

# Investigations into Children's Acquisition of the Partitive Structure

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## Abstract

Recent literature suggests that children's acquisition of DP is a process of gradual feature acquisition (Roeper 2006). This study looks at the acquisition of DP's barrier feature from the perspective of the acquisition of the syntax of the English partitive construction. This study explores the contrast between the partitive and the pseudopartitive. An adjective preceding the partitive cannot modify the lower noun, but it can in an equivalent pseudopartitive construction. This study shows that children aged 3-5 do not make this distinction, suggesting that children don't recognize partitive-internal DP as a barrier to adjectival modification.

## 1. Introduction

This study looks at children's acquisition of the syntax of the English partitive and suggests that children's misinterpretation of the partitive supports the claim that until age 6 children project an incomplete Determiner Phrase (DP) (Roeper 2006). I investigate children's acquisition of the contrast between the partitive and the pseudopartitive as a window into the acquisition of DP.

### *1.1. Theoretical Background*

#### *1.1.1. The Partitive-Pseudopartitive Contrast*

The partitive (1a) and the pseudopartitive (1b) differ on the surface only in the existence of a definite determiner.

- (1) a. a box of the chocolates
- b. a box of chocolates

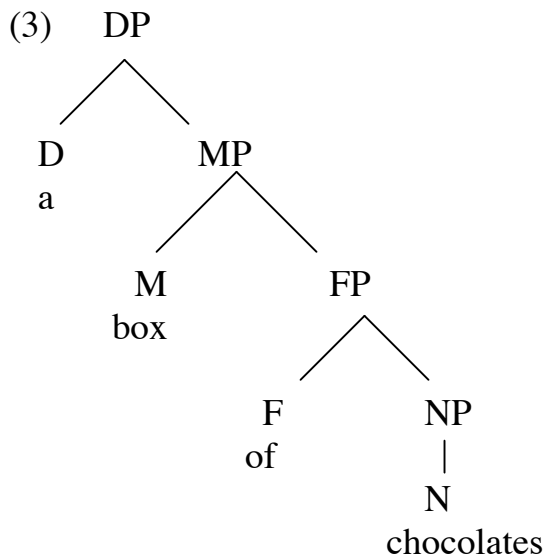
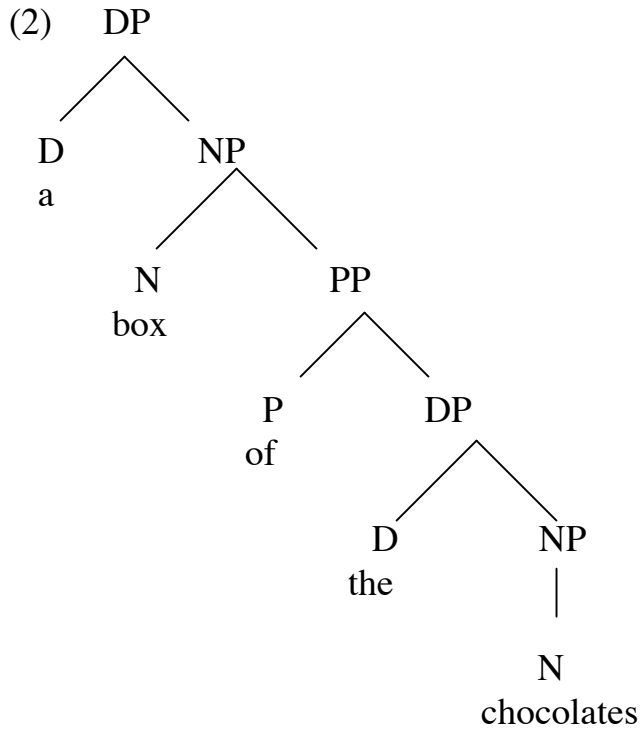
Despite this similarity, these two constructions differ greatly in their syntax. The partitive is a head complement structure (2), one DP inside another. The pseudopartitive is a single nominal projection (3). What is a Noun Phrase in the partitive is a Measure Phrase in the pseudopartitive and what is a Prepositional Phrase in the partitive is a functional projection in the pseudopartitive (Stickney 2004).

