

From chunk to segment: U-shaped patterns in the facilitative effect of frames on children's word production

Inbal Arnon
University of Haifa

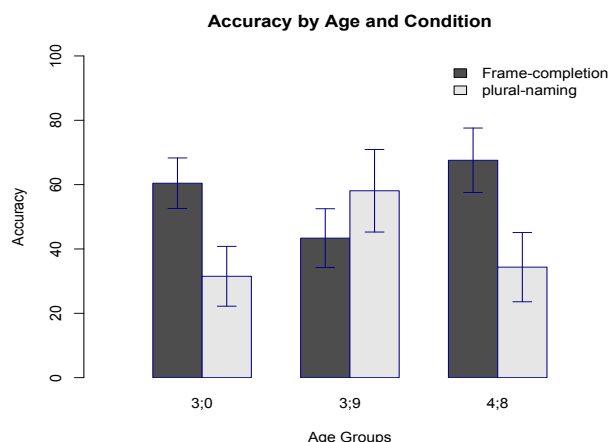
Adult production is influenced by the larger linguistic contexts words appear in: Adult speakers are faster to produce words in more predictable (and frequent) contexts [1]. Even though children (like adults) generally hear words embedded in larger phrases [2], and even though children attend to co-occurrence information in language [3], most studies of lexical and morphological acquisition have paid little attention to the effect of linguistic context on word production. Children's knowledge of the correct word form is typically assessed in isolation (e.g. object naming) or in a context assumed to be neutral. Here, we show that children attend to the larger phrases words appear in: they are better at producing irregular plurals (e.g., *mice*, *teeth*) after frames they often occur with (e.g., *Brush your – teeth*). We then use this effect to test the usage-based prediction that children draw on multi-word chunks in the learning process [4]. If children's reliance on larger chunks decreases with age, then the effect of frequent frames may be larger early on. A subsequent shift in focus to segmentation and analysis might weaken these links until children build-up adult like knowledge of the predictive relations between words and phrases.

We investigate the developmental relation between phrases and words by looking at the effect of frequent frames (e.g. *Brush your -- teeth*) on the production of irregular plurals in three age groups: younger (mean 3;0, N=22), intermediate (mean 3;9, N=21), and older (mean 4;8, N=26). Children have difficulty with irregular plurals (~30% correct, 7). If children's knowledge is context-sensitive, production should be facilitated following such phrases. If the relation changes with age, we should see differences between the three groups in the degree to which frequent-frames facilitate production

We compared irregular plurals elicited with a labeling-question (What are all these?) versus a frequent frame (e.g., *Three blind —*) in a between-subject design. For each of the target nouns we selected the most frequent two-word frame preceding the noun, excluding ones appearing less than three times in a 6-million portion of CHILDES. In both conditions children saw the same pictures and produced only the irregular noun. The younger children and the older children produced many more correct irregulars (e.g., *mice*) after frames than after general questions, younger: 60% vs. 32%, $B = 1.88$, $p < .001$; older: 68% vs. 34%, $B = 2.45$, $p < .001$). In contrast, the intermediate children were not better after frames but actually worse (44% vs. 57%, $B = -.26$, $p > .08$). These patterns held across items and persisted when noun frequency was controlled for.

The results (Fig 1) reveal a novel effect of context on children's production of irregular plurals. They document a U-shaped pattern in the effect of frequent-frames on production that is consistent with a move from chunks to segments (younger to intermediate) followed by a growing sensitivity to the larger patterns words tend to appear in. The findings highlight the importance of multi-word information in learning and the need to take context properties into account when assessing children's abilities.

Figure 1: Proportion correct excluding non-target responses (e.g. *lamb* for *sheep*)



References

- Jurafsky, D., Bell, A., Gregory, M., & Raymond, W. (2001). Probabilistic relations between words: Evidence from reduction in lexical production. In J. Bybee & P. Hopper (Eds.), *Frequency and the emergence of linguistic structure* (229-254). Amsterdam: Benjamins.
- Aslin, R. N., Woodward, J. Z., La Mendola, N. P., & Bever, T.G. (1996). Models of word segmentation in fluent maternal speech to infants. In J. L. Morgan & K. Demuth (Eds.), *Signal to syntax: Bootstrapping from speech to grammar in early acquisition* (pp. 117-134). Hillsdale, NJ: Erlbaum.
- Bannard, C., & Matthews, D. (2008). Stored word sequences in language learning: The effect of familiarity on children's repetition of four-word combinations. *Psychological Science*, 19, 241- 248.
- Abbot-Smith, K. & Tomasello, M. (2006). Exemplar-learning and schematization in a usage based account of syntactic acquisition. *The Linguistic Review*, 23, 275-290.