Measuring individual differences with the LLAMA aptitude tests

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Outline



2 Experiment 1

- Methodology
- Results & Discussion

3 Experiment 2

- Methodology
- Results & Discussion



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What is 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: 26)

- phonemic coding ability,
- grammatical sensitivity,
- inductive language learning ability
- rote-learning ability

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Overview of Aptitude

- Li (2015) Construct validity: meta analysis of 66 studies.
- Concluded:
 - Aptitude is independent of other individual differences, e.g. motivation.
 - executive working memory (EWM) more strongly associated with aptitude than phonological short-term memory (PSTM).
 - strong predictor of general proficiency but not vocabulary learning or L2 writing.
 - different components predicted different aspects of learning.

Background

- Aptitude and Working Memory
 - Linck et al (2013): relevance of PSTM to advanced learners.
 - Grañena (2015): two types of aptitude (explicit and implicit) linked to different cognitive styles (rational versus intuitive).
- Motivation and anxiety (Li 2015)
 - motivation and aptitude separate
 - negative correlation between anxiety and aptitude.
 - Sparks & Patton (2013): anxiety as result not cause of low aptitude

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Aptitude tests

• MLAT: Modern Languages Aptitude Test

- Carroll & Sapon (1959)
- Four components:
- learning words out of context
- grammatical sensitivity
- phonetic sensitivity
- inductive learning ability
- PLAB: Pimsleur Modern Languages Aptitude Battery
 - Pimsleur (1966)
 - English vocabulary size as measure of overall verbal ability
 - language analysis measures
 - sound discrimination measures
 - motivation

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LLAMA tests: background

- Developed by Paul Meara (2005)
- free, loosely based on MLAT
- increasingly used in research projects (over 1000 papers reference the LLAMA tests).
- Has not been fully validated.





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LLAMA tests

- Not only designed for English language neutral
- Four components
- LLAMA B = vocabulary measure
- LLAMA D = sound recognition (implicit learning)
- LLAMA E = sound-symbol correspondence
- LLAMA F = grammatical inferencing



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LLAMA tests



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Previous validation work: Grañena (2013)

Grañena (2013):

- Internal consistency, Gender and Language neutrality
- n=187 aged 18-39
- L1s: Spanish, Chinese and English
- internal consistency but two forms of aptitude
- LLAMA D measuring something different to the others
- LLAMA D measures implicit and others explicit?

Previous validation work: Rogers et al

- Cross-sectional series of studies 2013-2015 with BA students.
- (Presented at EUROSLA in 2014, 2015. 2014 work in Yearbook 16.)
- Looked at a range of factors that might influence test performance, including age, L1, L2 status, education level, gender, playing of logic puzzles.
- 404 participants in total.
- 346 took all 4 parts of the LLAMA tests and background questionnaires.

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Rogers et al Results

- Multiple regression analysis for 6 factors.
- Overall variance for:
 - LLAMA B: R² = 9.1%
 - LLAMA D: $R^2 = 4.8\%$
 - LLAMA E: R² = 3.4%
 - LLAMA F: $R^2 = 6.6\%$

• Only L2 status consistently was significant p < .05 (not for E).

- LLAMA B: $\beta =$ -.250, contribution to variance = 6.0
- LLAMA D: $\beta = .136$, contribution to variance = 1.8
- LLAMA F: $\beta = -.165$, contribution to variance = 2.6



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Methodology Results & Discussion

RQ & Participants

• Do the LLAMA tests actually predict student performance in class tests?

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Methodology Results & Discussion

RQ & Participants

- Do the LLAMA tests actually predict student performance in class tests?
- 15 beginner students of Latin (9 female).
- 14 L1 English, 1 L1 Latvian
- aged 18+
- Students of Classics at UG or MA level.
- 3 participants dropped out after first semester.
- Participants paid $\pounds 10$ to take part.

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Methodology Results & Discussion

Tasks

- LLAMA tests, WM storage task, motivation (LLOS, Noels et al 2000), anxiety (Horwitz et al 1986).
- Motivation (20 questions) divided into:
 - regulation (eternal, introjected & identified),
 - intrinsic (accomplishment, knowledge & stimulation)
 - amotivation
- Foreign Language Classroom Anxiety Scale: 33 items
- Tested 8 times over one academic year divided into 2 semesters.

