



Space and Language: The Growth of Spatial Language in 14- to 30-month-olds

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Background

Few studies have tracked the development of spatial language use in children younger than 4 years of age. Our research documents children's use of spatial language during naturalistic parent-child interactions.

Objectives

- To determine the specific categories of spatial phenomena children talk about in their naturalistic speech.
- To determine which categories of spatial phenomena are early/late emerging in speech.
- Within each of these categories of spatial phenomena, to track the growth of spatial language use in children.

Participants

- 60 parent-child dyads were visited in their homes every 4 months between child age 14 to 30 months, yielding 5 time points.
- Dyads were videotaped for 90 minutes during each visit.

Method

Coding

Words that children produced between 14 and 30 months were transcribed. Using the system for analyzing children's language about space (Cannon, Levine & Huttenlocher, 2007), we conducted a word-type level analysis.

Word-type level analysis (WTLA)

Decision #1: Is the word potentially spatial?

Decision #2: If so, in the transcript, is the word used spatially?

Decision #3: If so, to which spatial category does the word belong?

Spatial Categories Coded

- (1) Dimensions:** Words that describe the size of objects, people, and spaces (e.g., big, little, tall, tiny, small, etc.)
- (2) Shapes:** Words that describe the standard form of enclosed two- and three-dimensional objects and spaces (e.g., circle, triangle, shape, octagon, etc.)
- (3) Features and Properties:** Words that describe the features and properties of 2D and 3D objects, spaces, people, and the properties of their features (e.g., bent, curvy, edge, side, etc.)

"Where" is the object

Method (continued)

(4) **Location and Direction:** Words that describe the relative position of objects, people, and points in space. (e.g., to, from, on, off, under, above, high, low, etc.)

(5) **Deictics:** Words that are place deictics/pro-forms (i.e., these words rely on context to understand their referent; e.g., here, there, where, etc.)

(6) **Orientation and Transformation:** Words that describe the relative orientation or transformation of objects and people in space (e.g., flip, turn, rotate, etc.)

(7) **Quantifiers:** Words that describe amount (including relative amount) of continuous quantities, including the extent of an object, space, liquid, etc. (e.g., all, some, whole, part, etc.)

Results

- Data reported here are on the following categories: (1) dimensions, (2) shapes, and (3) features.
- These categories highlight the "what" of the object (i.e., size, shape, and features) and thus are related.

Dimension Terms

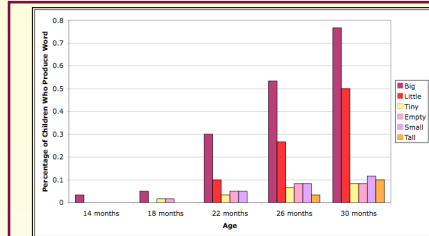


Figure 1. "Big" and "little" are early emerging with several children producing these terms by 22 months.

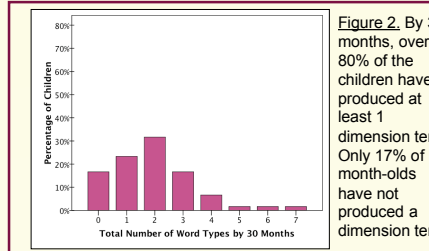


Figure 2. By 30 months, over 80% of the children have produced at least 1 dimension term. Only 17% of 30-month-olds have not produced a dimension term.

Results (continued)

Shape Terms

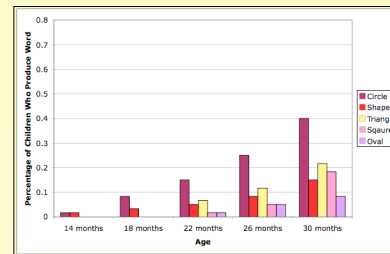


Figure 3. "Circle" begins to emerge at 22 months. Other shape terms, including the word "shape" are late emerging.

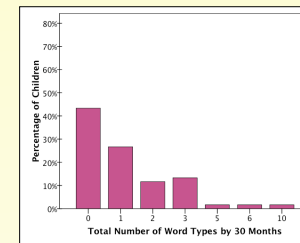


Figure 4. By 30 months, 56% of the children are producing at least 1 shape term. However, there are still over 40% of the children who have not produced a shape term.

Features and Properties Terms

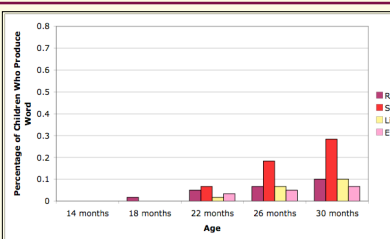


Figure 5. The only frequent spatial features term is the word "side," which begins to emerge around 26 months.

Results (continued)

Features and Properties Terms

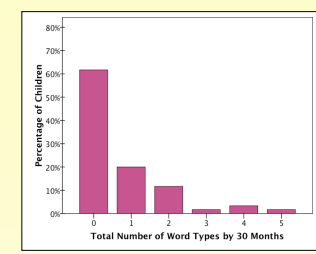


Figure 6. By 30 months of age, less than 40% of the children are producing at least 1 features term. Roughly 60% of the children have not produced a features term.

Conclusion

- Dimension terms were early emerging.
- Shape terms followed dimension terms in development -- 56% of 30-month-olds produce term.
- Feature terms were late emerging. Fewer than 40% of the children produced these terms by 30 months.
- Within each of these spatial language categories, a few words were early emerging, including "big," "little," "circle," and "side."
- There was variability in the number of word types produced by children within each spatial language category assessed.

Ongoing and Future Research

- Continue to track the growth of spatial language in children up until 46 months of age.
- Investigate the role of parental input in development of spatial language.
- Explore the relation between children's spatial language use and performance on non-linguistic spatial tasks (i.e., mental rotation, block design & spatial analogies).
- Experimentally manipulate the amount of spatial language children receive to see if it is related to spatial and mathematical thinking.

References

- Cannon, J., Levine, S., & Huttenlocher, J. (2007). *A system for analyzing children and caregivers' language about space in structured and unstructured contexts*. Spatial Intelligence and Learning Center (SILC) technical report.

Acknowledgments

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