Vocabulary Makes an Independent Contribution to Reading Comprehension in Young Adults' Reading Skills

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I. Purpose

Braze et al. (2007) found decoding together with listening comprehension (Lcomp) account for considerable variance in reading comprehension (Rcomp) among young adults, per the Simple View (Gough & Tunmer, 1986). However, vocabulary made an independent contribution. This new study has three goals.

1. Earlier conclusions regarding vocabulary (Braze et al., 2007) generalize to new samples and different stimulus materials.
2. Commonality analysis (Seibold & McPhee, 1979) provides a refined picture of the contributions of component skills.
3. We refine our model of lexical representation and access, grounded in the Lexical Quality Hypothesis (Hart & Perfetti, 2002).

II. Method

PARTICIPANTS

We recruited two cohorts of young adults (combined N=144, 69 female). Participants were assessed reading comprehension and related abilities (listening comprehension, phonological awareness, decoding, vocabulary, verbal memory, print experience). Samples include a wider range of reading skills than would be found among university students.

SUMMARY STATISTICS

	Mean	SD
Reading Comprehension		
A. PIAT sentence comp [1]	29.26	8.08
B. SDRT fast reading	18.36	8.15
Decoding/Word Recognition		
C. TOWRE nonwords	44.29	13.63
D. TOWRE words	87.40	11.19
E. WJ3 word attack	24.27	6.94
F. WJ3 word ID	64.78	7.93
Listening Comprehension		
G. PIAT sentence comp [1]	30.79	7.15
H. WJ3 oral comprehension [2]	25.27	4.28
Vocabulary		
I. PPVT raw score	168.33	20.19
J. PPVT std. score	100.59	15.63
K. WASI vocabulary [2]	53.63	16.12
Other		
L. Age	20.33	2.24
M. Education (yrs)	12.38	2.06
N. Title Recognition	8.52	5.08
O. Sentence Span	41.49	12.98

[1] PIAT materials split for Rcomp and Lcomp. See Spring and French (1990), Braze et al. (2007).
[2] Cohort 1 only (N = 89).

COMPOSITE VARIABLES

Reading comprehension = A + B
Nonword reading = C + E
Word reading = D + F
W & NW reading = C + D + E + F
Listening comprehension = G + H
Vocabulary = I + K

Regression modeling and commonality analysis (Seibold & McPhee, 1979) are used to determine unique and shared variances associated with each factor.

III. Result

Regression models grounded in the Simple View account for substantial, but incomplete portion of non-random variance in Rcomp. As predicted, vocabulary makes an independent contribution to Rcomp, above Lcomp and decoding skill.

Model 1: Reading Comprehension Composite

	beta	*t*	*p*	SSPC	Common	Total
Age	.07	1.23	.21995	.00	.12	.13
Education	.04	.67	.50188	.00	.25	.25
PIAT Listening	.24	4.11	.00007	.03	.50	.53
W + NW composite	.23	3.94	.00013	.03	.50	.53
PPVT (raw scores)	.47	7.34	< .00001	.09	.60	.69

Common to (only commonalities with at least 1% variance shown):

PIAT listening, & W+NW composite	.0178
PIAT listening, & PPVT	.0754
W+NW composite, & PPVT	.0766
Age, Education, & PPVT	.0121
Education, PIAT listening, & PPVT	.0152
PIAT listening, W+NW composite, & PPVT	.2091
Age, Education, PIAT listening, & PPVT	.0127
Age, Education, W+NW composite, & PPVT	.0146
Education, PIAT listening, W+NW composite, & PPVT	.0942
Age, Education, PIAT listening, W+NW composite, & PPVT	.0784
Multiple R^2 for model	.7758

Substitution of NW Reading composite for W+NW Reading composite has no essential effect on outcome.

Similarly (in a reduced sample), substitution of Listening comprehension composite for PIAT Listening scores and/or substitution of the Vocabulary composite for PPVT scores has little effect on outcome.