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The difference in syntactic structures between these two constructions is evidenced by the difference in syntactic behavior between the two (Stickney 2004). This paper focuses on how these two constructions behave in terms of adjectival modification. An adjective preceding the pseudopartitive can modify the head, 'chocolates' (4a). An adjective modifying the partitive is blocked from doing so (4b).

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- (4) a. A moldy box of chocolates  
b. A moldy box of those chocolates

The DP in the partitive blocks adjectival modification of the lower noun, hence in (4b) only the box can be moldy. The measure phrase in the pseudopartitive, however, is a semi-lexical projection (Alexiadou, Haegeman & Stavrou forthcoming). It has enough nominal features to be modified by the adjective, but is not lexical enough to head a construction. Being partially functional, it allows the adjective to reach through it to modify the head noun, regardless of whether it, itself, is modified by the adjective or not. The phrase in (4a) can be used in situations where the box is moldy, the chocolates are moldy, or both are moldy.

The syntax of neither the partitive nor the pseudopartitive has been investigated in terms of child language acquisition. The study discussed herein is the first of this type. I focus here on the acquisition of the definite determiner within the partitive. Young children have been shown to have difficulty acquiring the definite determiner in various constructions (Section 1.1.2). Does this difficulty also arise with the partitive?

### *1.1.2. DP & its Acquisition*

The process of children's acquisition of DP is a gradual one, starting with the use of articles sometime near the end of the second year in English (Kupisch 2006) and culminating with the acquisition of some semantic subtleties after age 6 (such as maximality, Wexler in press). There has been much written about the acquisition of DP both semantically and syntactically. The bulk of the recent literature has focused on a relatively late phase of acquisition in which the child has presumably acquired the syntax of DP and has almost completely acquired the semantics, except that he erroneously uses "the" to refer to a member of a set (Schafer & de Villiers 2000, Matthewson, Bryant & Roeper 2001, Schaeffer & Matthewson 2005, Wexler in press). This study focuses on children's acquisition of DP as a barrier to adjectival modification, supplementing previous research on the acquisition of DP as a barrier in various syntactic operations.

There has been much research, beginning with Ross (1967), to support the idea that DP acts as a barrier to various types of movement. Ross showed that complex NPs such as relative clauses, coordinate structures and nouns with noun complements were all barriers for movement. Elements within DP cannot be extracted by wh-movement, extraposition, etc. DP has also been shown to be a barrier for negative concord in African American English (Coles 1998). Children's acquisition of DP as a barrier has been investigated

in numerous environments including relative clauses (Otsu 1981), negative concord (Coles 1998), binding and question formation (de Villiers & Roeper 1995). A range of hypotheses have been suggested for children's initial inability to identify DP as a barrier, ranging from lack of DP altogether (de Villiers & Roeper 1995) to lack of particular features which trigger DP to be a barrier (Baauw 2002).

### 1.2. *Hypotheses*

Regardless of the various theories about how much structure children are projecting, it is clear from the studies listed above that children have trouble treating DP as a barrier --in cases in which it is clearly a barrier in the adult grammar. This trend suggests that children will initially have trouble with the syntax of the partitive. The partitive has an internal DP layer (2). This study examines the contrast between partitive and pseudopartitive with respect to adjectival modification (4a&b). Remember for adults, the DP in the English partitive creates a barrier that prevents an adjective preceding the partitive modify the lower noun. Several hypotheses can be proposed regarding how children will treat adjectival modification of the partitive.

- H<sub>0</sub>: English speaking children's DPs are target-like from the beginning, creating a barrier to adjectival modification in the partitive.
- H<sub>1</sub>: English speaking children's DPs are not target-like and young children use simple combinatorial processes when faced with complex nouns. These combinatorial processes will combine the adjective with the closest noun-like element, regardless of construction type.
- H<sub>2</sub>: English speaking children's DPs are not target-like and young children start out projecting NPs/DPs that lack a barrier feature.

H<sub>0</sub> predicts that children will, like adults, allow the adjective to modify low in the pseudopartitive but not in the partitive. H<sub>1</sub> predicts that children will always modify high, regardless of whether they are faced with a partitive or pseudopartitive. H<sub>2</sub> predicts that children will treat the partitive as if it were pseudopartitive, with free modification (high and/or low) regardless of construction type. The following experiment tests these hypotheses contrasting adjectival modification of the partitive and the pseudopartitive.

