How does background babble noise affect the course of new word learning in toddlers?
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Abstract

The naturalistic acoustic environments of young children are often not ideal for listening. Environments containing acoustic competitors disrupt speech perception and, therefore, may impose challenges on auditory based learning and language development. However, most studies of language acquisition take place in quiet laboratory settings which lack ecological validity. Only a small number of studies examined the effect of competing sound sources on the process of new word learning. Somewhat inconsistent with the ample evidence demonstrating a negative noise effect on speech recognition, young children seems to be successful at learning new words in the presence of acoustic competitors, especially when the target speech is more intense than the competing sound source (Dombroski & Newman, 2014; McMillan & Saffran, 2016). The reason/s for this inconsistency may be methodological, such as the use of between subjects designs and/or a single-session studies.

The current study explores the effects of competing babble on novel word learning in toddlers. To test this, we employed an adapted alternating treatments design (AATD), whereby the time course of each individual toddler’s novel word acquisition is tracked over multiple sessions. We hypothesize that speech competitors interfere with novel word learning. Specifically, we predict that novel words introduced in quiet will be acquired sooner (i.e., in fewer sessions) than novel words introduced in the presence of 4-talker babble. We do not predict learning of novel words that were not familiarized to the toddlers.

Methods

Participants: Four toddlers (2 females and 2 males) between 36-40 months of age with normal speech and language development and no known hearing impairments.

Stimuli:
- Sixteen CVC non-words with phonotactic probabilities of American English and sixteen novel objects
- Four known words and associated pictures
- Two stories that each contained four of the non-words. Each story included three exposures of each target word in a set structure. The stories were read by a native-English speaker and were videotaped over the readers shoulder.
- 4-talker babble: short sentences spoken simultaneously by wo female and two male voices.

Procedure: For each child, four non-words were assigned to Story A and four non-words were assigned to Story B. The other eight non-words were used as control non-words to test for learning to words that were not familiarized to the children. Toddlers were exposed to both stories in two conditions, once in quiet (60 dB SPL) and once in the presence of babble (0 dB SNR). Word-to-story assignment and story-to-condition assignment was counterbalanced across toddlers. Following each story, children were tested on their recognition of known and novel words using a four-alternative-forced-choice task. Half of the words were presented in quiet and half of the words were presented in babble.

Results

Toddlers’ word recognition accuracy for known words indicate that the speech was audible and the task was age appropriate. The few mistakes indicated in the table occurred when the words were presented in babble.

Figure 1. Word recognition accuracy for individual children as a function of exposure (learning) condition (babble vs. quiet) and Test Condition (babble vs. quiet) averaged across sessions.

References


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