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Generic interpretations of Possessive Recursion in English-Speaking Children

Tyler Poisson
University of Massachusetts Amherst

Jill de Villiers
Smith College, jdevilli@smith.edu

Hirsto Kyuchukov
University of Silesia

Bea Weinand
Smith College

Lilly Young
Smith College

See next page for additional authors

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Authors

Tyler Poisson, Jill de Villiers, Hirsto Kyuchukov, Bea Weinand, Lilly Young, Sofia Morales, and Laisha
Aniceto

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Abstract. Two-part *s*-possessives such as *the dad's kid's bike* admit at least two distinct interpretations: the dad has a kid who has a bike, or the dad has a bike that is made for kids. We propose that the former interpretation derives from recursively embedding DP-possessives, whereas the latter derives from representing *kid's bike* as a generic NP-possessive. Accordingly, in the right context, two-part *s*-possessives are fully ambiguous for adults between 'recursive' and 'generic' readings. These readings can be disambiguated syntactically. Consider the difference in meaning when we insert a relative clause and extract the constituent *kid's bike—the kid's bike that is the dad's*—versus when we extract the head noun *bike—the bike that is the dad's kid's*. Our story-based experiment demonstrates that 4-7-year-olds (N=79) and adults (N=68) strongly favor (~80%) the generic interpretation of phrases like *the kid's bike that is the dad's*, as the A-over-A constraint blocks the extraction of a DP-possessive out of a recursive DP.[1] Similarly, adults show a strong preference (~80%) for recursive interpretations of phrases like *the bike that is the dad's kid's*, as the A-over-A constraint blocks the extraction of the head noun *bike* out of the generic NP-possessive *kid's bike.* However, 4-5-year-olds admit generic readings of these recursive phrases 54% of the time; it is not until 6 or 7 years that children show an adult-like preference for the recursive interpretation (~80%). These data support two complementary claims. First, that recursive possessives are acquired late on account of their syntax, and second that children, like adults, represent generic possessives under a different syntactic node than regular possessives. Not all languages permit recursive prenominal possessives, and there is variation in the node (NP, DP, POSS, K) hosting the phrase. As a result, young children faced with two-part *s*-possessives may default to generic interpretations, which involve universal NP modification, until they recognize possessive recursion is a part of their grammar.

1. Introduction. All natural languages enable speakers to express possession, but the syntactic forms with which speakers can express it vary across languages (Marinis 2016). Recursive possessives provide a sharp example of cross-linguistic variability within this class of

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[1] The A-over-A Principle is a universal constraint on transformations suggested by Chomsky in Aspects (1965): If a category 'A' dominates a node of the same category 'A', then a transformation can only operate on the dominating node.

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expressions: English grammar licenses the iterative embedding of *s*-possessives via Determiner Phrases (1) while German does not (2b) (Roeper 2011, Li et al. 2020).

(1)
```
                    DP
                   /  \
               POSS    NP
              /   \     |
            DP    's   viola
           /  \
       POSS    NP
      /   \     |
    DP    's  teacher
     |
   Olivia
```