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## 2. Adjectival Modification Experiment

### 2.1. *Subjects*

42 normally developing children aged 2;11 - 6;2 (mean age 4;11) and 12 adult controls (undergraduate students at the University of Massachusetts, Amherst) participated in this study.

### 2.2. *Procedure*

The contrast between partitive and pseudopartitive (with respect to adjectival modification) had never before been tested experimentally. In order to test children, it was necessary to find a contrast that was clear for adults. To this end, the experiment contained three different types of tasks, an act out task, a coloring task and a story comprehension task, and it was assumed that any particular task that did not provide a clear contrast would be excluded from the final analysis. It was also clear during the design phase of this experiment that particular adjectives seem to be able to pragmatically cross barriers.<sup>1</sup> Adjectives were chosen which, to the author, seemed to best conform to the partitive/pseudopartitive parameters; however it was clear that these adjectives would need to be tested experimentally with adults as well as children.

In order to compare partitive and pseudopartitive, the experimental items differed only with respect to the definite determiner. Pseudopartitives tend to contain measure phrases that refer to containers (5a) or collections (5b).

- (5) a. a carton of milk
- b. a herd of elephants

This property of pseudopartitives necessarily excluded the study of partitives containing quantifiers (6a) or numbers (6b) because there are no pseudopartitive counterparts (7).

- (6) a. most of the milk
- b. three of the bears

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<sup>1</sup> For example, based on the claims above, a phrase like “a hot cup of the coffee” should not say anything about the temperature of the coffee, only the cup. But we may automatically assume that because the cup is hot, the coffee is hot, too.

- (7) a. \*most of milk  
 b. \*three of bears

Additionally, partitives and pseudopartitives were chosen that had nominal elements that could take similar adjectives. Hence, all items in the experiment contained some sort of container and some sort of substance (or large amount of small items). These will be referred to as “container” and “substance” for the rest of this paper.

Below are examples of each type of task. Each experimental item began with a story and was followed by a partitive or a pseudopartitive prompt (preceded by an adjective). The children received one of two versions of this experiment containing seven experimental items (2 act out, 2 coloring and 3 story comprehension). The two versions were counterbalanced so that items that were partitive in one version were pseudopartitive in the other. Thus, each child heard either 3 partitives and 4 pseudopartitives or 4 partitives and 3 pseudopartitives.<sup>2</sup> The stories were identical regardless of version or prompt type (partitive or pseudopartitive). Each story contained wording that made the definite determiner in the partitive items felicitous.

### 2.2.1. Act Out

The act out items required the child to put substances into containers. For each item, there were multiple substances and containers. Some of the substances and containers matched the adjective in the prompt and some did not. For example, in one item the child was presented with beads and pots. Half of the beads were sparkly and half were not. One of the pots was sparkly and two of the pots were not sparkly. The child was prompted to put beads in a pot so that we’d have either (8a) or (8b):

- (8) a. a sparkly pot of beads [pseudopartitive]  
 b. a sparkly pot of the beads [partitive]

If the child was given a pseudopartitive prompt, either the pot (container) or the beads (substance) could be sparkly. If the child was given a partitive prompt and he correctly recognized the DP “the” to be a barrier in the partitive, then he would only allow the pot to be sparkly and not the beads.

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<sup>2</sup> After the experiment was run it was determined that one of the act out tasks did not give useful results (see section 2.3). The results were analyzed without this item, leaving each subject with three partitive and three pseudopartitive items.

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### 2.2.2. *Coloring*

In the coloring task, the child was presented with a picture of a container filled with a substance and the child was instructed to color the picture according to the partitive or pseudopartitive prompt. In one item the child was showed how to put prickers on a cactus with a stamp marker and then was presented with a picture of a plate with cookies on it. She was then asked to make either (9a) or (9b):

- (9) a. a prickly plate of cookies [pseudopartitive]  
b. a prickly plate of the cookies [partitive]

If the child was given a pseudopartitive prompt, then coloring either the plate (container) or the cookies (substance), or both, was acceptable. If the child was given a partitive prompt, then only the plate would be available for coloring if she knew that the definite article serves as a barrier to adjectival modification.

