‘Two-pound cookies’ or ‘two pounds of cookies’: Children’s appreciation of quantity expressions

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Background

- This paper adds to the few studies exploring children’s grasp of how numerals combine with other words, as in measure phrases (MPs), to yield meaning. Specifically, we focus on children’s acquisition of *attributives* vs. *pseudopartitives*

➢ For **attributives**, MPs serve as adjectives to signal reference to attributes of individuals
three-pound strawberries

➢ For **pseudopartitives**, MPs combine with “of” to signal part-whole relations.
three pounds of strawberries

- Given the systematic and transparent nature of the syntax-semantics mapping, MPs offer a way to investigate children’s appreciation of the combinatorial power of language.
- **Research Question:** Are children who have just learned the meanings of numerals able to overcome their association with cardinality and use syntactic information to identify the entities being enumerated, even when they are not typical individuals?
- **Prior Study** suggests that 4-year-old children may understand the syntax-semantic mapping (Syrett, 2013).

Vignettes Shown

What Was Heard

Attributive Condition	Pseudopartitive Condition
These are my **three-pound strawberries**. They **each weigh three pounds**. If a mouse comes along and nibbles some, **do I still have three-pound strawberries**?	That’s **three pounds of strawberries – all of that together is three pounds of strawberries**. If a mouse comes along and nibbles some, **do I still have three pounds of strawberries**?
Adults: 96% Yes Children: 55% Yes	Adults: 6% Yes Children: 23% Yes

- However, children could have responded on the basis of contextual information – “each” and “all of that together” – without understanding the syntactic information.
- **Present study** revisits children’s understanding of these two types of MP constructions through three different tasks (Experiments 1, 2, & 3)

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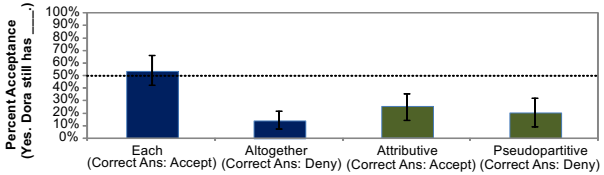
Experiment 1: Subtraction Paradigm

Participants: 24 children (4;1 to 6;2; M = 4;10; SD = 6.0 months; 12 F, 12M)
4 Conditions: Contextual vs. Decontextual Trials
Contextual Block: Each & Altogether
Decontextual Block: Attributive & Pseudopartitive
Blocks Counterbalanced.

Vignettes Shown

What Was Heard

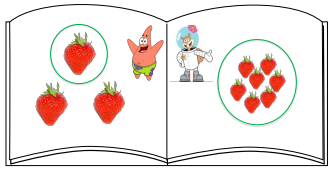
Contextual		Decontextual	
Each Condition	Altogether Condition	Attributive Condition	Pseudopartitive Condition
Dora has strawberries that are **each three pounds**. **Each** strawberry **weighs three pounds**. Does Dora still have strawberries that are **each three pounds**?	Dora has strawberries that are **altogether three pounds**. **All** of these strawberries together **weighs three pounds**. Does Dora still have strawberries that are **altogether three pounds**?	Dora has **three-pound** strawberries. Does Dora still have **three-pound** strawberries?	Dora has **three pounds of** strawberries. Does Dora still have **three pounds of** strawberries?



Without context, children did not understand the link between measure phrases and the part-whole relations of a set, though they did for “each” & “altogether.”
Contextual trials: 69% correct vs. Decontextual trials: 52.1% correct
No difference between responses on Attributive and Pseudopartitive trials.

Experiment 2: Sentence Matching

Participants: 10 children (4;1-5;10; M = 5;0, SD = 7.0 months; 4F, 6M)
Children played a shopping game in which they had to purchase the entire inventory of one of two salespersons.



Patrick is selling huge strawberries that each weigh three pounds. Sandy is selling small strawberries that altogether weigh three pounds.

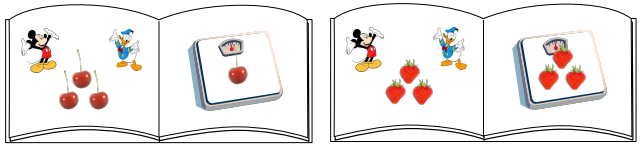
Spongebob wants to buy 3-pound strawberries
Who should he buy from?

Children did not distinguish between attributive and pseudopartitive trials.
48.8% Correct: n.s. diff from chance
Attributive Trials: 60.0% vs. Pseudopartitive Trials: 37.5%; diff not significant.

Experiment 3: Who said it Better?

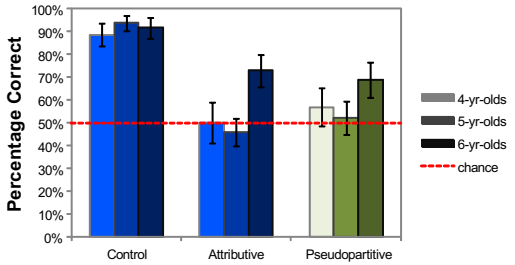
Participants: 11 four-year-olds (4;2-4;11, M = 4;7, SD = 3 months, 7F, 4M)
12 five-year-olds (5;0-5;11, M = 5;3, SD = 4 months, 3F, 9M)
12 six-years-olds (6;0-6;11, M = 6;6, SD = 4 months, 5F, 7M)

Children select between contrasting descriptions of a set after being told explicitly about its total weight or the weight of the individuals within it.
4 Control Trials: 2 Weight-Irrelevant, 2 Weight-Relevant (each/altogether)
8 Test Trials: 4 Attributive, 4 Pseudopartitive



Mickey says there are **three-pound** cherries.
Donald says there are **three pounds of** cherries.
Who said it better?

Mickey says there are **three-pound** strawberries.
Donald says there are **three pounds of** strawberries.
Who said it better?



By 6, children are able to distinguish between attributive and pseudopartitive measure phrases.
Only 6-year-olds above chance on Test Trials (70.8% correct)
No difference between 4-year-olds (53.4%) and 5-year-olds (49.0%)
No difference between percent correct on Attributive and Pseudopartitive Trials

Conclusion

- **Children do not automatically appreciate the mapping between syntax and semantics when it comes to measure phrases.**
- 4- and 5-year-old understood the part-whole relations indicated by “each” and “altogether,” but did not distinguish between attributive and pseudopartitive measure phrases.
- Modified replication (Exp. 1) indicates that success in Syrett (2013) likely due to comprehension of “each” and “altogether”
- By 6, children can distinguish between attributive and pseudopartitive measure phrases, indicating they may be beginning to appreciate the syntax-semantics mapping in these expressions

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