(2) a. Olivia-'s teacher-'s viola
        Olivia-POS teacher-POS viola
        'Olivia's teacher's viola'
     b. * Olivia-s lehrer-s bratsche
        Olivia-POS teacher-POS viola
        'Olivia's teacher's viola'
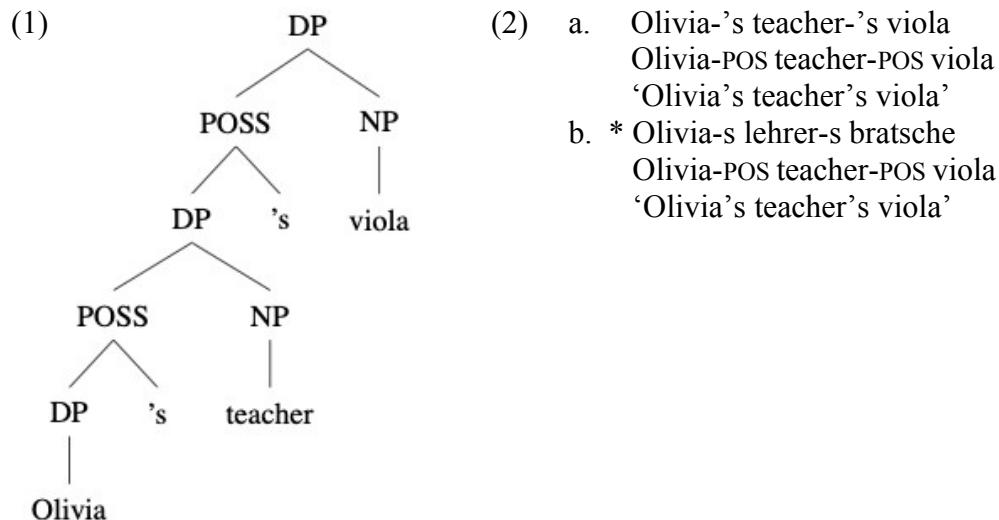
The challenge for the learner appears not to lie in acquiring the language-universal concept of possession, but in acquiring a language-specific means of expressing the concept in its complex form (1). In fact, possession is one of the first concepts that children communicate (Marinis 2016), while recursive possessives (1) would seem to appear strikingly late (Gentile 2003, Limbach & Adone 2010, Fujimori 2010, Roeper 2011, Pérez-Leroux et al. 2012). A collection of experimental work (Gentile 2003, Limbach & Adone 2010, Pérez-Leroux et al. 2012, Li et al. 2020) points to 6 or 7 years as the age at which children begin to demonstrate adult-like interpretations of recursive possessives. In some experiments, 4- and 5-year-olds avoid recursion by admitting conjunctive interpretations of recursive possessive phrases (Gentile 2003, Fujimori 2010, Limbach & Adone 2010, Sevenco et al. 2015, Li et al. 2020). Children 4-years-old and younger have also been documented avoiding recursion in comprehension tasks by dropping (i.e., deleting) one possessive in a two-part recursive phrase (Limbach & Adone 2010, Terunuma 2017, Li et al. 2020). Given these results, we can conclude that learners are hesitant to jump from singular non-prepositional *s*-possessives (e.g., *Olivia's teacher*), which they have by age 2 (Marinis 2016), to language-specific recursive possessives (e.g., *Olivia's teacher's viola*).
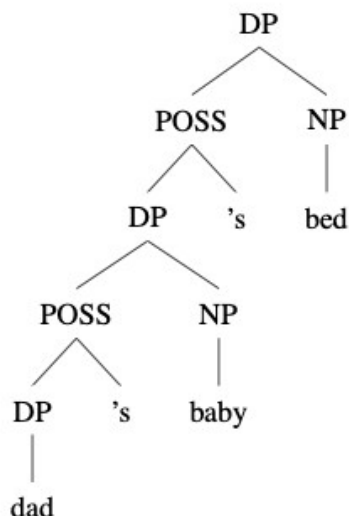
It remains a matter of open debate how the child eventually learns recursive possessives from input (Roeper 2011, Pérez-Leroux et al. 2018, Li et al. 2020, Li et al. 2021), but it has generally been taken for granted that the child has learned them once she comprehends and/or produces two-part *s*-possessives (2a). However, certain considerations (Hollebrandse & Roeper 2014, Li et al. 2020, Poisson, in preparation) complicate this picture. In particular, Poisson (in preparation) proposes that two-part *s*-possessives (2a) can be accurately represented without category recursion. If this turns out to be the case, then comprehension and/or production of two-part *s*-possessives on the part of the child is not necessarily indicative of recursion. This proposal turns on Munn's (1995) syntactic analysis of generic possessives, according to which they are Noun Phrases with type-denoting modificational possessors and meanings comparable to those of generic compounds[2]. Take for example the ambiguous possessive phrase in (3a).
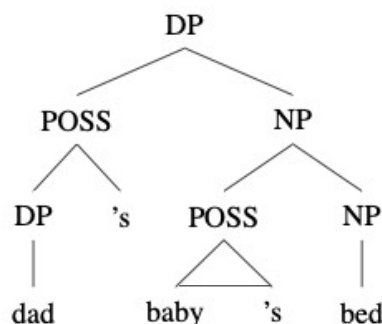
(3) a. *the dad's baby's bed*

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[2] However, Munn makes the case that they are not compounds because they are productive, show agreement, and have other properties that compounds do not.

One possible construal of (3a) involves recursive DP-possessives (see (3b)). However, *baby's bed* can also be construed as a generic NP-possessive (see (3c)), such that it denotes a baby-type bed (i.e., a bed made for babies). Put another way, we stipulate that (3a) has a recursive syntax when it refers to the bed of the dad's baby (3b), but not when it refers to the dad's baby-type bed (3c).

(3) b. Recursive tree

```
                    DP
                   /  \
               POSS    NP
               /  \     |
            DP    's    bed
           /  \
       POSS    NP
       /  \     |
     DP   's   baby
      |
     dad
```

c. Generic tree

```
                 DP
                /  \
            POSS    NP
            /  \    /  \
          DP   's POSS   NP
           |      / \     |
          dad  baby  's  bed
```

Poisson (in preparation) advances the hypothesis that learners can avoid recursion by interpreting the second possessive in a two-part possessive phrase as a generic (3c). For this to be possible, children must have distinct syntactic representations of generic possessives and regular possessives. Poisson contends that generic NP-possessives come early and takes as evidence natural speech data, including the reproductions below.

(4) a. Chi (2;3): *It's Coby's baby's jacket.*
         Mot: *But Coby's baby has clothes on already.*
         Mot: *She could wear this dress.*
         Chi: *No.*
         Chi: *She could wear this baby's hat.*   (Valian 1991)
     b. Chi (2;8): *I'm gonna have a little kid's spoon.*   (Clark 1982)
     c. Chi (2;9): *Want to get big girl's ones [goggles].* (Manchester 2001)

The 2-year-old in (4a) produces a generic possessive within the two-part possessive phrase *Coby's baby's jacket*, and the lone generic possessive *baby's hat*. The 2-year-olds in (4b-c) also produce unprompted generic possessives with modificational possessors that appear frequently in child speech. As further evidence, Poisson pilots a truth-value judgment task which demonstrates that 4-6-year-olds (n=13) admit 40% more generic interpretations[3] of ambiguous two-part possessive phrases than 7-10-year-olds (n=10).

These data can be taken as evidence that generic possessives are, as Munn (1995) posits, syntactically distinct from regular possessives, and thereby that two-part possessives can be represented by flat, or non-recursive, structures (as in (3c)). The upshot is that two-part

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[3] By 'generic interpretation/reading' we mean the reading of a two-part possessive on which the first possessive is treated as a referential DP and the second is treated as a type-denoting NP (3c).

possessives need not necessarily entail possessive recursion (i.e., the embedding of a like category as in (3b)). As mentioned above, previous research suggests that young children struggle to comprehend possessive recursion in experimental settings (Limbach & Adone 2010, Fujimori 2010, Roeper 2011, Pérez-Leroux et al. 2012, Leandro & Amaral 2014, Hollebrandse & Roeper 2014, Terunuma & Nakato 2018, Li et al. 2020). This does not necessarily mean that children will fail to comprehend two-part possessives when they involve generics.

