When do young children connect number words to discrete quantification?

Abstract

Young children acquire positive integer concepts gradually and in a piecemeal fashion (Wynn, 1992; Carey & Slusser, 2002). The present study investigates the development of one aspect of number concepts, i.e., the link between the conventional number-word list and discrete (rather than continuous) quantification. More specifically, this research asks the question: When do children know that number words (“one,” “two,” “three,” etc.) refer to collections of discrete things such as marbles or rocks, rather than continuous stuff, such as sand or water? Both parts of this study include 2-year-old English-speaking monolingual children. Results indicate that children tend to apply number words to discrete objects, as opposed to continuous quantities, by the time they understand two or three number words. Performance on these tasks also implies that even before children understand just one number word they are sensitive to volume and will therefore use terms such as “more” or “a lot” to refer to more-voluminous substances (discrete or continuous).

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Method

**Participants:** Young children ages 2.4 years old. All levels of number knowledge (e.g., zero, one, two, three, and “of things”).

**Procedure:**

1. Present children with two cups.
2. Place five (or six) objects into one cup and place the (six) scoop of stuff into the other cup.
3. Ask children “Which cup has five (six)?” or “Which cup has more (a lot)?”

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**Results:**

Children who know two or three number words apply number words to discrete objects. Children or early stages of number learning perform at chance. These results are not attributable to children’s age (F = .198, p = .659).

**Background**

**Question:** When do children connect number words to discrete sets? Does this connection rely on their knowledge of number words and numerosity and their understanding the counting principles?

**Discrete Objects**

(i.e., marbles, blocks, country, rocks, etc.)

**Continuous Substances**

(i.e., sand, rocks, coffee grounds, etc.)

**Background**

- Children acquire number words is a personal fashion. They probably learn the numbers in order (one, two, three, etc.) and they do so by progressing through levels of understanding.
- In the pre-number level children will refer to objects when asked for one word: they do not distinguish between higher numbers in the count list (they will refer a handful of items when asked for one, two, three, etc.)
- In the two-number level children will refer to objects when asked for “two” or an object when asked for “one” but they do not distinguish between higher numbers in the count list.
- If the two-number level children will refer to objects when asked for “two” or “a lot” or objects when asked for “one” but they do not distinguish between higher numbers in the count list.
- Once children have learned three or four number words they will come to understand certain counting principles. The next study then turns the meanings of all number words at their count list.

**Conclusion**

- Young children are likely to connect number words to discrete sets, rather than continuous volume or spatial extent, after learning only two or three number words.
- This implies that a connection between number words and discrete quantification is necessary to establish prior to developing a full and complete understanding of number counting principles.

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