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Long-term study suggests ways to help children learn language and develop cognitive skills

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Examining factors such as how much children gesture at an early age may make it possible to identify and intervene with very young children at risk for delays in speech and cognitive development, according to a new study by researchers at the University of Chicago.

The research by leading early learning scientists looked at children from a wide variety of backgrounds, including those from advantaged and disadvantaged families, and those who had suffered brain injury. Their work was published in an article, "New Evidence About Language and Cognitive Development Based on a Longitudinal Study: Hypotheses for Intervention" in the online edition of the *American Psychologist*. The paper offers evidence-based suggestions, which grew out of the study, for developing diagnostic tools and interventions to enhance language and cognitive development.

The authors found that although language learning varies according to family income and education levels, not all of the impacts are the same. Although parents from advantaged backgrounds spoke more with their children, there was no difference between advantaged and disadvantaged families in the quality of the word-learning experiences parents gave their children. The study found independent effects of both quantity and quality of input on word learning.

They also found that early gesture – the spontaneous gestures children

produce to communicate before and as they are learning to use words – can be used to identify which children with brain injury are likely to go on to develop spoken vocabularies within the typical range, and which children are likely to continue to experience language delay. The importance of the finding is that this diagnosis can be made before language delays appear in speech, thus opening the door for earlier and more targeted interventions.

"We believe that our findings have implications for prediction and diagnosis of later language deficits and for intervention that may improve language skills," explained lead author Susan Goldin-Meadow, the Beardsley Ruml Distinguished Service Professor in Psychology at the University. Goldin-Meadow is one of the nation's leading authorities on language learning and gesture.

By videotaping samples of children's and parents' speech and gestures during interactions at home, the researchers were able to examine in what way and how often gestures were used to communicate, and whether that might help predict the child's language acquisition. The researchers also evaluated whether the parents' speech was related to the children's development of cognition and language.

Susan Levine, the Rebecca Anne Boylan Professor in Education and Society in Psychology at UChicago, was also part of the team. Levine is a specialist on early mathematics development and has done pioneering work in the study of children with brain injuries.

"We are also exploring the impact that parent speech might have on variation in children's cognitive skills. This is a long term project spanning many years that allows us to answer some questions about the natural trajectory of learning and how it's affected by variations in learners and their environment," said Levine.

Two groups of children were observed in this study over four years. The first group included 64 families with children ranging from 14 months to nearly five years old without known physical or cognitive disabilities. Those children were assumed to be typical learners. The families represented a variety of ethnic/racial makeups and family income levels. The second group included 40 families with a child who had suffered a unilateral brain injury before or around the time of their birth.

The researchers videotaped interactions between the child and their primary caregiver (usually the mother) at home during ordinary daily activities for 90-minutes every four months for a total of 12 visits. The interactions were then transcribed for the analysis of all child and parent speech and gestures.

From that analysis, the researchers were able to develop four hypotheses on language and cognitive development:

- Charting early gesture has the potential to serve as a diagnostic tool to identify children at risk for language delay.
- Encouraging children to gesture at very early ages has the potential to increase the size of their spoken vocabularies at school entry.
- Encouraging caregivers to use more diversified vocabulary and complex syntax has the potential to facilitate children's acquisition of vocabulary and complex syntax.
- Encouraging caregivers to increase their use of words for number, for the spatial properties of objects, and for abstract relations like similarity has the potential for improving children's understanding of number and spatial thinking, and their ability to make sophisticated comparisons.

"We wanted to examine the influence of both environment and the learner on language, so we included children from a wide socio-

economic range to look at variation in learning environments, and children with early brain injuries to study variation in learners," said Goldin-Meadow. "We found that the amount and type of input children with brain injury receive from their parents or caregivers plays an even bigger role in syntactic and narrative development (but not vocabulary development) than it does in children without injury," said Levine.

Goldin-Meadow and colleagues said follow-up studies are needed to determine ways to increase the talk that children hear to enhance their language and thinking skills. They are hoping that the insights gained from this study and the follow-up studies can be used as a basis for developing educational materials such as videos, computer games and curricula for preschools.

Provided by University of Chicago

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