The present study puts this question to a stringent test, exploiting Chomsky's (1964) A-over-A Principle, which specifies that phrases cannot be extracted from within more inclusive phrases of the same labeled category. In view of this constraint, a DP that is recursively embedded in another cannot be extracted. We can however extract the head noun *bed* from within the recursive DP-possessive *dad's baby's bed* to yield (3d), because they are of differently labeled categories. Crucially, we can also extract the constituent *baby's bed* from the phrase *the dad's baby's bed* (see (3e)) without violating the A-over-A Principle (i.e., to the end of a grammatical output).

(3) d. Split recursive   e. Split generic
         the bed that is the dad's baby's   *the baby's bed that is the dad's*
         'the bed of the dad's baby'   * 'the bed of the dad's baby'
      * 'the baby-type bed of the dad'   'the baby-type bed of the dad'

It is important to note that the split recursive cannot be interpreted as the baby-type bed of the dad. Conversely, the split generic cannot refer to the bed of the baby. The A-over-A Principle can explain these restrictions if and only if generic possessives in fact belong to a different syntactic category than regular possessives, as Munn (1995) proposes. That is, the constituent *baby's bed* can be extracted as a (generic) NP-possessive from within a DP in the generic tree (3c) but not as a (referential) DP-possessive from within a DP in the recursive tree (3b). Conversely, the head noun *bed* can be extracted from within the DP-possessive *baby's bed* in the recursive tree (3b) but not from within the NP-possessive *baby's bed* in the generic tree (3c). It is in this manner that the A-over-A constraint imposes restrictions on interpretations of forms (3d) and (3e). The basic point is this. We cannot split up a generic *s*-possessive and preserve its meaning, so we are forced to interpret (3d) as a recursive DP-possessive. In the same vein, we cannot split up a recursive DP-possessive and preserve its meaning, so a generic interpretation of (3e) is forced. In both of these cases of extraction, it is a possessum that moves to the front, not a possessor.

1.1. EXPERIMENT. The present experiment consists of a forced-choice comprehension task, in which we use split recursive and split generic phrases (of the form in (3d) and (3e) respectively) to prompt (18-year-old) adult controls and (4-7-year-old) child participants to choose between two salient objects from a story, one that maps onto a recursive reading and the other that maps onto a generic reading of a relevant two-part possessive. A preliminary test revealed that the recursive and generic reading were equally viable, independent of prompt syntax, in each of the nine stories we developed. That is, when prompted with the unsplit two-part possessive to pick between the object that mapped onto a recursive reading and the object that mapped onto a generic reading thereof, 45% of adults' (N=8) interpretations were generic and 54% were recursive[4].

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[4] E.g., participants in this preliminary stage read Example Story 1 below, but were prompted to pick between the object with the unsplit phrase *the dad's baby's bed*. Roughly half chose the baby-type bed of the dad and the others chose the bed of the dad's baby. The former choice is indicative of a generic interpretation of the two-part

1.2. HYPOTHESIS. We predict that when we split a two-part possessive and insert a relative clause, adults will have a recursive reading of split recursive forms (3d), since the A-over-A constraint blocks the generic reading, and a generic reading of split generic forms (3e), since the A-over-A constraint blocks the recursive reading. If they are obtained, these results will support the claim that generic and regular possessives belong to different syntactic categories in mature grammar. The goal of our study is then to test children's comprehension of split recursive and split generic possessives. In so doing, we aim to serve two complementary purposes.

First, we are testing whether recursive possessives are later developing due to their syntactic complexity. Our experiment is well positioned to test this: children are tasked with comprehending two comparably complex possessive structures: the split recursive and split generic both involve intricate semantic relations, relative clause insertions, similar processing requirements, and constraints on extraction, only the former is recursive while the latter is not. Therefore, if children give adult-like responses to (i.e., pick out the expected referents of) split generic prompts, but not split-recursive prompts, then our study will lend favor to the claim, advanced by Roeper (2011), Snyder & Roeper (2004), and others, that recursive possessives are acquired late precisely because they entail a language-specific form of category recursion.

Secondly, we are testing whether children can avoid recursion by interpreting the second of two possessives in a two-part phrase as a generic NP. That is, we want to know if children represent generic and regular possessives under different phrasal categories. We should learn from our adult data whether split recursive and split generic forms are in fact grammatical and restricted by the A-over-A Principle. If they are, then we will have evidence that generic and regular possessives are assigned different category labels in mature grammar. But we are really concerned with developing grammar. If, for child participants, the A-over-A constraint blocks generic readings of split recursives and blocks recursive readings of split generics, then we can infer that child learners represent generic possessives under different syntactic categories than recursive possessives.

In line with existing literature, we predict that children younger than 6 do not have recursive possessives. We also predict that children 4 and older assign distinct phrasal categories to regular and generic possessives. In terms of our task, this pair of predictions converges on an expected result. If we are correct that children younger than 6 do not have split recursive possessives, and they represent generic possessives as NPs, then 4-5-year-olds should

(A)   be (near) adult-like on split generic prompts,

since the recursive misinterpretation will be absent from their grammar and blocked by the A-over-A constraint, and

(B)   be at chance on split recursive prompts.

(B) follows if the generic misinterpretation of split recursive prompts is blocked by the A-over-A constraint and the recursive alternative is unavailable until 6 or 7, leaving 4-5-year-olds with an uninterpretable phrase. In the context of our task, 4-5-year-olds should then guess on split recursive prompts and be at chance. Finally, we expect that 6-7-year-olds will be (near) adult-like at both split recursive and split generic prompts, since we anticipate that they have recursive DP-possessives, and that they represent generic possessives under a different syntactic category, like adults.

