The Effects of Domain-General and Health Knowledge on Sentence Processing and Recall among Older Adults

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INTRODUCTION

- The interplay between processing capacity and knowledge shapes language comprehension through the life span (Stine-Morrow, Miller & Hertzog, 2006).
- Conceptual integration (CI), a resource-consuming process whereby readers create a mental representation of relationships among concepts in the text, is reflected in an increase in processing time at syntactic boundaries, as a function of the number of new concepts introduced to that point (Payne & Stine-Morrow, in press). CI is predictive of subsequent text memory and is promoted by verbal ability and literacy experience, representing domain-general knowledge (Stine-Morrow et al., 2008; Payne et al., 2012).
- According to the Process-Knowledge Model of Health Literacy (Chin, Morrow, et al., 2011), health literacy is simply a special case of language comprehension that places specific demands on health knowledge. We tested this model by measuring reading time for health and domain-general texts among adults varying in age and health literacy, hypothesizing that verbal ability would promote CI for both types of texts, but that health knowledge would promote CI selectively in health texts.

METHODS

- Participants: N=107 (Mean=70; 60-88 yrs). 53 % ≤ high school education.
- Measures: Verbal ability (ETS Adv Vocab) and Health Knowledge (Hypertension Questionnaire, Chin et al., 2009)
- Materials: 48 18-word sentences, half on hypertension and half domain-general (science, nature, history), with sets matched on number of new concepts.

RESULTS

Correlations among Age, Verbal Ability, Health Knowledge (HK), Clause CI (CCI), Sentence CI (SCI) to Text Processes (as measured by the Best Linear Unbiased Predictors (BLUPs) derived from mixed-effects model), and Recall (Rec)

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<tr>
<th></th>
<th>Age</th>
<th>Verbal</th>
<th>HK</th>
<th>CCI_General</th>
<th>SCI_General</th>
<th>CCI_HK</th>
<th>SCI_HK</th>
<th>SCI_CCIG_general</th>
<th>SCI_SCI_General</th>
<th>SCI_SCI_HK</th>
<th>Verbal_X_CCI</th>
<th>Verbal_X_SCI</th>
<th>RecG</th>
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<tbody>
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General Text: A leopard is strong and agile enough to be able to tackle prey weighing twice its own weight.

Hypertension is the “silent killer” because it usually has no symptoms until it causes damage to the body.

Verbal ability promoted CI at clauses and sentences for both types of texts. Verbal X Clause CI on Recall People with higher verbal ability and more clause CI had better recall. The interaction of Verbal X Clause CI on Recall showing that clause CI especially benefits low-verbal readers to obtain better recall performance to compensate for their poorer general knowledge about texts.

CONCLUSIONS

- Verbal ability has domain-general effects in enhancing conceptual integration, regardless of the type of text. This likely contributes to the reliability of wrap-up across texts.
- Health knowledge has selective, domain-specific, effects in enhancing conceptual integration in domain-related texts.
- Conceptual integration at clause boundaries, which enables the reader to construct a strong semantic representation of the text, contributes to recall.
- These effects are largely age-invariant within an older sample, suggesting that knowledge is a powerful source of cognitive resilience into late life.