Model 2: Vocabulary (PPVT)

	beta	*t*	*p*	SSPC	Common	Total
Age	-.04	-.53	.59450	.00	.10	.10
Education	.17	2.27	.02482	.01	.22	.23
Sentence Span	.40	6.70	< .00001	.14	.24	.37
Title Recognition	.45	7.50	< .00001	.16	.24	.41

Common to:

Age, & Education	.0022
Age, & Sentence Span	.0086
Education, & Sentence Span	.0538
Age, & Title Recognition	.0045
Education, & Title Recognition	.0113
Sentence Span, & Title Recognition	.0838
Age, Education, & Sentence Span	-.0070
Age, Education, & Title Recognition	.0461
Age, Sentence Span, & Title Recognition	-.0139
Education, Sentence Span, & Title Recognition	.0519
Age, Education, Sentence Span, & Title Recognition	.0602
Multiple R^2 for model	.6154

Simple Correlations (p values in upper triangle are corrected for multiple comparisons)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. Age		< .001	< .001	.002	.171	.068	.070	.003	< .001	.171	.001	.073	.171	.005	.171	.037	< .001
2. Education	.65		< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	.030	.003	< .001	< .001	< .001	< .001
3. Title Recognition	.39	.39		< .001	.002	< .001	< .001	< .001	< .001	< .001	< .001	.024	.001	< .001	< .001	< .001	< .001
4. PPVT (rawscore)	.32	.48	.64		< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001
5. Sentence Span	.14	.38	.32	.61		< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001
6. PIAT sentences Listening	.22	.42	.44	.68	.60		< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001
7. WJ3 oral comprehension	.27	.49	.55	.83	.67	.66		< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001
8. PIAT sentences Reading	.31	.43	.48	.73	.55	.75	.66		< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001
9. SDRT fast reading	.34	.49	.57	.79	.59	.59	.75	.68		< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001
10. WJ3 word attack	.17	.39	.34	.60	.65	.60	.61	.58	.60		< .001	< .001	< .001	< .001	< .001	< .001	< .001
11. WJ3 word ID	.32	.50	.50	.78	.67	.65	.71	.70	.75	.86		< .001	< .001	< .001	< .001	< .001	< .001
12. TOWRE words	.21	.25	.25	.50	.44	.41	.49	.45	.56	.62	.64		< .001	< .001	< .001	< .001	< .001
13. TOWRE nonwords	.15	.31	.32	.57	.55	.52	.56	.54	.59	.85	.81	.72		< .001	< .001	< .001	< .001
14. W reading composite	.29	.41	.41	.71	.61	.59	.66	.64	.73	.81	.91	.91	.84		< .001	< .001	< .001
15. NW reading composite	.17	.37	.34	.61	.62	.58	.61	.59	.62	.96	.87	.69	.96	.86		< .001	< .001
16. W+NW composite	.24	.40	.39	.68	.64	.61	.65	.64	.70	.92	.92	.83	.94	.96	.97		< .001
17. R compr. composite	.36	.50	.57	.83	.62	.73	.76	.92	.92	.65	.80	.55	.62	.75	.66	.73	

IV. Conclusions

Vocabulary knowledge is a crucial component of reading comprehension in this young adult population, over and above word recognition skill and oral language comprehension. These relationships are key to understanding the etiology of poor reading comprehension.

Vocabulary knowledge is largely a product of experience with print, modulated by individual memory capacity.

References:

Braze, D., Tabor, W., Shankweiler, D. P. & Mencl, W. E. (2007) *Journal of Learning Disabilities* 40, 226-243.
Gough, P. B. & Tunmer, W. E. (1986) *RASE: Remedial & Special Education* 7, 6-10.
Nimon, K., Lewis, M., Kane, R. & Haynes, R. M. (2008) *Behavior Research Methods* 40, 457-466.
Perfetti, C. A. & Hart, L. (2002) in *Precursors of Functional Literacy*, ed. Verhoeven, L. (John Benjamins, Philadelphia, PA), 189-213.
Seibold, D. R. & McPhee, R. D. (1979) *Human Communication Research* 5, 355-365.
Spring, C. & French, L. (1990) *Journal of Learning Disabilities* 23, 53-8.

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