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possessive while the latter indicates a recursive reading.

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2. Method.

2.1. PARTICIPANTS. 79 English-speaking children aged 4-7-years-old participated in our online study via MIT's developmental research platform Lookit (Scott & Schutz 2017). Lookit requires video parental consent and child assent so that the child can be video-recorded during test trials to ensure that there is no interference. Only the child's responses are used in the data analysis. The ages and genders of the children are provided in Table 1. Lookit provides a demographic snapshot of the participants, which revealed that 2/3 were professional class, and all parents had at least an associate's degree. Approximately 2/3 identified as White, with Asian and Mixed Race representing the rest. The geographic diversity across the United States was broad. Though not as diverse as an ideal sample, the sample is on-par with what can be expected from an average University lab.

Age group	Girls (N)	Mean age (S.D.)	Boys (N)	Mean age (S.D.)
4-year-olds	13	4.46 (.24)	6	4.47 (.36)
5-year-olds	11	5.55 (.32)	12	4.49 (.34)
6-year-olds	12	6.43 (.22)	8	6.45 (.38)
7-year-olds	6	7.55 (.25)	7	7.40 (.29)

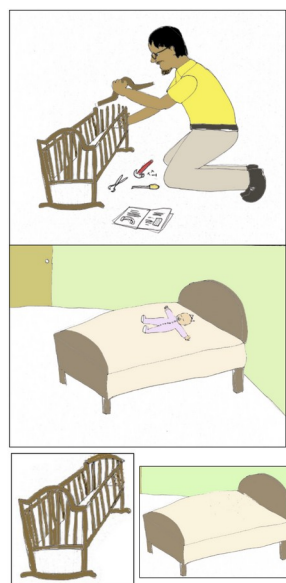Table 1. Child participants by age and gender

The experiment was converted to Qualtrics and adult data was collected on 68 English speakers who were recruited from undergraduate Psychology and Linguistics classes for partial course credit. They indicated that they spoke English as a first language, and their average age was 20-years-old, ranging from 18 to 22. Most of the subjects identified as women.

2.2. PROCEDURE. After the consent/assent procedure, parents and children were instructed as follows: "In this study children will be presented with a series of nine stories about different characters and their possessions. After each story your child will respond to a question. We are interested in how possessive phrases are processed in English. We ask you (the parent) to refrain from providing your child with any hints. At the end of every story, the child will select one of two choice objects based on a prompt. The prompt will not always instruct the child to make a choice, but they should expect to choose an object whenever there are two presented on the right of the screen. The child will make their choice by clicking on the object. In case the child points at the screen because they cannot click, you (the adult) can click on the object that the participant pointed to. The child can practice clicking on a choice in the practice round that comes next."

Each child received one set of nine stories after a practice round to ensure that they could manipulate the computer's mouse or trackpad to choose a picture (a circle). Each story contained a series of two or three pictures and an accompanying script which was pre-recorded and automatically read aloud. At the end of each story, participants faced a picture-selection task, in which they were prompted to click on one of two objects. For each story, participants were prompted just by a single phrase, either a split recursive or a split generic phrase, to choose between two objects. These prompts appeared in a fixed, pseudo-random order. The order of the stories in both of the two sets was constant. The two sets of stories differed in that they featured

opposite sequences of prompt types. A given subject randomly received either set A or set B. This difference is called Condition, a between-groups variable.

2.3. EXAMPLE STORIES

This dad likes to make things out of wood to sell to people.

He made a lovely baby's bed. See how nice it is?

He also has a baby, but she only sleeps on a grown up bed. All spread out!

Now, the cat decided to sleep in a bed. I'll tell you which one.

Set A: The bed that was the dad's baby's.
Set B: The baby's bed that was the dad's.

Figure 1. Example story 1

This girl was in the garden and found a lovely bird's egg. Bright blue!

The next day when she went to feed her pet bird, look, it laid an egg! A small yellow one.

You know what? One of the eggs had a baby bird inside. I'll tell you which one.

Set A: The bird's egg that was the girl's.
Set B: The egg that was the girl's bird's.

Figure 2. Example story 2

A couple of further notes are in order. Though in the one reading (3e repeated below) we have focused on the generic status of *baby's bed*, the fact is that there is an initial possessor, *dad's*, that should not be ignored, nor can it be interpreted as generic itself.

(3)   e.   *the baby's bed that is the dad's*

The evidence is clear that children have simple regular possessives by 2 or 3. Thus, the phrase (3e) as a whole should involve a regular possessive plus a generic possessive. If the child were to simply respond to *baby's bed*, ignoring *dad's*, then they would have free choice between a singular possessive or a generic possessive reading of *baby's bed*. Looking now at our sample story and focusing on the split generic prompt, *the baby's bed that is the dad's*, if children tended

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to ignore the larger syntactic structure and represent *baby's bed* in isolation, then we would expect them to freely choose between the baby-type bed of the dad and the bed of the baby. That is, if children's responses to the split generic prompts were unconstrained, then we could take that as evidence that children were ignoring the larger syntactic structure.