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Background Experiment 1 Experiment 2

Methodology Results & Discussion

Conclusions and Next steps

2 Results & Dis

ID	WM	В	D	Е	F	Anxiety	Motivation	TB1	TB2
01	6	35	40	90	70	30	knowledge	68	61
02	5.5	70	35	90	70	55	knowledge	85	88
03	4	20	0	70	40	35	identified	65	68
04	6.5	60	25	30	50	75	knowledge	40	-
05	7	20	50	90	50	69	accomplish	89	79
06	7.5	50	20	100	50	67	knowledge	66	-
07	7	45	20	50	80	52	identified	60	-
08	6	65	10	50	40	71	accomplish	80	61
09	6.5	100	40	100	40	37	accomplish	93	84
10*	6	50	30	90	40	32	knowledge	79	63
11	6	75	50	100	80	64	identified	87	76
12	6	55	30	30	30	70	knowledge	88	86
13	3.5	65	20	70	70	52	accomplish	86	70
14	7	55	10	90	70	70	intrinsic	92	74
15	5.5	70	30	100	60	62	knowledge	88	78
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Measuring individual differences with the LLAMA aptitude tests

Methodology Results & Discussion

Results: FL Classroom Anxiety

- Wide range of foreign language anxiety.
- No correlation with any classroom test or overall semester result.
- Also no correlation with aptitude test results.



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Methodology Results & Discussion

Results: Motivation



• Motivation: all learners highly motivated in the subject.

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Methodology Results & Discussion

- No correlations with overall semester results (Spearman's).
- LLAMA B (vocabulary) correlates with test 4 (r=.644, p<.01)
- LLAMA D (implicit) correlates with test 1 (r=.595, p<.05) and test 6 (r=..650, p<.05)

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Methodology Results & Discussion

Discussion

- Marks for this group are consistently fairly high lack of variation.
- Range of levels for anxiety and aptitude but not predictive.
- Surprising (?) aptitude results given focus on vocabulary and grammar in the class (Ilama B & F)
- Small participant numbers.
- Similar motivation profiles due to nature of the group (students of Classics).

Methodology Results & Discussion

Background

- Previous research linking working memory and aptitude.
- Two WM measures and LLAMA tests.
- Data collected by final year undergraduates for module assignment.



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Methodology Results & Discussion

Tasks & Participants

- 184 participants
- 100 female and 64 male (20 no gender info)
- ages 17-86 (M=30, s.d.= 14)
- Two working memory tasks: storage and digits backwards.
- 154 took all LLAMA tests and WM storage test
- 75 of 154 also took digits backwards
- another 30 only took LLAMA B (vocab) and WM storage test

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Methodology Results & Discussion

Working memory tasks

storage task: http://www.cogmed.com/working-memory-challenge digits backwards: http://cognitivefun.net/test/11



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Methodology Results & Discussion

Overall Results

	Storage	Digits	В	D	Е	F	
Mean	5.76	6.25	53.95	30.72	63.16	50.99	
s.d.	1.044	1.455	21.03	20.44	26.50	25.04	
Reminder:							

- LLAMA B = vocabulary measure
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Methodology Results & Discussion

Principal Components Analysis

- Identified two factors/ components.
- Factor 1: Both WM tasks with LLAMA B, E, F
- Factor 2: Storage with LLAMA D

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LLAMA F	.800	172
LLAMA E	.768	097
LLAMA B	.734	475
WM Storage	.647	.541
WM Digits	.536	281
LLAMA D	.487	744

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Methodology Results & Discussion

Discussion

- Supports Grañena's (2013) analysis of two components.
- Possibly link to different elements of working memory?
- Need more detailed data: suggestive results.
- BUT opposite to what was expected.
- NB: Only 75 did the digits backwards.

Conclusions and Next steps

- Too small a sample to analyse for predictive power.
- Repeat with 2016 intake across a range of languages.
- Need more data re: working memory.

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Conclusions and Next steps

- Too small a sample to analyse for predictive power.
- Repeat with 2016 intake across a range of languages.
- Need more data re: working memory.
- LLAMA-B now available online. Working on others.
- Validation study with school children (application).
- Simplified version of LLAMA-F to be used as training tool to reduce over-selectivity in autism.

Thank you Any questions?

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