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

DIALUKI (www.jyu.fi/dialuki)

Lea Nieminen, CALS, University of Jyväskylä, Finland
Riikka Ullakonoja, CALS, University of Jyväskylä, Finland
Eeva-Leena Haapakangas, CALS, University of Jyväskylä, Finland
Ari Huhta, CALS, University of Jyväskylä, Finland
Charles Alderson, Lancaster University, UK

Preliminary results – please do not quote
### Participants

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

Preliminary results – please do not quote

### DIALUKI: Variables

**Independent (Predictor) Variables**
- Cognitive / psycholinguistic tasks in L1 and FL
- Motivation questionnaire
- Linguistic tasks:
  1. L1 & FL vocabulary
  2. L1 & FL segmentation
  3. FL dictation
- Background information:
  1. parents’ questionnaire
  2. student’s questionnaire

**Dependent Variables**
- Writing in L1 & FL
- Reading tests in L1 & FL

Preliminary results – please do not quote
UNIVERSITY OF JYVÄSKYLÄ

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

Preliminary results – please do not quote

UNIVERSITY OF JYVÄSKYLÄ

Cognitive tasks for 4th graders

- **Effectiveness of working memory**
  - *Backwards digit span in L1 & FL*
- **Phonological awareness**
  - *Non-word reading L1*
  - *Non-word repetition L1 & FL*
  - *Phoneme deletion L1 & FL*
  - *Common unit L1*
- **Rapid recognition of words**
  - *Rapidly presented words in L1 & FL*
- **Speed of lexical access**
  - *List reading in L1 & FL*
- **Decoding in L1**
  - *Non-word spelling*
- **Rapid naming**
  - *RAN L1 (numbers, letters, colours)*
  - *RAN FL (numbers, colours, objects)*

Preliminary results – please do not quote
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

Preliminary results – please do not quote

Cognitive and psycholinguistic tasks (2)

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

Preliminary results – please do not quote
Cognitive and psycholinguistic tasks (3)

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

Cognitive tasks for 4th graders

- Effectiveness of working memory
  * Backward digit span in L1 & FL

- Phonological awareness
  * Non-word reading L1
  * Non-word repetition L1 & FL
  * Phoneme deletion L1 & FL
  * Common unit L1

- Rapid recognition of words
  * Rapidly presented words in L1 & FL

- Speed of lexical access
  * List reading in L1 & FL

- Decoding in L1
  * Non-word spelling

- Rapid naming
  * RAN L1 (numbers, letters, colours)
  * FL (numbers, colours, objects)

Preliminary results – please do not quote
Stepwise multiple regression analysis, L1 cognitive variables with reading in Finnish as L1

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

Preliminary results – please do not quote

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

<table>
<thead>
<tr>
<th></th>
<th>Adjusted R Square</th>
<th>% variance</th>
<th>First variable</th>
<th>Second variable</th>
<th>Third variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>4th Grade</td>
<td>.108</td>
<td>11%</td>
<td>List reading L1 34.8%</td>
<td>Backward digit span L1 36.3%</td>
<td>Non-word repetition L1 28.9%</td>
</tr>
</tbody>
</table>

Preliminary results – please do not quote
Stepwise multiple regression analysis, cognitive variables with EFL reading

<table>
<thead>
<tr>
<th>4th Grade</th>
<th>Adjusted R Square</th>
<th>% variance</th>
<th>First variable</th>
<th>Second variable</th>
<th>Third variable</th>
<th>Fourth variable</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>.282</td>
<td>28%</td>
<td>Phoneme deletion in English (.437)</td>
<td>Rapidly presented words in English (.412)</td>
<td>RAN in English (.355)</td>
<td>RAN in L1 (.020)</td>
</tr>
</tbody>
</table>

Relative weights of the significant cognitive predictor variables with EFL reading

<table>
<thead>
<tr>
<th>4th Grade</th>
<th>Adjusted R Square</th>
<th>% variance</th>
<th>First variable</th>
<th>Second variable</th>
<th>Third variable</th>
<th>Fourth variable</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>.282</td>
<td>28%</td>
<td>Phoneme deletion in English 41.0%</td>
<td>Rapidly presented words in English 32.4%</td>
<td>RAN in English 23.0%</td>
<td>RAN in L1 3.6%</td>
</tr>
</tbody>
</table>

Preliminary results – please do not quote
### Stepwise multiple regression analysis, L1 cognitive variables with writing in Finnish as L1

<table>
<thead>
<tr>
<th>4th Grade</th>
<th>Adjusted R Square</th>
<th>% variance</th>
<th>First variable</th>
<th>Second variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.119</td>
<td>12%</td>
<td>Rapidly presented words L1 (.304)</td>
<td>Phoneme deletion L1 (.264)</td>
<td></td>
</tr>
</tbody>
</table>

Preliminary results – please do not quote

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

<table>
<thead>
<tr>
<th>4th Grade</th>
<th>Adjusted R Square</th>
<th>% variance</th>
<th>First variable</th>
<th>Second variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.119</td>
<td>12%</td>
<td>Rapidly presented words L1 58.9%</td>
<td>Phoneme deletion L1 41.1%</td>
<td></td>
</tr>
</tbody>
</table>

Preliminary results – please do not quote
### Stepwise multiple regression analysis, cognitive variables with EFL writing

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

Preliminary results – please do not quote

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

<table>
<thead>
<tr>
<th></th>
<th>Adjusted R Square</th>
<th>% variance</th>
<th>First variable</th>
<th>Second variable</th>
<th>Third variable</th>
<th>Fourth variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>4th Grade</td>
<td>.343</td>
<td>34%</td>
<td>Rapidly presented words L1</td>
<td>Phoneme deletion in English</td>
<td>RAN in English</td>
<td>Common unit L1</td>
</tr>
</tbody>
</table>

Preliminary results – please do not quote
Factor analysis: Cognitive variables

<table>
<thead>
<tr>
<th>Factors</th>
<th>Variables</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Factor 1</strong></td>
<td>List reading in FL &amp; L1</td>
</tr>
<tr>
<td>Speed of lexical retrieval</td>
<td>Rapidly presented words FL &amp; L1</td>
</tr>
<tr>
<td></td>
<td>Rapid automatized naming FL &amp; L1</td>
</tr>
<tr>
<td></td>
<td>Backward digit span FL</td>
</tr>
<tr>
<td></td>
<td>Common unit L1</td>
</tr>
<tr>
<td><strong>Factor 2</strong></td>
<td>Non-word spelling L1</td>
</tr>
<tr>
<td>Processing of unknown linguistic material</td>
<td>Non-word repetition L1</td>
</tr>
<tr>
<td></td>
<td>Non-word reading L1</td>
</tr>
<tr>
<td></td>
<td>Phoneme deletion FL &amp; L1</td>
</tr>
<tr>
<td></td>
<td>Backward digit span FL &amp; L1</td>
</tr>
<tr>
<td></td>
<td>Common unit L1</td>
</tr>
<tr>
<td></td>
<td>Rapidly presented words FL &amp; L1</td>
</tr>
</tbody>
</table>

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
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.

Preliminary results – please do not quote

Thank you for your attention!

To learn more about DIALUKI, please visit our website

www.jyu.fi/dialuki

Preliminary results – please do not quote