Diagnosing foreign language reading proficiency

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Outline

- Diagnosing second / foreign language
- Reading in a second or foreign language
- DIALUKI study (diagnosing reading and writing in a second or foreign language—attempt at operationalising constructs)
  - Inter-disciplinary (see www.jyu.fi/dialuki)
- Preliminary results from different age groups
Diagnosis

- Focus on learners’ strengths and weaknesses; on their prediction, even explanation
- Very under-developed and under-theorised in language testing and teaching
- Diagnosis requires a better understanding of language abilities at a less general level than is currently the case
- Need to define constructs both theoretically and operationally.
  (see Alderson 2005, 2007; Huhta 2008)
Defining constructs – What is reading?

Lower-level processes

• Must be highly automatised for fluent reading
• Rapid and automatic recognition of a large number of words crucial
• Working memory plays a crucial role in low level processes, but also in the interaction of different levels of processes
Higher level processes: main components

A. Text level model of comprehension extracts the meaning the writer is attempting to convey.

B. The situation model of reader interpretation is the synthesis of the reader’s background knowledge with the text model, taking into account the purpose of the reader in reading the text.

C. A set of reading skills and resources under the command of the executive control in working memory (strategies, goals, inferences, background knowledge, comprehension monitoring)
Reading in a second or foreign language (SFL)

Little is known about

- how SFL reading develops
- how to identify strengths and weaknesses
- which abilities contribute most to the development of overall SFL reading performance
- how teachers can best facilitate reading abilities

Preliminary results - please do not quote
Attempts at operationalising constructs
Paves way for more and better diagnostic tests in the future by increasing our understanding of diagnosing L2 reading and writing
DIALUKI – Diagnosing reading and writing in SFL

- Research project 2010–2013: work in progress
- Can different L1 and L2 linguistic measures predict difficulties in SFL R/W?
- How does SFL proficiency in R/W develop in psycholinguistic and linguistic terms?
- Which features or combinations of features characterise different CEFR proficiency levels?
- Cooperation between language testers, other applied linguists and psychologists (L1 reading)
DIALUKI informants

- Finnish-speaking learners of English as FL
  - primary school 4th grade (age 10/11)
  - lower secondary school, 8th grade (age 14/15)
  - gymnasium (academically oriented upper secondary school), 2nd year students (age 17/18)

- Russian-speaking learners of Finnish as SL at beginner and intermediate levels
  - in the primary and lower secondary schools
Three major studies

Study 1 (in 2010): A cross-sectional study with 3 x 200 + 200 students.
- Exploring the value of a range of L1 & L2 measures in predicting L2 reading & writing, in order to select the best predictors for further studies.

Study 2 (in 2011): Several training / experimental studies, each a few weeks in length
- The effects of training on SFL reading and writing
- Using computerized learning games in L1 and L2.
  - Graphogame for diagnosing & treating dyslexia

- The development of literacy skills, and the relationship of this development to the diagnostic measures.
## DIALUKI (Study 1) outline

### INDEPENDENT VARIABLES

- **Cognitive features**
- **Motivation**
- **L2 vocabulary size**
- **Personal and family background**

### DEPENDENT VARIABLES

- L1 reading
- L1 writing
- L2 reading
- L2 writing

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Preliminary results - please do not quote
Dependent variable: reading in English as FL

- Self-assessment / reading in L1 (Finnish)
- Self-assessment / reading in FL (English)
- Spelling in L1 (correcting real L1 words)
- Size of L1 Finnish vocabulary (vocabulary test score)
- Size of FL English vocabulary (vocabulary test score)
- Effectiveness of working memory (backwards digit span score in L1)
- Effectiveness of working memory (backwards digit span score in FL)
- Rapid recognition of words (accuracy of identifying rapidly presented words in L1)
- Rapid recognition of words (accuracy of identifying rapidly presented words in FL)
- Speed of lexical access (speed of reading a list of words in L1)
- Speed of lexical access (speed of naming in L1)
- Speed of lexical access (speed of reading a list of words in FL)
- Speed of lexical access (speed of naming in FL)
- Spelling in L1 (accuracy of spelling non-words in L1)
- Attitude to reading in the free time
- Frequency of reading in English

Reading in FL (English) (DIALANG and Pearson PTE General test score)
Study 1 – dependent variable(s)

