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## Cognitive bases of reading and writing in a second/foreign language

DIALUKI ([www.jyu.fi/dialuki](http://www.jyu.fi/dialuki))

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### DIALUKI (2010 – 2013)

- **DI**agnosing reading (**LU**keminen) and writing (**KI**rjoittaminen) in a second or foreign language
- Academy of Finland, University of Jyväskylä, ESRC (Economic & Social Research Council, UK)
- Principal investigator: J. Charles Alderson (Lancaster University, UK)
- Development of reading and writing in S/FL
- Can different L1 and L2 linguistic measures predict difficulties in S/FL reading and writing?
- How does S/FL proficiency in reading and writing develop in psycholinguistic and linguistic terms?
  - Helps to develop diagnostic instruments

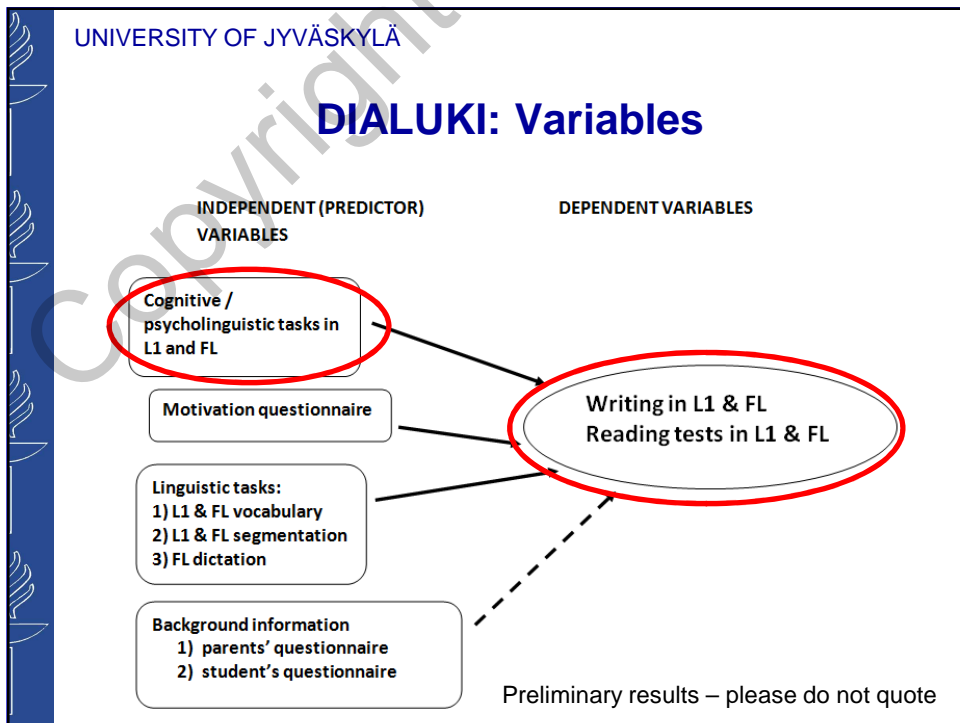
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### Participants

| L1           | Grade/age               | English as FL | Finnish as L2 |
|--------------|-------------------------|---------------|---------------|
| Finnish      | 4th grade / 9-10 years  | 210           |               |
|              | 8th grade / 13-14 years | 208           |               |
|              | Gymnasium/17-18 years   | 219           |               |
| Russian      | 3rd – 6th grades        |               | 186           |
|              | 7th – 9th grades        |               | 78            |
| <b>Total</b> |                         | <b>637</b>    | <b>264</b>    |

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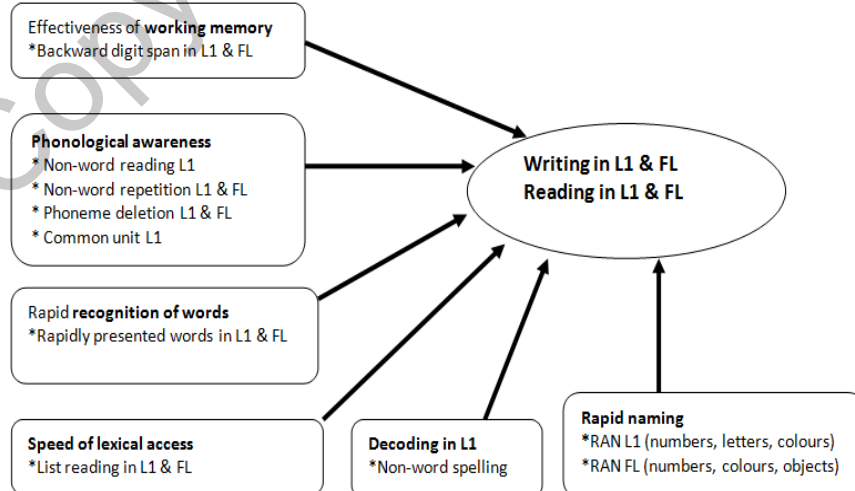
## Reading and writing tasks for 4th graders

