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Are Explicit Frequency Counters Necessary in Computational Models of Early Word Segmentation?

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Abstract

Frequency counters are computational mechanisms that track the frequency or probability of speech units. Such counters are idealizations which re-describe frequency effects in early word segmentation, not providing an underlying learning mechanism from which these effects arise. Previous work has shown that Implicit Chunking represents a plausible learning mechanism explaining infants' sensitivity to statistical cues when segmenting small-scale artificial languages (French et al., 2011). However, no work has examined whether Implicit Chunking allows to segment naturalistic speech in a developmentally plausible way. Here, we show how a novel symbolic model of Implicit Chunking – CLASSIC-Utterance-Boundary - performs better or as well as previous frequency-based models (i.e., transitional probability, chunking) at predicting children's word age of first production and a range of word-level characteristics of children's vocabularies (word frequency, word length, neighborhood density, phonotactic probability). We suggest that explicit frequency counters are not necessary to explain infants' speech segmentation in naturalistic settings.