Reading in a foreign language (English)
- DIALANG reading test of English (2 levels), 30 items; linked with the CEFR levels
- Pearson Test of English (PTE) General, 24 operational reading items; linked with the CEFR

→ for this study, 20 + 20 best items combined into a measure of reading in English

→ 4th grade: Pearson Test of English for Young Learners

(Writing in English: tasks from PTE General & a Finnish CEFLING study)

(Reading and writing in L1 (Finnish): e.g., PISA reading tests, CEFLING writing tests)
Predictor variables: Cognition / psycholinguisitc measures

- Speed of lexical access (FL)
- Speed of lexical access (L1)
- Rapid recognition of words (accuracy of identifying rapidly presented words in L1)
- Effectiveness of working memory (backward digit span score in L1)

Dependent variables:

- Reading in FL (English)
- Reading in L1 (Finnish)
- Spelling in L1 (= PISA test score)
- Size of L1 Finnish vocabulary (= vocabulary test score)
- Size of FL English vocabulary (= vocabulary test score)
- Attitude to reading in the free time
- Frequency of reading in English

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Preliminary results - please do not quote
## Study 1 – independent / predictor variables

<table>
<thead>
<tr>
<th>Cognitive/psycholinguistic features (constructs)</th>
<th>Cognitive/psycholinguistic measures (operationalizations)</th>
</tr>
</thead>
<tbody>
<tr>
<td>efficiency of working memory (capacity, speed, ...)</td>
<td>backwards digit span task</td>
</tr>
<tr>
<td>efficiency of phonological processing (and of phonological loop) phonological awareness</td>
<td>repetition of non–words in L1 &amp; L2 finding common phonemes in L1 non–words phoneme deletion task in L1 non–words writing heard non–words in L1</td>
</tr>
<tr>
<td>speed of lexical access</td>
<td>rapid recognition of real L1 &amp; L2 words rapid reading a list of real L1 &amp; L2 words</td>
</tr>
<tr>
<td>efficiency of syntactic and semantic processing and awareness</td>
<td>text segmentation task</td>
</tr>
</tbody>
</table>

Administered individually (about 1 hour)

Preliminary results - please do not quote
Backward Digit Span Memory Test in L1 and SFL

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<td>6</td>
<td>9</td>
<td>1</td>
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<td>3</td>
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</table>
Rapid Automatic Naming (colours, letters and numbers)

- In L1 and L2
- Say these as fast and as accurately as you can
Reading as many words as possible in one minute

<table>
<thead>
<tr>
<th>Osio</th>
<th>Vastaus</th>
<th>P.</th>
<th>Osio</th>
<th>Vastaus</th>
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</tbody>
</table>
Reading rapidly presented words

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Preliminary results - please do not quote
Reading rapidly presented words

day
Reading rapidly presented words

%&#
Independent / predictor variables 2 – Linguistic measures

- Reading in FL (English)
  (= DIALANG and Pearson PTE General test score)

- Effectiveness of working memory
  (backward digit span score in L1)

- Effectiveness of working memory
  (backward digit span score in FL)

- Rapid recognition of words
  (accuracy of identifying rapidly presented words in L1)

- Rapid recognition of words
  (accuracy of identifying rapidly presented words in FL)

- Speed of lexical access
  (speed of reading a list of words in L1)

- Speed of lexical access
  (speed of naming in L1)

- Speed of lexical access
  (speed of reading a list of words in FL)

- Speed of lexical access
  (speed of naming in FL)

- Spelling in L1
  (accuracy of spelling non-words in L1)

- Attitude to reading in the free time

- Frequency of reading in English
Study 1 – independent variables 2

Linguistic constructs and their measures

Receptive vocabulary
- FL (Nation / Schmitt et al. Vocabulary Levels test of English)
- L1 (Finnish vocabulary test from DIALANG)

L1 reading
- PISA reading tests
- ALLU test (4th grade)

Spelling (& phonology)
- correcting spelling errors in real L1 words (+writing heard L1 non-words)

Syntax: segmentation task in L1 and FL

Self-assessed reading and writing in L1 and FL

Group tasks (about 3 hours)
Motivation and background variables

- Iwaniec Motivation measure of Instrumentality, Intrinsic Interest, Motivational Intensity, Parental Encouragement, Anxiety, Self-regulation and Self-concept

