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Enhanced explicit vocabulary learning compared to implicit grammar learning in adults

Compared to young children, the language learning process is much more difficult and less successful in adulthood. Little is known about how non-linguistic cognitive processes contribute to these age-dependent differences. We argue that language learning involves both explicit declarative memory processes to learn vocabulary and implicit procedural memory processes to learn grammatical patterns. In this preliminary study, we aimed to quantify the relative contribution of declarative versus procedural learning in adults via an artificial language learning task. Participants ages 18 to 29 heard novel singular and plural words associated with images of common objects. The grammar of the language consisted of two regular suffixes that marked plurality intermixed with irregular words containing irregular suffixes. After 30 minutes of training, participants were then tested on whether an auditorily-presented word correctly matched a corresponding object. Vocabulary was tested using regular singular and irregular plural words learned in the training sessions while grammar was tested by generalizing the grammatical plural suffixes to novel words and forms of words that did not appear in training. Results revealed that adults performed significantly better and quicker on vocabulary test items compared to grammar test items. This suggests that adults' diminished engagement in procedural mechanisms may result in less effective grammar learning. Overall, the results shed light on how declarative and procedural memory differences result in adults' specific difficulty with grammatical language learning in a domain-general manner. Ongoing research in our laboratory is examining the neural bases of this phenomenon using the present language learning paradigm.