### 2.2.3. *Story Comprehension*

The story comprehension items required the child to either choose a picture or answer a yes/no question. Again, the child was presented with either a partitive or pseudopartitive prompt. His answers would differ depending on whether he allowed the adjective preceding the structure to modify the lower noun (substance). In one item the child was told a story about a witch who has a special chicken soup recipe that she always uses. She makes the soup and then does different things with it. The child was presented with four pictures: an old pot with new soup in it, a new pot with old soup in it, and two foils. The child was then prompted to hand the witch each picture. The relevant prompt asked the child to hand the witch either (10a) or (10b):

- (10) a. an old pot of soup [pseudopartitive]  
b. an old pot of the soup [partitive]

The key diagnostic for barriers in all of the above cases is whether the child allows the adjective to modify the lower noun (substance) in the partitive. This should be disallowed if the child is target-like and recognizes that the DP is a barrier to adjectival modification. In other words, a child who recognizes that DP is a barrier should allow an adjective to modify either container or substance for the pseudopartitive, but should *disallow* the adjective to modify the substance when presented with a partitive construction. Table 1 sums up the various predictions made by the hypotheses in Section 1.2.

Table 1: Predictions based on prompt type

	Partitive items		Pseudopartitive Items	
	Substance	Container	Substance	Container
H <sub>0</sub> (target)	N	Y	Y	Y
H <sub>1</sub>	N	Y	N	Y
H <sub>2</sub>	Y	Y	Y	Y

### 2.3. Results

As mentioned in Section 2.2, there were no precedents for experimentally testing the interaction of adjectives with the partitive and the pseudopartitive, and three types of task were used to investigate this contrast. There was no significant difference between performance on the various task types (for both adults and children), so the results for each task are collapsed in the data below.

However, one difficulty did arise for the coding of the results. A “both” response, when given for a partitive prompt, was difficult to interpret. Did the child ignore the barrier in the partitive and allow the lower noun to be modified? Or did he recognize that the adjective referred only to the container (head noun), but let the adjective modify the substance for some other reason (say, matching for instance). For this reason, all “both” responses were removed from the data analysis. The majority of “both” responses were on pseudopartitive items, so this removal did not skew the data toward any of the predictions in Table 1. One act out item *did* elicit a large proportion of “both” responses and was removed from the data analysis.<sup>3</sup>

Table 2: Percentage of substance and container responses for each prompt type<sup>4</sup>

Age	Partitive items		Pseudopartitive Items	
	Substance	Container	Substance	Container
3 (n = 9)	57.14%	42.86%	68.18%	31.82%
4 (n = 12)	48.57%	51.43%	70.97%	29.03%
5 (n = 11)	53.33%	46.67%	61.29%	38.71%
6 (n = 10)	37.03%	62.96%	65.51%	34.48%
Adult (n = 12)	25.00%	75.00%	50.00%	50.00%

<sup>3</sup> This act out item required the subject to put colored pompoms into colored boxes. Both adults and children had a tendency to match the color for container and substance.

<sup>4</sup> These results are based on 324 responses to six experimental items.