- Background variables based on questionnaires from PISA and previous research projects
### 8th Grade and Gymnasium compared: 20 overlapping DIALANG items

<table>
<thead>
<tr>
<th>YEAR</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>CEFR Level</th>
<th>Range of CEF Levels</th>
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<tbody>
<tr>
<td>8th Grade</td>
<td>181</td>
<td>6.57</td>
<td>3.167</td>
<td>A2</td>
<td>A1-B2</td>
</tr>
<tr>
<td>Gymnasium</td>
<td>133</td>
<td>12.06</td>
<td>4.253</td>
<td>B1</td>
<td>A1-B2</td>
</tr>
</tbody>
</table>

T = 12.554, p = .000  Mean is significantly higher for the Gymnasium students
## Correlations linguistic and psycholinguistic variables, 8th graders only

<table>
<thead>
<tr>
<th></th>
<th>8th graders</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pearson General + DIALANG (best 20 items from each)</td>
</tr>
<tr>
<td>Self-assessment of reading in Finnish</td>
<td>.137</td>
</tr>
<tr>
<td>Self-assessment of reading in English</td>
<td>.272</td>
</tr>
<tr>
<td>Spelling in Finnish (correcting real words)</td>
<td>.245</td>
</tr>
<tr>
<td>Reading in Finnish (PISA)</td>
<td>.403</td>
</tr>
<tr>
<td>Size of L1 (Finnish) Vocabulary</td>
<td>.282</td>
</tr>
<tr>
<td>Size of L2 (English) Vocabulary</td>
<td>.704</td>
</tr>
<tr>
<td>Attitude to reading in free time</td>
<td>.159</td>
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<tr>
<td>Frequency of reading in English</td>
<td>.337</td>
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</tbody>
</table>

Preliminary results - please do not quote
## Correlations (Pearson) Cognitive variables with EFL Reading

<table>
<thead>
<tr>
<th></th>
<th>4th Graders Pearson Young Learners Test in English - total score</th>
<th>8th graders Pearson General + DIALANG (best 20 items from each, r= 701)</th>
<th>Gymnasium Pearson General + DIALANG (best 20 items from each, r=701)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Backwards digit span in L1 (Finnish) - score</td>
<td>NS</td>
<td>.221</td>
<td>.214</td>
</tr>
<tr>
<td>Backwards digit span in FL (English) - score</td>
<td>.253</td>
<td>.336</td>
<td>.377</td>
</tr>
<tr>
<td>Rapidly presented words in L1 (Finnish)</td>
<td>.359</td>
<td>.211</td>
<td>.207</td>
</tr>
<tr>
<td>Rapidly presented words in FL (English)</td>
<td>.375</td>
<td>.289</td>
<td>.251</td>
</tr>
<tr>
<td>Reading a word list (in one minute) in L1 Finnish - last word reached</td>
<td>.310</td>
<td>.360</td>
<td>NS</td>
</tr>
<tr>
<td>Reading a word list (in one minute) in FL English - last word reached</td>
<td>.234</td>
<td>.363</td>
<td>.180</td>
</tr>
<tr>
<td>Rapid naming of colours, numbers and letters in L1 Finnish - time</td>
<td>NS</td>
<td>- .202</td>
<td>NS</td>
</tr>
<tr>
<td>Rapid naming of colours, numbers and letters in FL English - time</td>
<td>- .367</td>
<td>- .509</td>
<td>NS</td>
</tr>
<tr>
<td>Number of correctly spelled non-words in L1 Finnish</td>
<td>.214</td>
<td>.130</td>
<td>NS</td>
</tr>
</tbody>
</table>
Stepwise multiple regression analysis, cognitive variables

<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>
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<tbody>
<tr>
<td>4th Grade</td>
<td>.192</td>
<td>almost 20%</td>
<td>Rapidly presented words in English (.375)</td>
<td>Rapid naming of colours etc in English (−.367)</td>
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<td>(10–11 years old)</td>
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<tr>
<td>8th Grade</td>
<td>.294</td>
<td>almost 30%</td>
<td>Rapid naming of colours etc in English (.509)</td>
<td>Backward digit span in English (.336)</td>
<td>Rapidly presented words in English (.289)</td>
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<td>(14–15 years old)</td>
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<td>Gymnasium</td>
<td>.166</td>
<td>almost 17%</td>
<td>Backwards digit span in English (.377)</td>
<td>Rapidly presented words in English (.251)</td>
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<td>(17–18 years old)</td>
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# Stepwise multiple regression analysis, linguistic variables

