpenter 2007 for discussion). We take no stance in the matter here.

In the well-formed discourse in (a), at t_2 when the cleft sentence is uttered, the existence presupposition is satisfied, and the QUD raised at t_1 is directly addressed. The hearer can therefore evaluate whether or not the sentence is true and accept or reject the speaker's proposal to update the common ground. In (b), however, neither demand is met at t_2. The cleft sentence presupposes that something is chasing a cat, which is not part of the common ground. Moreover, as a consequence of the congruence requirement on clefts, the sentence uttered can only be used as an answer to a question of the form, "What is chasing a cat?," which is not the established QUD. Consequently, before the hearer can decide whether or not to add the conveyed information to the common ground, certain repair mechanisms must kick in. Two things, in particular, must happen. First, the existence presupposition must be accommodated, i.e., added to the common ground. However, observe that even if the hearer were to accommodate the existence presupposition, she is stuck with a proposition that does not address the relevant QUD, and the discourse is still at risk to fail. As a result, a second repair mechanism must be activated. More specifically, a different question than the one made explicit at t_1 must be accommodated, based on cues provided by the information structure of the cleft sentence.

This is precisely where the majority of the child participants in our studies have difficulties. Our experimental design is not fine-grained enough to pinpoint whether it is presupposition accommodation, question accommodation, or both that lead to their difficulties. For present purposes, we adopt a broader notion of accommodation that captures both instances (e.g., Thomason 1990; Roberts 2015). Thomason (1990:343), for instance, characterizes accommodation as involving an "adjustment of the conversational record to eliminate obstacles to the detected plans of your interlocutor." Doing so is a sophisticated task, in which the hearer must (i) recognize the goals and intentions of the speaker, (ii) recognize the pragmatic problems standing in the way of realizing those goals, (iii) know the steps that can be taken to rectify the situation, and (iv) charitably choose to do so.

In principle, the child may go astray at any point during this process. It is possible, for example, that a child fails to recognize that a speaker uttering an incongruent sentence may nevertheless intend to convey the meaning. Or, the child maybe egocentric or uncharitable, failing to see that it is within her power to prevent a communication breakdown (see Gualmini et al. 2008). However, recall that children *did* try to interpret infelicitous sentences whenever they could for the purpose of performing the task at hand, though the means by which they did so was decidedly nonadult. In other words, they do attempt some form of repair, suggesting that they recognize the communicative goal at hand, recognize furthermore that the preconditions for accomplishing these goals are not met in the context, and are charitable enough to try and fix it. This leaves us with the possibility that children have difficulties with step (iii), namely, identifying the right kinds of repair mechanisms. We would like to suggest that children and adults differ in what they take to be available or licensed repair strategies. Adults, upon encountering a sentence whose pragmatic requirements are unsatisfied, may adjust the context so that the sentence is rendered less odd. Children seem to find it difficult (or impossible) to carry out this type of implicit adjustment of the context in our test environments. On the other hand, children evidently allow themselves the option to reanalyze the sentence to a different one altogether (for instance, a simple declarative). This is not a possible repair option for adults, for whom the syntactic structure of the sentence they heard cannot be manipulated to better fit the context.

To summarize, then, we have argued the following. Young children know the complex syntactic and interpretive properties of clefts; however, they fail to demonstrate this knowledge in contexts that require certain kinds of accommodation before the sentence can be given a meaning. We suggested that children might not be as adept as adults at repairing the conversational context to make it more suitable for the target sentence.

6.2. *Theoretical Significance*

Our results have some key implications for theories of clefts, which we outline in this subsection. Our results show that children's behavior with *it*-clefts and pseudoclefts is largely isomorphic. They

showed similar accuracy rates and processing patterns for felicitous items of both types and in both cases diverged from adults on infelicitous items. While one may dismiss these parallels as coincidental, we believe that they receive a more elegant explanation under theories that take the two structures to be related.

A second potential contribution relates to the question of whether or not cleft structures involve A-movement over an intervening element, namely, the underlying subject of the small clause. This type of movement is a key component in the predicate inversion analysis. An important relevant finding within language acquisition is that children have trouble with precisely this type of configuration—the best-known exemplar of which is the passive, shown to be developmentally delayed until around age 7 or so. A number of grammatical accounts have been put forward to explain this delay.[16] An early proposal, by Borer & Wexler (1987), argued that children have difficulties with A-movement generally. A more recent conceptualization of this idea by Wexler (2004), termed the Universal Phase Requirement, proposes that certain domains that are transparent for syntactic operations in adult grammar, for instance the *v*P in passives, are strong phases in the child grammar. This would mean that for children, the underlying object is too deep inside the phase to be accessible for movement operations. On a third account, the Argument Intervention Hypothesis (Orfitelli 2012), it is the intervening (sometimes implicit) agent in passive constructions that cause problems. Crucially, all three proposals predict that if cleft sentences involve A-movement from an underlyingly predicative position, children should show similar delays on these structures. This expectation is clearly not borne out in our data. If we accept the claims from the developmental literature about the delay with structures like passives, then our findings in this article provide an argument against aspects of the predicate inversion analysis.

7. Conclusion

Our experiments showed that children have early understanding of syntactic and pragmatic aspects of clefts. The subject-object asymmetry found in previous work was shown to be illusory but ultimately revealing of what really goes wrong in children's behavior with these structures.