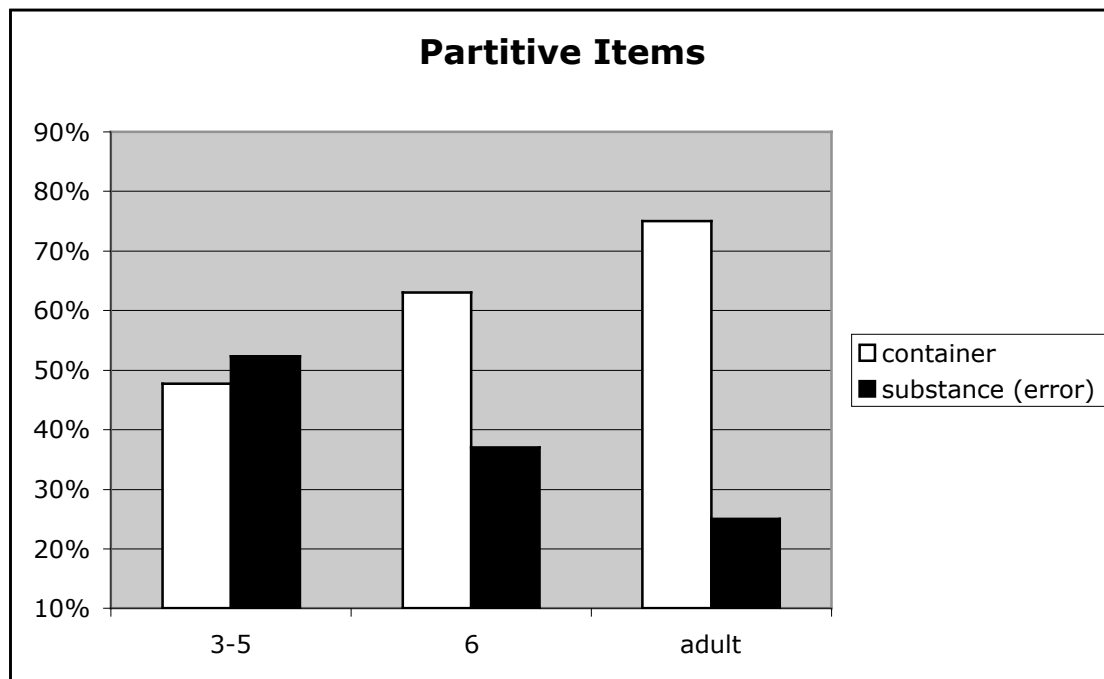


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Subjects were analyzed based on individual age groups and there was no significant difference between the performance of three, four and five year olds. These responses were collapsed for the analysis below.

The crucial responses for all hypotheses are the substance responses. All age groups gave more substance than container responses in the pseudopartitive. Only the 6 year olds and the adults clearly preferred container responses to substance responses in the partitive (Figure 1).

Figure 1: Percentage of response types per age group for partitive items

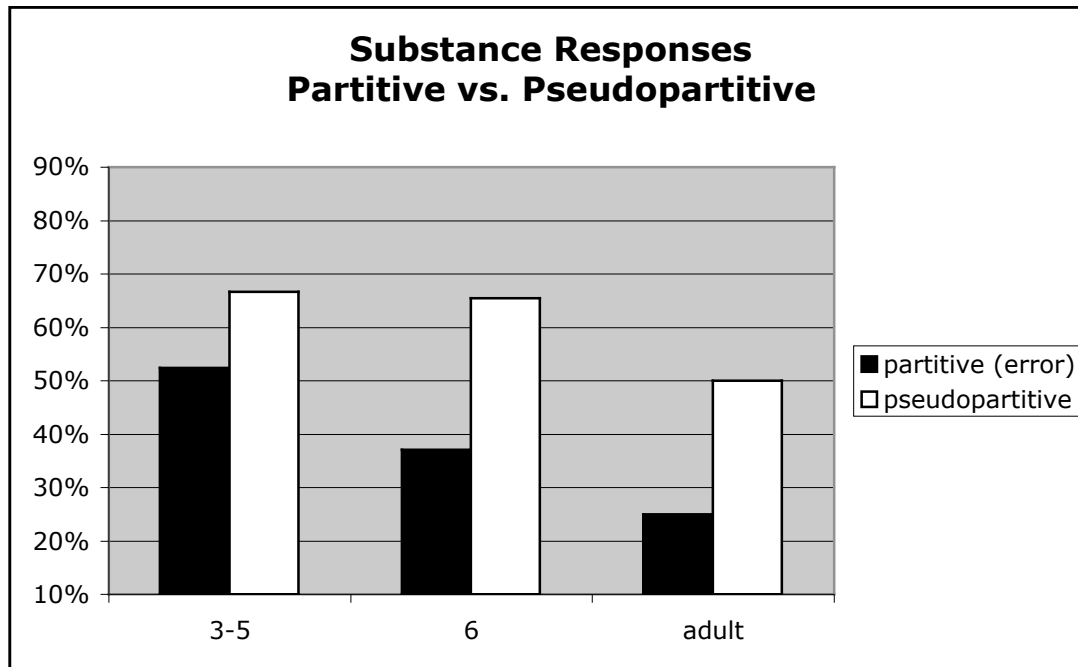


The proportion of partitive errors was analyzed with a univariate analysis of variance, with the average number of partitive errors at three levels of age (3-5, 6 & adult). The dependent variable was the proportion of partitive errors. There was a main effect of age  $F(2,53)=3.673$ ,  $p=.032$ . A pairwise comparison showed significance between the partitive error scores of adults and 3-5 year olds at  $p=.013$ .