<table>
<thead>
<tr>
<th>Grade</th>
<th>Dependent variable</th>
<th>Adjusted R Squared</th>
<th>% variance</th>
<th>First IV</th>
<th>Second IV</th>
<th>Third IV</th>
</tr>
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<tbody>
<tr>
<td>4th</td>
<td>Pearson Young Learners Test in English</td>
<td>.437</td>
<td>44%</td>
<td>Size of English vocabulary (.662)</td>
<td>L1 Finnish Reading (ALLU) (.399)</td>
<td></td>
</tr>
<tr>
<td>8th</td>
<td>Pearson General + DIALANG Medium</td>
<td>.623</td>
<td>62%</td>
<td>Size of English Vocabulary (.740)</td>
<td>L1 Finnish Reading (PISA) (.403)</td>
<td>Size of Finnish Vocabulary (.282)</td>
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<td>Gymnasium</td>
<td>Pearson General + DIALANG Advanced</td>
<td>.703</td>
<td>70%</td>
<td>English dictation (.780)</td>
<td>Size of English vocabulary (.752)</td>
<td>L1 Finnish Reading (PISA) (.426)</td>
</tr>
</tbody>
</table>

Preliminary results - please do not quote
(Tentative) summary: cognitive variables

- Working memory efficiency
  - Finnish 4 < 8 < Gym
  - English 4 < 8 = Gym (ceiling effect)

- Speed of lexical access
  - Finnish 4 > 8 = Gym (ceiling effect?)
  - English 4 > 8 = Gym (ceiling effect?)
  - But two anomalies (List EN: 8 > 12)
  - (RAN EN: 8 > 4 > Gym)

- Non-word spelling
  - Finnish 4 < 8 < Gym
(Tentative) summary: cognitive variables

Finnish vs. English

- Working memory efficiency
  - Finnish better than English and discriminates better (ceiling effect for English)

- Speed of lexical access
  - Finnish better than English but 8th vs Gym no discrimination (ceiling effect for both)
(Tentative) summary, predictions (cognitive)

Correlations of IV with DV

- Working memory: L2 always better predictor than L1
- Speed of lexical access: L2 always better predictor than L1
  - (except word list, where L2 words were shorter than L1)
- Amount of variance predicted = 20–30%

Preliminary results - please do not quote
Correlations of IV with DV

- Self-assessment reading L2 better predictor than self-assessment reading L1
- Size of L2 vocabulary much better predictor than size of L1 vocabulary
- L1 reading second best predictor for 4th and 8th
- L2 Dictation best predictor for Gym, but....
- Amount of variance predicted varies from 44% – 70%

(Tentative) summary, predictions (linguistic)
(Tentative) conclusions

- Cognitive performances in L1 improve from 4th to 8th to Gym
  - (except where possible ceiling effect)
- Cognitive performances in L2 improve from 4th to 8th but not from 8th to Gym
  - (unless ceiling effect)
(Tentative) conclusions

- Linguistic variables better predictors than cognitive variables
- L2 vocabulary consistently good predictor
- L2 dictation even better for one age group
- The Simple View of Reading = Comprehension + Decoding?
- But the better predictors are more integrated / holistic. So in what sense are they “diagnostic”, rather than simply overlapping?
(Tentative) conclusions

- Databases not yet complete – more cognitive variables to be entered; further linguistic tasks need to be entered (e.g. segmentation task)
- Need to explore more linguistic variables (Structures? Lexical formulae? Morphological processes?) Insights needed from SLA and teachers.
- What about higher level reading processes / strategies?
- More sophisticated analyses needed to examine weaker students contrasted with stronger.
- Current instruments need some refinement
Next steps

- Further analyses of Study 1 Finnish/English data
  - More IVs e.g. the remaining psycholinguistic tasks
  - Similar analyses on writing in a FL (writing as DV)
  - Structural Equation Modelling of the relationships between different IVs and DVs (e.g. path analyses)

- Analyses of Study 1 Russian/Finnish data
  - Same / different results?

- Further analyses of Finnish/English data across the three groups

- Implications for Studies 2 and 3

Preliminary results - please do not quote
Thank you for your attention!

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