Sticking with the same Example Story 1, notice that the bed that is possessed by the baby is not itself a baby-type bed. Therefore, if the child were under any condition to pick out the bed of the baby, we do not have to worry that they understood *baby's bed* generically and then picked freely between two salient baby-type beds; if the child picks the adult-type bed that the baby owns, then their notion of *baby's bed* is quite clearly referential and not type-denoting. Now, contrast this with the eggs in the second example story. Both the referent that maps onto the split recursive (the egg of the girl's bird) and the referent that maps onto the split generic (the bird-type egg of the girl) are bird-type eggs. Therefore, any child who picks out the recursive referent (the egg of the bird of the girl) may nevertheless be representing *bird's egg* as a generic possessive and be freely choosing between two salient bird-type eggs, one that happens to map onto a recursive reading and one that maps on to a generic reading of the phrase. We balanced our stories along these lines, so that in about half of them the intended referent of the split recursive was not of the type specified by the generic possessive in the split generic. We then tested whether this factor made a difference to the answers provided: if children are biased towards a generic interpretation irrespective of the syntax (e.g., if they do not respect the A-over-A constraint in split recursive cases), then they should not prefer one or the other object in stories with two selectable objects of the same generic type (bird-eggs in Example Story 2), but should prefer the sole object that maps onto the generic interpretation in stories with selectable objects of different types (baby-bed and grownup-bed in Example Story 1). Finally, we must acknowledge that the split generic possessive has what could be called a 'co-ownership reading'. Consider (3e), *the baby's bed that is the dad's*. Obviously, there is a sense in which the dad owns, or possesses, anything his baby does. After all, the dad is likely to have been the initial owner (say through purchase) of any item that the baby is to come into possession of. In light of this, notice that one can read (3e) conjunctively, if mistakenly, and take it to indicate co-ownership: *the baby's bed that is [also] the dad's* or *the baby's bed that is the dad's [too]* (maybe the baby has a different bed at mom's house). But notice now how our design controls for this possibility: if the child misrepresents the split generic along these lines, then they will pick the recursive referent, just as they would under other misrepresentations of the split generic prompt.

3. Results.

3.1. CODING. A response was considered adult-like if and only if the child selected the object that mapped onto the generic reading in response to the generic prompt, or the object that mapped onto the recursive reading in response to the recursive prompt. To illustrate, for any child who received Set A, an adult-like response to Example Story 1 would be to select the big bed, i.e. the object that maps onto the recursive reading of the prompt. A non-adult-like response would be to choose the crib the dad made, i.e. the object that maps onto the generic reading.

3.2. STATISTICAL ANALYSES. First the effect of gender as a variable for the children was checked using two independent sample t-tests, and the results were not significant, so gender was not explored further in the analysis.

Repeated measures ANOVAs were run in SPSS on the data set after it was checked for homogeneity of variance by Levene's test (non-significant by median values) and for sphericity

by Maury's test (non-significant). Age and condition were group variables, and the syntax of the prompt (split recursive or split generic) was the repeated measures variable, since each participant received both types of question regardless of condition. The dependent measure was the percentage of adult-style responses.
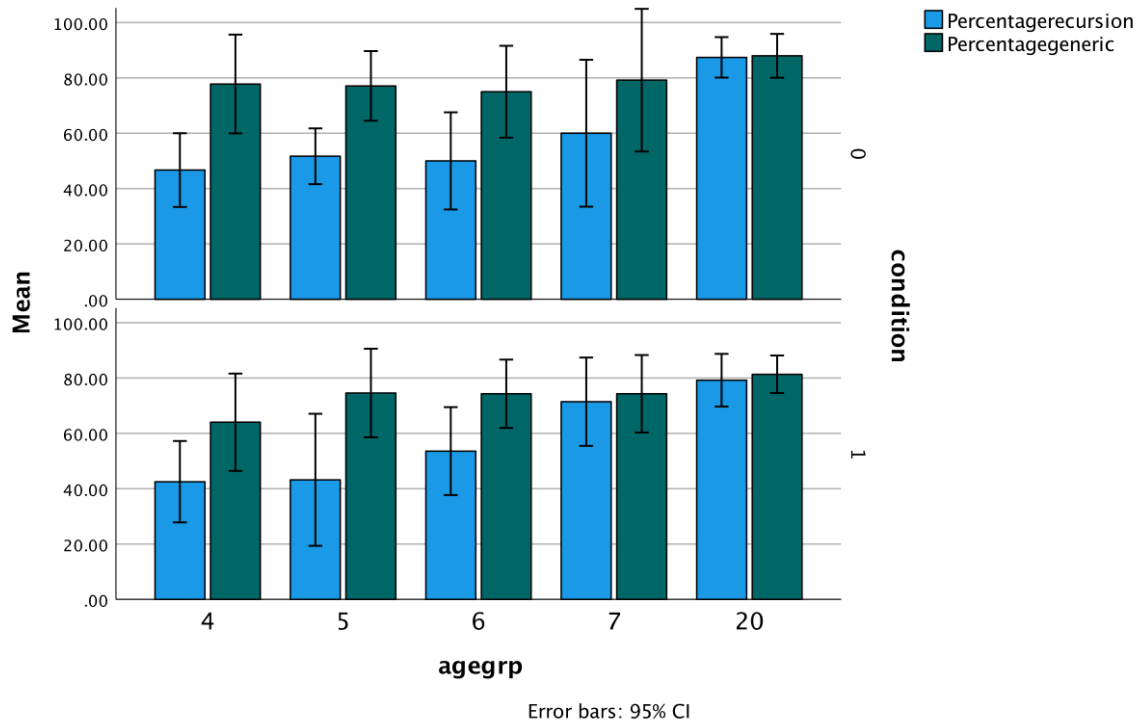

Figure 3. Differences by age group and condition in adult-like answers to generic and recursive possessive prompts

As Figures 3 shows, the differences across condition were non-significant ($F(1,122)= -1.27$, $p=.26$), demonstrating that the results replicate when the opposite questions are asked. The difference in responding by age is highly significant ($F(4,122) =16.9$, $p<.001$), as is the interaction between age and prompt syntax ($F(4,122) = 4.6$, $p<.002$). As the graphs demonstrate, responding in an adult way to the split generic prompt changed little over age, with even 4-year-olds providing virtually adult-like generic answers. In contrast, recursive interpretations to split recursive prompts were slow to develop and only adult-like by age 7-years. The effect of prompt syntax replicates if the adults are removed as a group: ($F(1, 67)=26.8$, $p<.001$), but there are no significant effects of condition or age among the children themselves.