The proportion of substance responses (Figure 2) for partitive versus pseudopartitive items were analyzed with a 2X3 mixed analysis of variance, with the average numbers of substance answers at two levels of prompt type (pseudopartitive and partitive) and three levels of age (3-5, 6 & adult). The dependent variable was the proportion of substance responses. There was a main effect of prompt type  $F(1,51)=16.609$ ,  $p=.000$  and a main effect of age  $F(2,51)=3.278$ ,  $p=.046$ . There was not a significant interaction between age

and prompt type  $F(2,51)=1.036$ ,  $p=.362$ . However, looking at the effects of prompt type for each age group individually reveals that adults are significant  $F(1,11)=7.05$ ,  $p=.02$  and six year olds are significant  $F(1,9)=9.256$ ,  $p=.014$ .

Figure 2: Substance responses for partitive and pseudopartitive based on age group



The results are consistent with  $H_2$ . In contrast to the adults, who make a clear distinction between partitive and pseudopartitive, children aged 3-5 are not respecting the barrier to adjectival modification that is present in the partitive.  $H_1$ , which suggested that children might combine the adjective with the closest nominal element, is not supported. All children preferred to modify the head in the pseudopartitive (instead of combining the adjective with the closer Measure Phrase). Additionally 3-5 years olds showed no significant preference for modifying the first noun in the partitive. This also rules out  $H_0$ , which predicted that children would modify the first noun in the partitive and be free to modify either nominal element in the pseudopartitive.

The results show us that children aged 3-5 are not respecting the barrier in the partitive that prevents the adjective from modifying the lower noun. This is consistent with previous research that shows children have trouble treating DP as a barrier.

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### 3. Discussion

Despite the promising results from this experiment, showing us that children are not respecting a barrier in the partitive that is respected by adults, there are remaining questions about the partitive that prevent a strong claim regarding the acquisition of DP. The first question regards whether DP or PP creates the barrier to modification in the partitive. The second question is whether children have difficulty recognizing *all* DPs as barriers or just “the.” Further questions brought up by this research include (a) what structure children build when they misrepresent the partitive and (b) what triggers children to recognize that DP is a barrier.

#### 3.1. DP or PP?

The structures in Section 1.1.1 present more than one difference between partitive and pseudopartitive. The partitive (2) contains not only an internal DP, but also an internal Prepositional Phrase (PP). The pseudopartitive (3) has a less-than-prepositional Functional Projection<sup>5</sup> headed by “of.” Sabbagh (to appear) suggests that PP is a phase. For the purposes of this paper, “phase” can be defined as “barrier.” Sabbagh claims that many of the cases in which DP appears to be a barrier are actually cases in which a PP is blocking movement. If PP is indeed a barrier, and not DP, then the results seen herein would be due to a deficient Prepositional Phrase, rather than a deficient Determiner Phrase.

The adjectival modification experiment was not able to differentiate between a case in which PP is a barrier and DP is a barrier. The next step in experimentation is to compare pseudopartitive constructions with comparable head complement constructions containing true PPs, such as in (11).

- (11) a. a lumpy bowl of oatmeal  
b. a lumpy bowl with oatmeal

The Prepositional Phrase in (11b) prevents the adjective “lumpy” from modifying “oatmeal.” If children are successful in recognizing this contrast, then there is evidence that DP is indeed the source of the problem seen in this study.

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<sup>5</sup> This functional projection is only defined by Stickney (2004) as being non-prepositional. Similar uses of “of” as FP can be found in Deevy 1998, den Dikken 1998 and Kayne 2004, *inter alia*.

3.2. *All DPs or just “the”*

The experiment discussed in this paper used only “the” as the definite determiner in the partitive. If PPs can be ruled out as the source of the barrier in the partitive, which seems likely in light of the amount of literature that suggests that DP is a barrier, additional questions still remain regarding choice of determiner. Is it the case that children fail to treat *all* DPs as barriers or does each type of determiner get recognized as a barrier at different times in the acquisition process? The majority of the literature on the acquisition of both the syntax and semantics of DP focuses on “the” (Maratsos 1976, Otsu 1981, Coles 1998, Matthewson, Bryant & Roeper 2001, Roeper 2006, Wexler in press, interalia). Kupisch 2005 suggests that the acquisition path and timing for the definite determiner in any given language depends on the amount and kind of semantic information encoded on it. It may be the case that for each type of DP this knowledge must be acquired.

