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

Jessie Chin[1], Brennan R. Payne[1], Elizabeth A. L. Stine-Morrow[1], Daniel G. Morrow[1], Xuefei Gao[1], Thembi Conner-Garcia[2], James F. Graumlich[2], Michael D. Murray[3,4]

[1]University of Illinois at Urbana Champaign, [2]University of Illinois College of Medicine, [3]Purdue University, [4]Regenstrief Institute

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

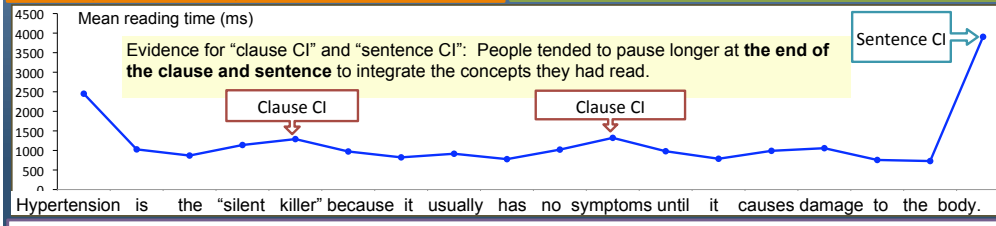
•N=107 (Mean=70; 60-88 yrs); 53 % ≤ high school education.

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.

General Texts: A leopard is strong and agile enough to be able to tackle prey weighing twice its own weight.
Health Texts: Hypertension is the "silent killer" because it usually has no symptoms until it causes damage to the body.

Procedure: Moving window paradigm for self-paced reading (Just et al., 1982) for immediate recall.



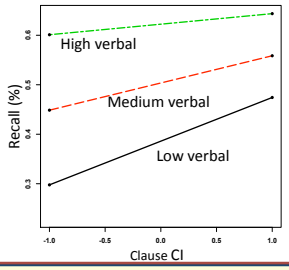
RESULTS

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)

	Age	Verbal	HK	CCIG	SCIG	CCIH	SCIH	RecG
Verbal	0.18							
HK	0.15	0.57*						
CCI_General(G)	-0.07	0.33*	0.18					
SCI_General	-0.09	0.11	0.11	-0.12				
CCI_Health(H)	0.02	0.29*	0.26*	0.72*	-0.08			
SCI_Health	-0.06	0.09	-0.01	-0.08	0.72*	-0.23*		
RecG	0.02	**0.73***	**0.40***	**0.38***	-0.02	0.43*	-0.07	
RecH	-0.02	**0.64***	**0.36***	0.26*	0.002	**0.39***	-0.04	0.91*

Collapsed across text type, recall was predicted by **Clause CI**, controlling for verbal ability and HK.

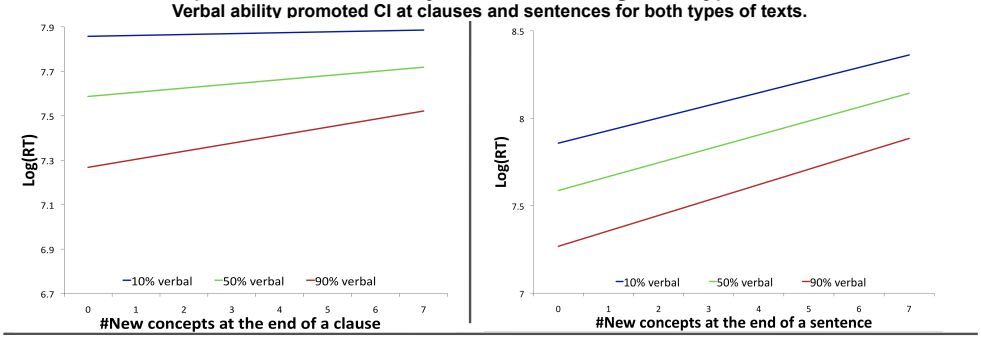
Regression	Model 1	Model 2	Model 3	Model 4
R^2	0	0.45	0.48	0.50
F(1,106)	0.02	30.19*	20.26*	16.24*
	Standardized Beta Coefficients			
Age	0.02	-0.1	-0.1	-0.11
Verbal		**0.70***	**0.65***	**0.62***
HK		-0.003	-0.02	-0.03
Clause CI (CCI)			**0.16***	**0.23***
Sentence CI (SCI)			-0.08	-0.11
Verbal X CCI				**-0.21***
Verbal X SCI				-0.08



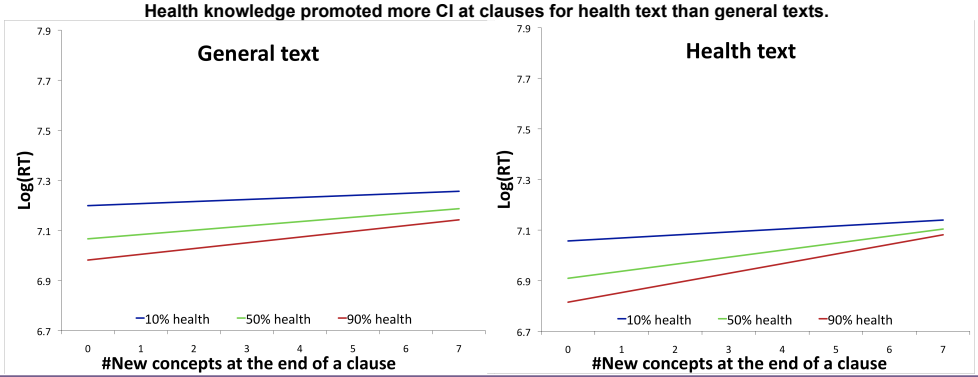
Verbal X Clause CI on Recall
People with higher verbal ability and more clause CI had better recall. The interaction of Verbal X Clause CI on Recall showing that clause CI especially benefits low-verbal readers to obtain better recall performance to compensate for their poorer general knowledge about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

CI depended on verbal ability, domain knowledge, and type of text….

Verbal ability promoted CI at clauses and sentences for both types of texts.



Health knowledge promoted more CI at clauses for health text than general 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.**

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