One sample t-tests were run to confirm that the split recursive prompts only produced responses above chance level (50%) for 7-years-olds and adults. Inspection of the frequency histograms reveal a spread of responses to recursive prompts at every age until age 7, when there is a sudden jump in correct answers. In contrast, generic responses were always greater than chance at each age. Table 2 shows these results.

Age group	Comparison with chance for recursive prompt			Comparison with chance for generic prompt		
	t	df	p-value	t	df	p-value
4-year-olds	-1.288	18	.107	3.679	18	.002

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5-year-olds	-.428	22	.673	5.810	22	<.001
6-year-olds	.459	19	.651	5.630	19	<.001
7-year-olds	2.744	12	.018	4.958	12	<.001
20-year-olds	11.022	56	<.001	13.559	56	<.001

Table 2. One sample t-tests comparison with chance (.5) responding for each age group by prompt type

We also tested whether it made a difference if both object referents were of the same type (as with the bird-eggs in Example Story 2). The results showed no statistically significant difference in generic answers or recursive answers by story type, nor interaction with age.
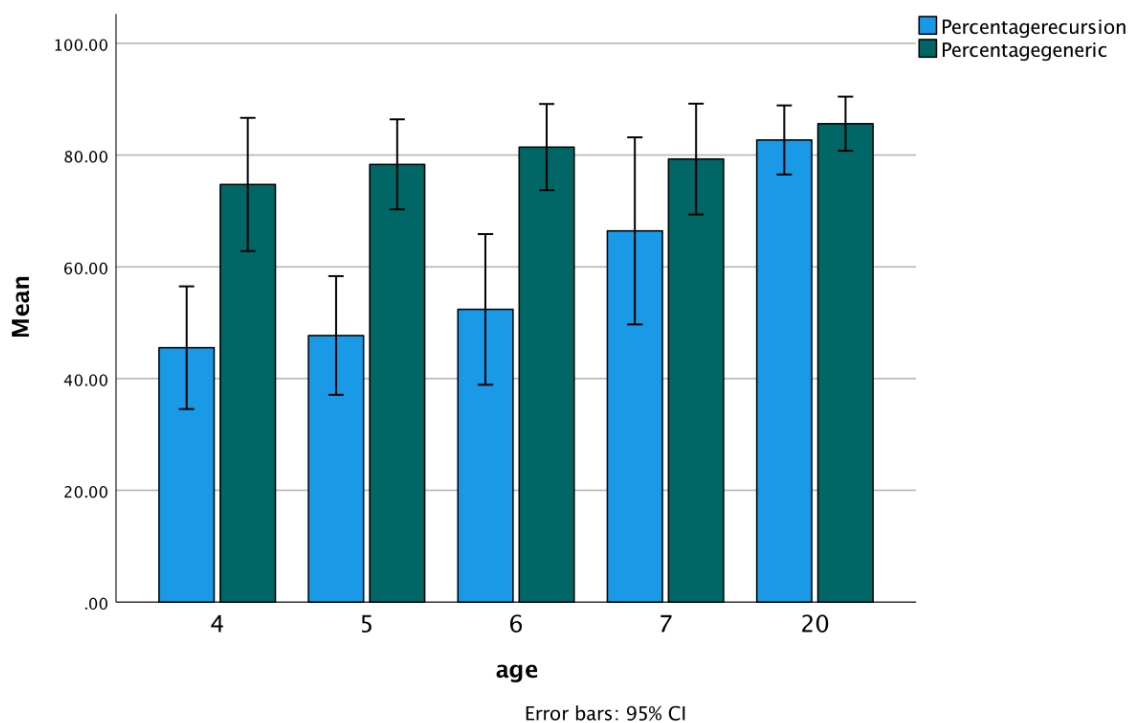

Figure 4. Average across conditions of percentage adult-like answers to recursive and generic prompts

As shown in Figure 4, our basic result is this. English-speaking children don't do better than chance on recursive prompts (such as *the bed that is the dad's baby's*) until age 6 or 7, when they become adult-like. In striking contrast, on generic prompts (such as *the baby's bed that is the dad's*), children as young as 4 are essentially adult-like and do significantly better than chance through 7. In other words, as it turns out,

(A)   Children 4 and older are (near) adult-like on split generic prompts, and

(B)   Children age 6 and younger behave at chance on split recursive prompts.

4. Discussion. First, these results are in keeping with literature suggesting that possessive recursion is acquired late (Snyder & Roeper 2004, Limbach & Adone, 2010, Fujimori 2010, Roeper 2011; 2013, Pérez-Leroux et al. 2012, Leandro & Amaral 2014, Hollebrandse & Roeper 2014, Terunuma & Nakato 2018, Li et al. 2020). Our study shows that by 4-years, children

demonstrate adult-like comprehension of split generics such as *the baby's bed that is the dad's*, but fail to achieve adult-like readings of split recursives such as *the bed that is the dad's baby's* until 6 or 7. Our adult data supports the claim that this minimal pair of structures differs in that the split recursive involves category recursion whereas the split generic doesn't. Since it is well attested that children have simple regular possessives (e.g., *baby's bed* meaning the bed of the baby) at 4- and 5-years-old, we contest that the best explanation of 4-5-year-olds difficulty with split recursives is that they do not have the syntax that mediates the recursive interpretation, since their success with the comparably complex split generic structure suggests that they have the requisite processing capabilities and relational concepts.