If so, it is probable that “the” is one of the last determiners to be recognized as a barrier. de Villiers & Roeper (1995) discuss children’s difficulty with DP. They look at light verb constructions such as “make the decision” in which the determiner is *not* a barrier to extraction.

- (12) a. How<sub>i</sub> did the boy make the decision to play t<sub>i</sub>?  
 b. \* How<sub>i</sub> did the boy like the decision to play t<sub>i</sub>?

(de Villiers & Roeper 1995, 82:25)

de Villiers & Roeper claim that in adult English the “the” in “make the decision” is located in spec,NP and that no DP is projected to create a barrier to movement. They show that children’s grammars treat “like the decision” like “make the decision,” allowing “how” to be extracted across a barrier.

The fact that for adults the “the” in “make the decision” does not create a barrier presents an interesting point: English “the” is ambiguous in what features it contains. If children notice this, it may take them longer to treat “the” as a barrier, even though they may recognize that other DPs are barriers. An ambiguous “the” may also be the cause of the 25% error rate in adults (Section 2.3) on the partitive items. If “the” is ambiguous in what features it contains, it may be possible that for some adults “the” occasionally loses its barrier feature. This account would need to be worked out more fully.

Whether some property of “the” is responsible for the above results can be investigated experimentally by simply contrasting the type of determiner used in the partitive.

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- (13) a. an old pot of the soup  
b. an old pot of Jane's/his/that soup

If “the” is indeed treated differently by children (or adults), then the contrast in (13) should show it.

### *3.3. Children's Partitive Structure*

Another issue in need of further investigation is the question of just what sort of partitive children are constructing if they don't have a complete Determiner Phrase. One possibility is that they are building a partitive construction that is identical to the adult construction, except for the fact that DP lacks particular features, including the one that makes DP a barrier. Another possibility is that children, lacking the DP barrier feature, are building a pseudopartitive. Rutkowski (forthcoming) suggests that pseudopartitives, diachronically, are syntactically reduced partitives. It may be that initially the pseudopartitive is an easier structure for children to project. A third possibility is that children are building a partitive that contains only NPs. Each of these options would be consistent with the results of the current experiment, but have further implications that can be tested experimentally. For example, a partitive containing only NPs would lack semantic features such as referentiality, but would have the same extraposition properties as the partitive, which differ from the pseudopartitive (see Stickney 2004).

### *3.4. What Triggers Barriers?*

Discussion of just how children encode articles and whether or not they treat them as barriers to movement or modification encourages us to ask what triggers their knowledge of barriers. A number of features have been suggested as being responsible for barriers, including referentiality (Chomsky 1998) and specificity (Diesing 1992). The acquisition of the semantics of the definite determiner have been investigated at length (as mentioned in 1.1.2), but a comprehensive study of correlation between the acquisition of semantic information and the acquisition of barriers is still lacking. Referentiality is acquired quite early in acquisition. Specificity comes in a bit later, but both of these properties are acquired well before children consistently treat DP as a barrier. It may be promising to look at Maximality (Wexler in press), which is mastered around age 6, as a possible piece of this puzzle.

### 3.5. Conclusion

This is the first look at children's acquisition of partitive syntax. I have shown that children's acquisition of partitive syntax is not complete by age 5. This supports the literature that suggests children's DP syntax is incomplete at this age. However, the limitations of the experiment discussed herein leave many questions unanswered. These questions beg to be addressed experimentally. Future experiments are needed that continue to contrast the partitive, the pseudopartitive and other head-complement structures regarding type of preposition used and type of determiner used. Experiment design needs to be cleaner, allowing for responses that hold no ambiguity.

Further experimentation will not only strengthen the conclusions expressed above, but will help investigate whether barrierhood must be learned for each type of determiner and will begin to address what semantic features finally trigger children to treat DP as a barrier.

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