- **Reading** comprehension in Finnish as L1
  - 12 multiple choice questions based on a text *Turhat tavarat* (*Unnecessary things*)
- **Reading** comprehension in English as FL
  - Pearson Test of English for Young Learners, number of (mixed format) items = 24
- **Writing** in Finnish as L1
  - Opinion
- **Writing** in English as FL
  - Message to a foreign friend

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## Cognitive tasks for 4th graders



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## Cognitive and psycholinguistic tasks (1)

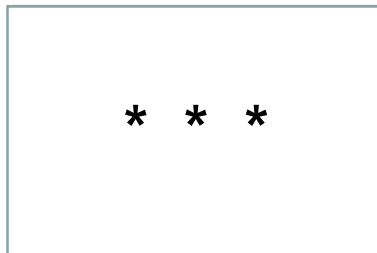
- Backwards digit span L1 & FL
  - L1: 2-8 digits, numbers 1-9
  - FL: 2-5 digits, numbers 1-6
- Common unit in a pair of non-words L1
  - *vapi – lumpe*
- Phoneme deletion L1 & FL
  - *Tauk – auk*
  - *kisP - kis*

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## Cognitive and psycholinguistic tasks (2)

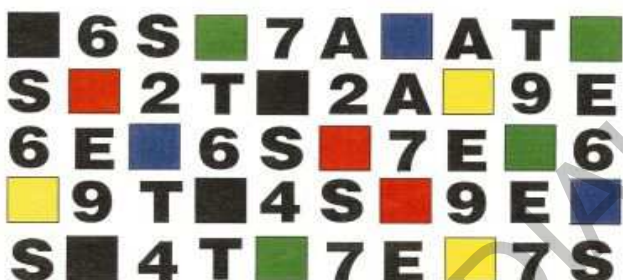
- Rapidly presented words (L1 & FL)
  - L1: 14 words (length 2-8 letters)
  - L2: 8 words (length 2-9 letters)



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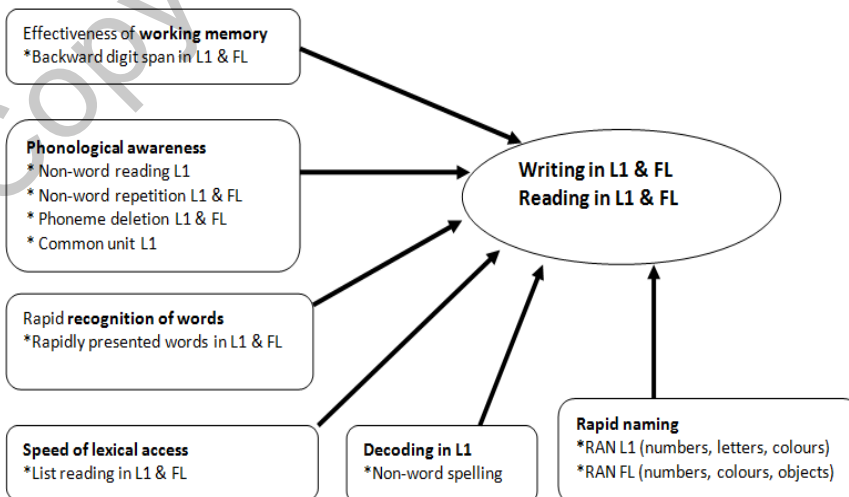
### Cognitive and psycholinguistic tasks (3)

- RAN Rapid Automatized Naming L1 and FL
- Mixed stimuli:
  - numbers, letters and colours (L1)
  - numbers, objects and colours (FL)



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### Cognitive tasks for 4th graders



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## Stepwise multiple regression analysis, L1 cognitive variables with reading in Finnish as L1

|                  | Adjusted R Square | % variance | First variable                   | Second variable                         | Third variable                          |
|------------------|-------------------|------------|----------------------------------|---|---|
| <b>4th Grade</b> | .108              | 11%        | <b>List reading L1</b><br>(.247) | <b>Backward digit span L1</b><br>(.243) | <b>Non-word repetition L1</b><br>(.219) |

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## Relative weights of the significant L1 cognitive predictor variables with reading Finnish as L1

|                  | Adjusted R Square | % variance | First variable                         | Second variable                               | Third variable                                |
|------------------|-------------------|------------|--|---|---|
| <b>4th Grade</b> | .108              | 11%        | <b>List reading L1</b><br><b>34.8%</b> | <b>Backward digit span L1</b><br><b>36.3%</b> | <b>Non-word repetition L1</b><br><b>28.9%</b> |

