



Aptitude and Memory

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Background

- Language learning aptitude has featured intermittently in the spotlight since Henmon's work in the 1930s.
- Language learning aptitude remains undefined at a theoretical level (cf. Grigorenko et al., 2015; Robinson, 2001; Skehan, 2016)
- LLAMA aptitude tests (Meara, 2005) relate to cortical morphometry and white matter microstructure (Novén et al., 2021).
- Is language learning aptitude domain specific or general?
- Aptitude is working memory (Wen, 2016; Berthele & Udry, 2021)?
- Aptitude is Long Term memory (Buffington & Morgan-Short, 2019)?

Research Questions

- Are the LLAMA v.3 tests (more) reliable?
- Do the LLAMA v.3 tests measure the same thing as common WM and LTM tests?

Tasks

- LLAMA aptitude tests (Meara & Rogers, 2019)
 - Free, loosely based on Carroll's MLAT
 - Includes four subtests
 - Revised v.3 test reprogrammed in www.gorilla.sc



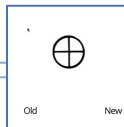
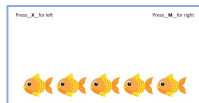
LLAMA_D
Sound Recognition

LLAMA_B
Vocabulary Test

LLAMA_E
Sound Symbol Correspondence

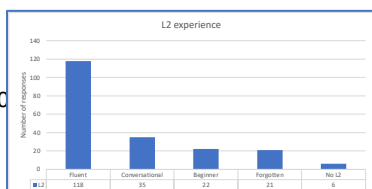
LLAMA_F
Grammatical Inference

- Memory tests
 - auditory digit-span forwards & backwards test
 - Test phonological loop & CE
 - Flanker task
 - Test response inhibition (CE)
 - Towers of Hanoi
 - Test procedural memory
 - Also used for CE?
 - CVMT (Trahan & Larrabee, 1988, Morgan-Short et al., 2014)
 - Test declarative memory



Participants

- n= 210
- F=145, M=56, NB = 9
- Mean age = 23, (SD = 8.629, Mode= 20)
- L1 English = 47,
- L1 German = 110,
- bilingual L1 = 18,
- other L1/missing = 35



Results: RQ1 Are the LLAMA v.3 tests (more) reliable?

Table 1: Comparison of Cronbach alpha scores
Note: No change to LLAMA B tests, LLAMA D extra items /100

LLAMA Subtest	Original tests Bokander & Bylund (2020, table 4)	New LLAMA tests v.3
LLAMA B	.81	.855
LLAMA E	.74	.902
LLAMA F	.60	.854
LLAMA D	.54	.562

Discussion RQ1:

- Yes, improvements on Cronbach's alpha.
- No change on LLAMA B (expected).
- New LLAMA D version on website with improved alpha scores ($\alpha=.702$ all; $\alpha=.875$ yes items).

Results: RQ2 Do the LLAMA v.3 tests measure the same thing as common WM and LTM tests?

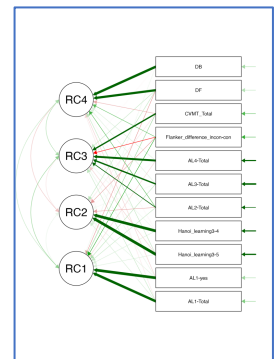
Exploratory Factor Analysis (rotation: promax, Eigenvalues >1)
Model: $\chi^2 (17, n=210) = 32.301, p=.014$

Factor Loadings	Factor 1	Factor 2	Factor 3	Factor 4	Uniqueness
Hanoi_learning3-5	1.014				-0.001
Hanoi_learning3-4	0.768				0.413
LLAMA D-yes only		0.991			0.004
LLAMA D -Total		0.712			0.421
LLAMA F -Total			0.678		0.544
LLAMA E -Total			0.479		0.745
CVMT -Total			0.455		0.770
LLAMA B -Total			0.414		0.755
DB				0.807	0.344
DF				0.620	0.621
Flanker_difference_incon-con					0.972

Note. Applied rotation method is promax.

Discussion RQ2:

- LLAMA scores split between D and others – implicit vs explicit? (Granena, 2013)
- LLAMA B, E, F same factor as declarative memory
 - Role of DM in L2 (Ullman 2015)
 - Vocab and grammar in DC
- WM measures not on same factors as LLAMA tests (contra Wen, 2016)



Conclusion

- New LLAMA tests are more reliable and test something different to WM measures
- Language learning aptitude is domain specific?
- Further research needed re: LTM.
- New LLAMA website coming soon: www.llamatests.org

Limitations:

- Scoring of Hanoi
- missing data: LLAMA D n=135, CVMT n=193, DB n=174

Aptitude and Memory: further info

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Table 1: differences between old and new LLAMA tests (see Rogers, Meara & Rogers, in press)

https://www.lognostics.co.uk/tools/LLAMA_3/index.htm

	2005 v.1	2019 v.3
LLAMA D	30 items Out of 75 Separate learning and test phases	40 items Out of 100 (on website: no separate learning and test phases)
LLAMA B	20 items	20 items
LLAMA E	20 items Binary choice answers	20 items Choice from 20 answers
LLAMA F	20 items Binary choice answers	10 items Each item marked against 2 criteria Create own sentence from 16 words

Descriptive Statistics for LLAMA tests					
	LLAMA D (all)	LLAMA D (yes)	LLAMA B	LLAMA E	LLAMA F
Valid	135	135	210	210	210
Mean	29.644	15.133	9.652	8.505	8.905
Std. Deviation	3.920	2.788	4.777	5.655	5.060
Note: LLAMA D (all) = old and new items; out of 40, LLAMA D (yes) = old items only; out of 20					

Descriptive Statistics for memory tests								
	Flanker	CVMT	DF	DB	Hanoi 3-4	Hanoi 3-5	Hanoi 3-6	Hanoi 3-7
Valid	210	193	178	174	188	131	27	1
Mean	8580.845	77.793	6.466	5.787	420.945	536.746	507.007	375.041
Std. Dev	119576.896	12.111	1.823	1.579	512.601	449.626	307.502	-
Hanoi scoring: RT/number of moves/discs								

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