We would like to close by highlighting some issues that need to be addressed in future work. While we were able to locate the source of children's nonadult behavior in their difficulties manipulating the conversational context, we were not able to identify whether all types of accommodation are equally challenging for them. Previous research has found both presupposition accommodation (Schulz 2003) and question accommodation (Hackl, Sugawara & Wexler 2015) to pose problems for children, but it is possible that the necessary skills for the two develop at different points. In order to disentangle the relative contributions of presupposition failure and incongruence, it is necessary to examine children's comprehension of cleft sentences in contexts where only one or the other constraint is violated.

We find no reason to doubt that children's knowledge of the existence presupposition and information structure of clefts is in place early on. However, it would be premature to conclude that by age 4, children know all there is to know about these structures. As mentioned earlier, there are aspects of cleft meaning that were not directly tested in our experiments—for instance, the exhaustivity inference associated with them. Heizmann (2012) investigated the acquisition of this property specifically and found that even at age 6, children are more willing to accept nonexhaustive clefts than adults.[17] Thus, it could very well be that there are certain aspects of clefts that continue to develop during the course of the early primary school years.

[16]There have been other proposals that take children's difficulties with passives to be due to a reversal of the canonical relationship between thematic role and word order or due to processing difficulties caused by an intervening nominal. Note, however, that both properties hold object clefts, as well, which we found to be adultlike when felicitous.

[17]This could be related to children's difficulties with the uniqueness/maximality presupposition of definite descriptions, including free relatives (e.g., Modyanova & Wexler 2008).

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Appendix A: Target items, experiment 1

Table A1. Agent Context

Item	*Condition*	*QUD*	*Sentence*
1	T-Congruent	Look, something is chasing the cat! I wonder what it is!	It's a bear that is chasing the cat.
2	T-Congruent	Look, something is chasing the cat! I wonder what it is!	It's a dog that is chasing the cat.
3	T-Congruent	Look, someone is tickling the grandpa! I wonder who it is!	It's a girl that is tickling the grandpa.
4	T-Congruent	Look, something is carrying the monkey! I wonder what it is!	It's a sheep that is carrying the monkey.
5	T-Incongruent	Look, someone is pushing the girl! I wonder who it is!	It's the girl that a man is pushing.
6	T-Incongruent	Look, someone is splashing the boy! I wonder who it is!	It's the boy that a girl is splashing.
7	T-Incongruent	Look, something is poking the butterfly! I wonder what it is!	It's the butterfly that a monkey is poking.
8	T-Incongruent	Look, someone is feeding the little boy I wonder who it is!	It's the little boy that is feeding a woman.

Table A2. Patient Context

Item	*Condition*	*QUD*	*Sentence*
1	T-Congruent	Look, the bear is chasing something! I wonder what it is!	It's a cat that the bear is chasing.
2	T-Congruent	Look, the dog is chasing something! I wonder what it is!	It's a cat that the dog is chasing.
3	T-Congruent	Look, the girl is tickling someone! I wonder who it is!	It's a grandpa that the girl is tickling.
4	T-Congruent	Look, the sheep is carrying something! I wonder what it is!	It's a monkey that the sheep is carrying
5	T-Incongruent	Look, the man is pushing someone! I wonder who it is!	It's the man that is pushing a girl.
6	T-Incongruent	Look, the girl is splashing someone! I wonder who it is!	It's the girl that is splashing a boy.
7	T-Incongruent	Look, the monkey is poking something! I wonder what it is!	It's the monkey that is poking a butterfly.
8	T-Incongruent	Look, the woman is feeding someone I wonder who it is!	It's the woman that is feeding a little boy.

Appendix B: Target items (false), experiment 2

Table B1. Agent Context

Item	*Condition*	*QUD*	*Sentence*
9	F-Congruent	Look! Someone is pulling the girl! I wonder who it is!	It's a dog that is pulling the girl!
10	F-Congruent	Look! Someone is poking the grandma! I wonder who it is!	It's a man that is poking the grandma!
11	F-Congruent	Look! Something is biting the bird! I wonder what it is!	It's a dog that is biting the bird!
12	F-Congruent	Look! Something is poking the sheep! I wonder what it is!	It's a monkey that is poking the sheep!
13	F-Incongruent	Look! Something is carrying the cat! I wonder what it is!	It's the cat that a giraffe is carrying!
14	F-Incongruent	Look! Something is catching the fly! I wonder what it is!	It's the fly that a bird is catching!
15	F-Incongruent	Look! Someone is chasing the man! I wonder what it is!	It's the man that a cat is chasing!
16	F-Incongruent	Look! Something carrying the bird! I wonder what it is!	It's the bird that an elephant is carrying!

NB: True Target items 1–8 were the same as Experiment 1.

Table B2. Patient Context

Item	*Condition*	*QUD*	*Sentence*
9	F-Congruent	Look! The boy is pulling someone! I wonder who it is!	It's a man that the boy is pulling!
10	F-Congruent	Look! The girl is poking someone! I wonder who it is!	It's a boy that the girl is poking!
11	F-Congruent	Look! The horse is biting something! I wonder what it is!	It's a mouse that the horse is biting!
12	F-Congruent	Look! The squirrel is poking something! I wonder what it is!	It's a bird that the squirrel is poking!
13	F-Incongruent	Look! The elephant is carrying something! I wonder what it is!	It's the elephant that is carrying a penguin!
14	F-Incongruent	Look! The frog is catching something! I wonder what it is!	It's the frog that is catching a worm!
15	F-Incongruent	Look! The girl is chasing someone! I wonder who it is!	It's the girl that is chasing a mouse!
16	F-Incongruent	Look! The camel is carrying something! I wonder what it is!	It's the camel that is carrying a squirrel!