Poor reading and second languages

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Herbert Zangs (1976): The anti-reading device
Plan of the Lecture

Outside of a dog, a book is man’s best friend.
Inside of a dog, it’s too dark to read. (Groucho Marx)

• Introduction
• A bit about alphabetic scripts
• What is reading?
• What is SLL?
• Overview of the (scarce) literature
• Some recent research from our lab
• Conclusions
Development of Scripts: From Clay Tablets to iPads

- Without the phonetic alphabet cultures remain tribal... (McLuhan, 1962)
- “Ceci tuera cela” (in the novel Notre-Dame de Paris by Victor Hugo, 1831)
What is (poor) reading?


• Education and the brain: A bridge too far (Bruer, 1997). Learning to see words (Wandell, et al., 2012)

• Genes, cognition and dyslexia: Learning to read the genome (Fisher & Francks, 2006). Speech perception and language acquisition in the first year of life (Gervain & Mehler, 2010).

• Evolutionary and genetic perspectives on educational attainment (Byrne, et al., 2007). Generalist genes and learning disabilities (Plomin & Kovas, 2005)
Theories of Second Language Learning in a Time Line

- Skinner: Behaviourism
- Chomsky: Universal Grammar (LAD)
- Brown: Stages, Morpheme studies
- Krashen: Monitor model
- Ellis: Frequency-based abstraction of regularities (through chunking)
Dyslexia and SLL: What is out there?

- Elbro, Daugaard & Gellert (2012). Dyslexia in a second language? - a dynamic test of reading acquisition may provide a fair answer.
Dyslexia and second language reading: A second bite at the apple?

• SLL aptitude based on phonological, orthographic and syntactic skills in L1
• SLL failure due to L1 deficits
• DPER = Dyslexic preference for English reading
• Difficulty with spoken L1 and/or L2?
• Orthographic compensation?
Dyslexia in English as a second language

- Dyslexia in Norwegian assessed with a Receptive Language test and the dyslexia group (n=20) was median split on Receptive Language in L2

- The two dyslexic groups were then compared with a norm group on expressive language, pragmatics, spelling, reading and translation of L2
Core deficits and variable differences in Dutch poor readers learning English

- Phonological deficit is general, orthographic deficit varies across individuals
- Normals compared with D + good orthographic skills and D + poor orthographic skills (in L2)
- Differences found on vocabulary, semantic fluency, word and text reading in L2 and ortho skills in L1 between D + good and D+ poor ortho
Multilingual dyslexia in university students

- Examined multilingual high performers with and without dyslexia (in Swedish and Finnish) on performance in Finnish, Swedish, and English
- No differences in pseudoword reading
- Differences across the board: text reading fluency and accuracy, chains, dictation and free writing, mainly HP errors in English
Dyslexia in a second language?

• Dynamic reading test: learn 3 new symbols associated with 3 ‘universal’ sounds, ‘read’ two-letter syllables, ‘read’ nonwords with new letters

• ES of dyslexic-nondyslexic effect on dynamic reading ability .08, .30, .40, no native-foreign language learning effects
Recent research I: Cross-linguistic research is comparing apples with pears!

- **Grapheme-Phoneme Transparency**
  - More than one pronunciation: MAT-MATE
  - Spelling reflects meaning: QUAYS-KEYS
  - Context-dependent pronunciations: BROTH-BOTH
  - ‘Odd’ spellings: YACHT, SOAP

- **Syllabic Complexity**
  - Romance languages: open CV structures
  - Germanic languages: consonant clusters (HERFST = autumn)

- **Morphology**
  - Complex, but consistent and transparent: agglutinations
  - Rule learning and word form knowledge: mutations
    GWRAIG (woman) + MAWR (big) =
    Y WRAIG FAWR (the big woman)
The fairest cross-linguistic comparison

• L1: Scandinavia offers a very neat ‘natural’ experiment:
  – Danish has an opaque orthography, whereas Swedish and Norwegian are fairly transparent (Seymour, Aro & Erskine, 2003)
  – Match not only for frequency, but also for word forms: Danish, Swedish and Norwegian share many cognates
  – Very similar linguistic, cultural and educational circumstances

• L2: Transfer of L1 skills to L2 learning
  – Similarity between native language and the second language (Ellis & Beaton, 1993; Geva & Siegel, 2000; Hamada & Koda, 2008; Sparks et al., 2008)

• A different tack (and method) on L1 and L2 learning (stepwise):
  – Mediated by Orthographic Learning, Phonological Memory and Vocabulary (L1, L2)
  – L2 is mostly learnt through the written channel
Could you spell this?


