The development of word recognition: The use of the possible word constraint by 12-month-olds

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Fluent speech contains no reliable pauses between words. By 7.5 months infants can segment words from fluent speech. At this age infants rely most heavily on prosodic cues such as word initial stress and distributional cues such as the transitional probabilities between syllables (Saffran et al, 1996). During the second year of life, infants' word recognition abilities undergo considerable improvement. Finally, by the age of 24 months, infants appear to be approaching adult-like word recognition skills (see Jusczyk, 1999 for review).

Many adult word recognition models emphasize the importance of existing items in the lexicon for recovering words from fluent speech (see Brent, 1999 for review). A question that arises about these segmentation abilities has to do with how infants integrate information from different types of word boundary cues. For instance, Norris et al (1997) suggested that a Possible-Word Constraint (PWC) could ease word recognition by limiting the number of lexical candidates activated by a given input. This constraint requires that, whenever possible, the input should be parsed into a string of feasible words. Any segmentation resulting in impossible words (i.e. a single consonant) is impossible. Norris et al (1997) used a word spotting task to demonstrate that adults find words such as "apple" more easily in a possible condition (ie vuffapple) rather than in an impossible condition (fapple).

In the present study, we investigated whether or not 12-month-olds could use the PWC to aid them in word recognition. In Expt 1, we exposed 32 infants to lists of 2 words: rush and lop or rack and win. After 30 seconds of familiarization to both words, the head-turn preference procedure was used to determine whether these words were easier to recognize in a possible as opposed to impossible condition. During the test phase, infants were presented with test lists containing the target words embedded within possible (i.e. niprush) or impossible (i.e. prush) conditions. Infants tested with targets in possible conditions listened significantly longer to the lists containing the targets words ($p < .01$), whereas infants tested with lists containing targets in impossible conditions did not. This result suggests that 12-month-olds, like adults, may use existing knowledge about possible words to constrain their hypotheses concerning words in the input Infants familiarized with the word "rush" did not recognize the word "rush" when it was buried within a container like "prush." This result fits with the PWC because positing that "rush" is contained within "prush" would leave a residue which cannot form a word on its own: the consonant "p."

Experiment 2 tests whether infants use PWC when processing fluent speech. Infants are familiarized with pairs of words (rest and low or rise and lay). However, in the test phase they hear passages rather than word lists. Half of the infants in each of these two conditions are being tested with passages containing the target words in a possible condition (i.e."delay"), while the other half are being tested on passages containing the words in impossible conditions (i.e. "play"). Preliminary results suggest that infants will recognize the words when they are presented in a "possible" condition.

In addition to Expt. 2, we have been carrying out 2 additional studies similar to Expts. 1 and 2. However we have moved the target to the beginning of the filler rather than the end. For example, the target word dull has been buried in a possible container such as "dullkef" or an impossible container such as "dullk." In combination, these 4 studies provide some interesting evidence concerning the role of context on infants' ability to find words in fluent speech.

References

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