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An Engineered Approach: Examining the Role of Child-directed Speech With Automatic Speech Recognition and Network Science

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Abstract

Language acquisition is a significant developmental process children undertake automatically but is only partially understood. Though researchers have long debated the influence of internal knowledge and external stimuli in language acquisition, both features are required for this process. External stimuli are dominated by child-directed speech for the first few years of life. Accordingly, the role of child-directed speech (CDS) in early language acquisition continues to attract cognitive and developmental researchers. Here, we use statistical and computational tools from Automatic Speech Recognition (ASR) and Network Science to explore the statistical nature of CDS. In particular, we examine CDS using two complementary computational approaches: a bottom-up approach using ASR as a representation of auditory processing, and a top-down approach using networks to represent semantic and syntactic knowledge. Exploring CDS with both methods offers the unique opportunity to model the role of CDS in language acquisition from a more holistic perspective.