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## Stepwise multiple regression analysis, cognitive variables with EFL reading

|                  | Adjusted R Square | % variance | First variable                               | Second variable                                     | Third variable                   | Fourth variable            |
|------------------|-------------------|------------|--|---|----------------------------------|----------------------------|
| <b>4th Grade</b> | .282              | <b>28%</b> | <b>Phoneme deletion in English</b><br>(.437) | <b>Rapidly presented words in English</b><br>(.412) | <b>RAN in English</b><br>(-.355) | <b>RAN in L1</b><br>(.020) |

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## Relative weights of the significant cognitive predictor variables with EFL reading

|                  | Adjusted R Square | % variance | First variable                                     | Second variable   | Third variable                        | Fourth variable                 |
|------------------|-------------------|------------|--|---|---------------------------------------|---------------------------------|
| <b>4th Grade</b> | .282              | <b>28%</b> | <b>Phoneme deletion in English</b><br><b>41.0%</b> | <b>Rapidly presented words in English</b><br><b>32.4%</b> | <b>RAN in English</b><br><b>23.0%</b> | <b>RAN in L1</b><br><b>3.6%</b> |

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## Stepwise multiple regression analysis, L1 cognitive variables with writing in Finnish as L1

|           | Adjusted R Square | % variance | First variable                    | Second variable            |
|-----------|-------------------|------------|-----------------------------------|----------------------------|
| 4th Grade | .119              | 12%        | Rapidly presented words L1 (.304) | Phoneme deletion L1 (.264) |

Preliminary results – please do not quote

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## Relative weights of the significant L1 cognitive predictor variables with writing in Finnish as L1

|           | Adjusted R Square | % variance | First variable                             | Second variable                     |
|-----------|-------------------|------------|--|-------------------------------------|
| 4th Grade | .119              | 12%        | Rapidly presented words L1<br><b>58.9%</b> | Phoneme deletion L1<br><b>41.1%</b> |

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## Stepwise multiple regression analysis, cognitive variables with EFL writing

|           | Adjusted R Square | % variance | First variable                       | Second variable                       | Third variable            | Fourth variable          |
|-----------|-------------------|------------|--------------------------------------|---------------------------------------|---------------------------|--------------------------|
| 4th Grade | .343              | 34%        | Rapidly presented words L1<br>(.491) | Phoneme deletion in English<br>(.435) | RAN in English<br>(-.401) | Common unit L1<br>(.301) |

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## Relative weights of the significant cognitive predictor variables with EFL writing

|           | Adjusted R Square | % variance | First variable                      | Second variable                      | Third variable          | Fourth variable         |
|-----------|-------------------|------------|-------------------------------------|--------------------------------------|-------------------------|-------------------------|
| 4th Grade | .343              | 34%        | Rapidly presented words L1<br>37.8% | Phoneme deletion in English<br>30.2% | RAN in English<br>19.8% | Common unit L1<br>12.2% |

Preliminary results – please do not quote

## Factor analysis: Cognitive variables

| Factors  | Variables   |
|--|---|
| <b>Factor 1</b><br>Speed of lexical retrieval                | List reading in FL & L1<br>Rapidly presented words FL & L1<br>Rapid automatized naming FL & L1<br>Backward digit span FL<br>Common unit L1  |
| <b>Factor 2</b><br>Processing of unknown linguistic material | Non-word spelling L1<br>Non-word repetition L1<br>Non-word reading L1<br>Phoneme deletion FL & L1<br>Backward digit span FL & L1<br>Common unit L1<br>Rapidly presented words FL & L1 |

Preliminary results – please do not quote

## Summary of the results

- Cognitive variables predict variance in EFL tasks better than in Finnish as L1 tasks
- Cognitive variables predict variance in English writing task better than in other tasks examined here
- However, cognitive tasks seem to have only small contribution to the prediction of variance in reading and writing tasks
- Common factors behind the cognitive variables seem to be speed of lexical retrieval and processing of unknown linguistic material; also working memory plays a role in these variables

Preliminary results – please do not quote

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## **Discussion: why are these variables unable to predict variation in reading and writing?**

- Finnish as L1
  - These cognitive tasks are designed to detect dyslexics and very poor readers.
  - 4th graders are already experienced and skilled readers; It is easy to learn read and write in Finnish because the orthography is extremely transparent and systematic.
- English as FL
  - In case of 4th graders the cognitive variables administered in foreign language are more linguistic variables than cognitive variables.
  - Writing in English: beginning learners of English are not yet used to writing in English.

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**Thank you for your attention!**

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