Now turning to the question of whether children have distinct syntactic labels for regular and generic possessives. We found evidence compatible with our hypothesis that children aged 4 and older do have a distinction between generic and regular possessives. First of all, we have assumed that children obey the A-over-A constraint, which forbids movement operations on a category from inside a like category. The fact that adults treat the full possessive (e.g., *dad's baby's bed*) as ambiguous, but sharply differentiate between interpretations in the split cases (3d-e), is evidence that these structures are syntactically distinct in mature grammar and constrained by the A-over-A principle.

But could young children be handling the split structures in some other way? Could they be evading the A-over-A constraint? If, for example, the younger children were merely analyzing the constituent *baby's bed* in isolation when prompted with the split generic, the prediction would be that they would give 50/50 responses to cases like (3e), *the baby's bed that is the dad's*, where a full possessive *baby's bed* is moved to the front: one possible interpretation would come from a generic reading of the possessive, and a second would come from a regular possessive reading of the constituent (e.g., *baby's bed* could in that case refer to the bed that the baby owns). But at no age was the response to the split generic prompt at chance. At every age the adult-like generic referent was the highly probable alternative. That can only mean that the children were attending to the whole structure (according to which the dad, not the baby, was the owner of the bed). The intended meaning is reconstructed precisely because the extraction of *baby's bed* as a generic NP-possessive does not violate any constraints. On the other hand, reconstructing *bed* back into the form *dad's baby's bed* can only be achieved if the whole is recursive, since it would be a violation of the A-over-A Principle to extract the NP *bed* from the generic NP *baby's bed.* The chance performances we recorded strongly imply that young children obey the A-over-A constraint but also lack the alternative recursive structure.

Why, then, does the generic interpretation come easier and earlier than the recursive alternative? The first point to make is that the syntax of the generic possessive is easier: it involves NP rather than DP, and so the structure is less complex. The difference in the depth of embedding is obvious from the trees in 3a and 3b. In work on different structures such as relatives and Prepositional Phrases, children avoid recursion by choosing flatter structures like conjunction (Roeper 2011). In the case of two-part possessives, young children seem able to avoid recursion by grouping two nouns into a generic phrase. The inaccessibility of the recursive syntax and the accessibility of the non-recursive generic syntax in early grammar steers the child toward the generic interpretation of two-part possessives.

Syntactic complexity also correlates with semantic type. In an analysis by Hinzen and Mattos (2021), the bare category label, e.g., N, V, is associated with a generic semantic type. As the form is merged with other material to build a larger category, it becomes increasingly

referential: N->NP->DP, V->VP->IP. For example, the bare noun *duck*, may refer to the substance eaten as part of a menu:

(i)   *We have duck on the menu tonight, if you care for it?*

With an indefinite article, it becomes a type:

(ii)   *Would you like a duck as a pet?*

With even more specification, say a demonstrative, it now refers to a particular instance:

(iii)   *I saw that duck laying an egg.*

Munn (1995) also makes the argument that regular possessives get their referentiality in virtue of being DPs, unlike generics. This reasoning in the linguistic domain accords with the Generic-as-Default hypothesis in the cognitive domain, which treats generics as a default mode of conceptual representation for young children (Leslie 2008). It is important to recognize variation across languages in the forms of possessives. Not all languages permit syntactically recursive prenominal possessives, and there is variation in the node (NP, DP, POSS, K) hosting the phrase, depending on agreement, case, and so forth. As a result, young children may default to generic syntax in the case of embedded possessives before they acquire DP-recursion.

    We are actively exploring the current structural distinction in other languages that have possessive forms different from those in English. For example, the original study was inspired by work on Romani, which has an elaborate possessive paradigm in which the inflection on the possessor must be in agreement in number and gender with the possessor and the possessum. We are currently investigating whether the extra cues available to link two nouns together in a possessive relation may make recursive possessives easier in such a language relative to English (Kyuchukov & de Villiers, in preparation). Additionally, we ask if we can find a parallel set of structural constraints for a possessive paradigm such as Spanish, in which the possessive is carried not by an inflection but by a preposition phrase. Finally, we are in the process of translating our experiment into Marathi, wherein the genitive marker shows gender agreement with the possessum such that the first possessor in a two-part possessive agrees with the final head noun if the phrase is generic, but not if it is recursive. As such, we do not have to transform two-part possessive phrases to form a minimal pair in Marathi.

    Up until this point we have focused on two interpretations of ambiguous two-part possessives, naming one 'recursive' and the other 'generic'. However, just like we can recursively embed regular possessives, we can recursively embed generic possessives, and they are productive. For instance, the recursive NP-possessive *kid's firefighter's helmet* refers to the plastic red firefighter's helmet that is made for children, a kid-type, firefighter-type helmet. To our knowledge, no studies have examined these structures; they go without mention in the literature on recursive possessives. Future researchers might experiment with these forms to see if they are late acquired like their DP counterparts and if they obey the same constraints on extraction. For example, do children or adults admit a recursive generic reading of the phrase *the helmet that is the kid's firefighter's*? What about the phrase *the firefighter's helmet that is the kid's*? We are in a position to comment on these questions. First, we anticipate that the A-over-A constraint applies to recursive generic possessives, such that neither of these phrases admit recursive generic interpretations, as they would entail the extraction of an NP from within another. Moreover, we have no reason to believe that NP-possessive recursion would be significantly easier for children than DP-possessive recursion, even if generic meanings are the

default, as both forms ultimately entail language-specific recursive syntax. For one thing, even if NP modifiers are universal, recursive NP-possessives are likely to be attested to far less in the input. Ultimately, language-specific category recursion in the case of possessives should pose an acquisition challenge, irrespective of the category that is recursed.

