Investigating the Relationship between Working Memory and Language Learning Aptitude

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Introduction

Working Memory –

'Working memory is a multi-component system providing temporary storage of information for brief periods of time that can be used to support ongoing cognitive activities.' (Baddeley, 1992)

Language Learning Aptitude –

'The amount of time a student needs to learn a given task, unit of instruction, or curriculum to an acceptable criterion of mastery under optimal conditions of instruction and student motivation.' (Carroll, 1990)

Working Memory and Language Learning Aptitude –

New research argues that language aptitude batteries should be revised to include components that measure working memory following evidence that memory plays a crucial role in language learning
(Wen 2012, 2016; Granena & Long 2013; Yalçın, Çeçen, & Erçetin, 2016).

Research Question

What is the Relationship between Working Memory and Language Learning Aptitude?

Language Aptitude Tasks

- LLAMA Aptitude Tests (Meara 2005)
- Free, loosely based on Carroll's MLAT
- Includes four subtests
- Has yet to be validated

LLAMA_B Vocabulary Test

LLAMA_D Sound Recognition

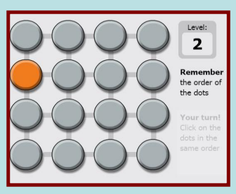
LLAMA_E Sound Symbol Correspondence

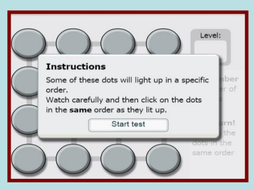
LLAMA_F Grammatical Inferencing

Working Memory Tasks

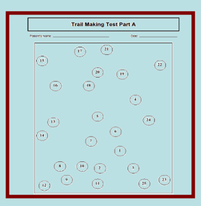
Test One: Digit-Span Backwards

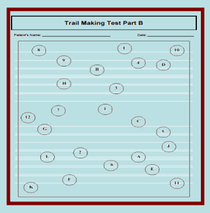
Test Two: Visual-Spatial Test





Test Three: TMT A & B





Participant Methodology

- Data collected by BA dissertation students
- Tesni Galvin, Amelia Cobner, Martha Chisholm, Jake Clothier & Issy Greenfield

- 127 participants
- Data consists of predominantly students
- Predominantly native English speakers
- Looked at a range of factors that may affect test performance, including age, gender, L1, L2 status, undergraduate course, education level

Table I – Participant Data

No. Females	60
No. Males	67
Age Range	16-78
Average Age	33.5

Factor Analysis

- Extraction Method: Principal Component Analysis.

Pattern Matrix[a]

	Component 1	Component 2
LLAMA E	.807	
LLAMA F	.799	
LLAMA B	.670	
LLAMA D	.546	
WM3 (A)		.906
WM3 (B)		.877
WM1 (Visual)		-.498
WM2 (Digits)		-.392

Extraction Method: Principal Component Analysis.
Rotation Method: Oblimin with Kaiser Normalization.
a. Rotation converged in 6 iterations.

2 Factors (Eigenvalue >1)
- Aptitude loads on a different factor to working memory measures.

Pattern Matrix[a]

	Component 1	2	3	4
LLAMA F	.831			
LLAMA E	.828			
LLAMA B	.672			
WM3 (A)		.914		
WM3 (B)		.867		
WM2 (Digits)			.897	
WM1 (Visual)			.586	
LLAMA D				.947

Extraction Method: Principal Component Analysis.
Rotation Method: Oblimin with Kaiser Normalization.
a. Rotation converged in 6 iterations.

4 Factors (Fixed factors)
- 3 explicit LLAMA measures (B, E, F) load on 1 factor.
- 2 attention measures (TMT A & B) load on a 2nd factor.
- Digits backwards and visuo-spatial measures both load on a 3rd factor.
- LLAMA D (implicit) loads on a final factor.

Conclusion

- Results support Granena (2013, 2014) findings that the LLAMA subtests and working memory load separately – indicating only a very loose relationship.
- WM measures cannot completely substitute for language learning aptitude measures.

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