

The Roots of Grammar: New Study Shows Children Innately Prepared to Learn Language

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To learn a language, a child must learn a set of all-purpose rules, such as “a sentence can be formed by combining a subject, a verb and an object” that can be used in an infinite number of ways. A new study shows that by the age of seven months, human infants are on the lookout for abstract rules – and that they know the best place to look for such abstractions is in human speech.

In a series of experiments appearing in the May issue of *Psychological Science*, a journal of the Association for Psychological Science, Gary Marcus and co-authors Keith Fernandes and Scott Johnson at New York University exposed infants to abstractly structured sequences that consisted of either speech syllables or nonspeech sounds.

Once infants became familiar with these sequences, Marcus and his colleagues presented the infants four new unique sequences: Two of these new sequences were consistent with the familiarization “grammar,” while two were inconsistent. For example, given familiarization with *la ta ta, ge lai lai*, consistent test sentences would include *wo fe fe* and *de ko ko* (ABB), while inconsistent sentences would include *wo wo fe* and *de de ko* (AAB). They then measured how long infants attended to each sequence in order to determine whether they recognized the previously learned grammar.

In the first two experiments, the researchers examined infants’ rule learning using sequences of tones, sung syllables, musical instruments of varying timbres and animal noises.

Across both experiments, infants were able to identify rules only when exposed to speech sequences (versus nonspeech sequences). These findings are significant, says Marcus, because “the essence of language is learning rules, and these results suggest that young infants are specifically prepared to learn these rules from speech.”

In a third experiment, the researchers discovered another intriguing result: Infants were able to generalize rules learned from speech to the sequences of nonspeech sounds, even though they couldn’t directly learn rules from the nonspeech stimuli. Infants were again familiarized with structured sequences of speech and then tested on their ability to recognize those same structures in sequences of tones, timbres, and animal sounds. Infants who received this pre-exposure to structured sequences of speech were able to recognize these same structures in the nonlinguistic stimuli. This shows, according to Marcus, that “infants’ drive to understand the abstract patterns underlying speech must be much stronger than their pull towards understanding abstraction in other domains.”

“Infants may analyze speech more deeply than other signals because it is highly familiar or highly salient, because it is produced by humans, because it is inherently capable of bearing meaning, or because it bears some not-yet-identified acoustic property that draws the attention of the rule-induction system,” writes Marcus.

“Regardless, from birth, infants prefer listening to speech,” he continues, “and the intriguing patterns we have observed in rule learning and transfer could in some way be an extension of that initial, profound interest in speech.”