References

Chomsky, Noam. 1964. *Current issues in linguistic theory*. The Hague: Mouton Chomsky, Noam. 1965. *Aspects of the theory of syntax.* Cambridge, MA: MIT Press.

Fujimori, Chikako. 2010. *Acquisition of recursive possessives in Japanese*. Amherst, MA: University of Massachusetts MA thesis.

Gentile, Sarah. 2003. *On the acquisition of left branching recursive possessives*. Amherst, MA: University of Massachusetts MA thesis.

Hinzen, Wolfram & Otávio Mattos. 2021. Explaining early generics: A linguistic model. *Mind & Language* 38(1). 256–273. https://doi.org/10.1111/mila.12367.

Hollebrandse, Bart & Tom Roeper. 2014. Empirical results and formal approaches to recursion in acquisition. In Tom Roeper & Margaret Speas (eds.), *Recursion: Complexity in cognition* (Studies in Theoretical Psycholinguistics 43). Cham: Springer. https://doi.org/10.1007/978-3-319-05086-7_9.

Leandro, Wendy & Luiz Amaral. 2014. The interpretation of multiple embedded genitive constructions by Wapichana and English speakers. *Revista Linguíftica* 10(2). 149–162.

Leslie, Sarah-Jane. 2008. Generics: Cognition and acquisition. *Philosophical Review* 117(1). 1–47. https://doi.org/10.1215/00318108-2007-023.

Li, Daoxin, Xiaolu Yang, Tom Roeper, Micheal Wilson, Rong Yin, Jaienu Kim, Emma Merritt, Diego Lopez & Austin Tero. 2020. Acquisition of recursion in child Mandarin. In Megan Brown & Alexandra Kohut (eds.), *Proceedings of the 44th Boston University Conference on Child Language* (BUCLD 44), 294–307. Somerville, MA: Cascadilla Press.

Daoxin Li, Lydia Grohe, Petra Schulz & Charles Yang. 2021. The distributional learning of recursive structures. In Danielle Dionne & Lee-Ann Vidal Covas (eds.), *Proceedings of the 45th annual Boston University Conference on Language Development* (BUCLD 45), 471–485. Somerville, MA: Cascadilla Press.

Limbach, Maxi & Dany Adone. 2010. Language Acquisition of Recursive Possessives in English. In Katie Franich, Kate Iserman & Lauren Keil (eds.), *Proceedings of the 34th Annual Boston University Conference on Language Development* (BUCLD 45), 281–290. Somerville, MA: Cascadilla Press.

Marinis, Theo. 2016. Acquiring possessives. In Jeff Lidz, William Snyder & Joe Pater (eds.), *The Oxford handbook of developmental linguistics*, 435–460. Oxford: Oxford University Press. https://doi.org/10.1093/oxfordhb/9780199601264.013.19.

Munn, Alan. 1995. The possessor that stayed close to home. *Proceedings of the Western Conference on Linguistics (WECOL)* 24. 181–195.

Pérez-Leroux, Anna Teresa, Anna Castilla-Earls, Susana Béjar & Diane Massam. 2012. Elmo's sister's ball: The problem of acquiring nominal recursion. *Language Acquisition* 19. 301–311.

Pérez-Leroux, Anna Teresa, Anna Castilla-Earls, Susana Béjar, Diane Massam & Tyler Peterson. 2018. Strong continuity and children's development of DP recursion. In Luiz Amaral, Marcus Maia, Andrew Nevins & Tom Roeper (eds.), *Recursion across domains*. 296–313. Cambridge: Cambridge University Press.

Poisson, Tyler. in preparation. Generics in the acquisition of recursive possessives. In Adina Camelia Bleotu & Deborah Foucault (eds.), *Proceedings of Recursion Across Languages. The Intricacies of Babel* (Studies in Theoretical Psycholinguistics 43). Cham: Springer.

Roeper, Tom. 2011. The acquisition of recursion: How formalism articulates the child's path. *Biolinguistics* 5(1-2). 57–86. https://doi.org/10.5964/bioling.8831.

Snyder, William & Tom Roeper. 2004. Learnability and recursion across categories. In Alejna Brugos, Linnea Micciulla & Christine Smith (eds.), *Proceedings of the 28th Boston University Conference on Language Development* (BUCLD 28). 543–552. Somerville, MA: Cascadilla Press.

Sevcenco, Anca, Tom Roeper & Barbara Zurer-Pearson. 2015. The acquisition of recursive locative PPs and relative clauses in child English. Paper presented at Generative Approaches to Language Acquisition 2015 (GALA 2015).

Terunuma, Akiko, & Terue Nakato. 2018. Recursive possessives in child Japanese. In Luiz Amaral, Marcus Maia, Andrew Nevins & Tom Roeper (eds.), *Recursion across domains*, 187–210. Cambridge: Cambridge University Press.

Terunuma, Akiko, Miwa Isobe, Motoki Nakajima, Reiko Okabe, Shunuchiro Inada, Sakumi Inokuma & Terue Nakato. 2017. Acquisition of recursive possessives and locatives within DPs in Japanese. In Maria LaMendola & Jennifer Scott (eds.), *Proceedings of the 41st annual Boston University Conference on Language Development* (BUCLD 41), 626–636. Somerville, MA: Cascadilla Press.