Modeling Lexical-Semantic Networks of School-Age Children through a Repeated Word Association Task
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Background
When producing language, speakers rely on semantic knowledge to access words relevant to the discourse context (Dell, 1986; Roels, 1992). Models of vocabulary development often assume that words are organized into semantic networks (Chi & Koeske, 1983; Steyvers & Tenenbaum, 2000). Researchers have used word association tasks as a means of learning about the properties of the network (Nelson, McEvoy, & Schreiber, 2004).

We used a repeated word-association task (Sheng & McGregor, 2010) to collect word associations from school-aged children and adults, and visualized patterns of shared associations using network models (Bagdasar, Smith, & Hils, 2011).

Research Hypotheses
We aimed to study the development of lexical-semantic organization by comparing word associations of younger and older children (Study 1) and children and adults (Study 2).

• Hypothesis 1. Developmental Change Younger participants may have more difficulties generating specific associates to cues. Their word associations will be more generic and less cue-specific.

• Hypothesis 2. Developmental Stability As children acquire words, they link semantically related words together in long-term memory. While still capable, these associative networks may show increasing differentiation over the lifespan.

Word Association Task
48 cues, each repeated 3 times in separate blocks of trials. Participants first provide the word coming to mind.

Examples of Word Associations
Numbers show the semantic relatedness (LSA) and semantic distance (CBOW) in relation to the cues

Descriptive Statistics for Receptive Vocabulary and Nonverbal Assessments

Semantic Network Models of Shared Word Associations

Shared Associations

Main Findings

• Younger and older participants did not differ markedly in the semantic relatedness of their responses (LSA and CBOW estimates), which suggests that word associations are remarkably stable from childhood into adulthood. In each group, over list repetitions, word associations became more distant and less related to the cues.

• Lexical-semantic network models suggest a significant increase in shared cue-specific associates (principle of differentiation) in more mature networks (Engelhafer & Hills, 2017). This differentiation is reflected in the larger number of communities of one cue (highlighted in yellow).

• In both studies, older participants exhibited greater agreement in their responses to specific cues (i.e., shared associations that were “local only” or “global with local”). This suggests a developmental progression from a larger proportion of meanings that are specific to the child’s experience, declining over time to incorporate conventional meanings that the language community agrees upon.

• Additional analyses (not shown) focused on perseverative responses (usage of the same response across different cues), idiosyncratic (unique) responses, and clangs (sound-based associations), all of which distinguish children with developmental language disorder from neurotypical peers (Brooks et al, 2017). Clangs were most frequently seen in younger children of Study 1. Perseverative and idiosyncratic responses increased over list repetitions, reflecting heightened demands on executive functions (e.g., inhibiting prior responses to the cues; difficulties generating cue-relevant responses).

References