Hypotheses

• For both L1 and L2 Reading, Spelling:
  – $D < S = N$
  – Mediated by Orthographic Learning (and Phonological Memory and Vocabulary)
  – Orthographic Learning develops less efficiently in a deep orthography like Danish. Therefore Danish children are less well equipped for learning the deep English

• Alternative hypothesis for L2 learning:
  – $D \geq S = N$
  – Danish children are used to a noisy system, will compensate with whole-word reading (and possibly partial decoding), which may well work for English
Frequency-balanced cognates

- English Reading aloud and Spelling: 40 words of decreasing frequency
  - never much off ... misgivings semantic discretionary
- Scandinavian Reading aloud and Spelling: 40 cognates of decreasing and balanced frequency
  - D: om vi seg ... bedrageri diskusjoner forfatterskap
  - S: om vi seg ... bedrägeri diskussioner författarskap
  - N: om vi seg ... bedrageri diskusjoner forfatterskap
- Silent Reading
  - E: sandcoffeeblue soundwoodjokefox swanbrightmud
  - D: påfemslåost jahusdagsol tagblivefraom
  - S: påfemslårost jahusdagsol takblifrånom
  - N: påfemslåost jahusdagsol takblifraom
Covariates

L1 Vocabulary

Age Bands
- 9-10 year-olds
- 10-11 year-olds
- 11-12 year-olds

Danes
Swedes & Norwegians
L1 dependent variables

![Graph showing L1 Reading Accuracy across different age bands for Danes and Swedes & Norwegians.](image-url)
L2 dependent variables

L2 Spelling

Age Bands
- 9-10 year-olds
- 10-11 year-olds
- 11-12 year-olds

# Words Spelled Correctly (16)
- Danes
- Swedes & Norwegians
Some more results and conclusion

- **L1 - L2 correlations:**
  - Spelling .69, Silent reading .78, Reading fluency: .80, Reading accuracy .68

- **Covariates - Dependent variables correlations:**
  - Orthographic Learning - Spelling: .52, Silent reading: .60
  - Phonological Memory - Silent reading: .24
  - Vocabulary - Reading accuracy: .33, Spelling: .43, Silent reading: .38

- L2 Reading, Spelling and Vocabulary dependent on L1 proficiency, mediated by Orthographic Learning, Phonological Memory, and Vocabulary

- Trade-off L1 proficiency and Orthographic Depth (grapheme-phoneme transparency/consistency)
Recent research II: Direct assessments

- Behavioural-genetic research on SLL
  - B-G design used to study SLL
- Language learning aptitudes
  - Semantics, Orthography, Phonology
- Language abilities
  - Reading, Writing, Listening, Speaking
- More details on a L2 production task: Cookie Theft
  - Lexical Efficiency, Grammatical Support, Fluency
- Wrap up
  - Are we ready for B-G research?
Principles of behavioural-genetic research

- MZ twins share 100% of their genes
- DZ twins share about 50%
- In twins designs correlations of pairs within MZ samples are compared with correlations of pairs within DZ samples
- If MZ twins are more alike than DZ twins, then high heritability
- If MZ correlations are roughly the same as DZ correlations, then the environment is important
- Multivariate set-up, longitudinal set-up
Behavioural-genetic research on SSL

• 2007 Language Learning Round Table Conference
  – Nick Ellis & Karen Woodman: wish list of direct language assessments

• The first B-G studies on SLA

  – H: ± .65, but E: .13
  – No direct assessments: self-reports and teacher ratings

• 2010/2011 Victor’s Sabbatical Project at NIAS

• Network: **EUROgenials** (genetics in acquisition of languages)
  – France, Italy, Spain, Netherlands, UK, Nordic countries
Language Aptitude Tests

- Orthography
  - Learn the spelling of a novel word
- Phonology
  - Learn the pronunciation of a novel word
- Semantics
  - Learn the meaning of a novel word
Äpplen som importeras av FULP är godast.
<table>
<thead>
<tr>
<th></th>
<th>Test word form:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>24</strong></td>
<td>Spela tennis med en ....racket.</td>
<td>a. TARKS</td>
</tr>
<tr>
<td><strong>25</strong></td>
<td>Äpplen som importeras av ....är godast.</td>
<td>a. FULP</td>
</tr>
<tr>
<td><strong>26</strong></td>
<td>Använd...handskar när du jobbar i trädgården.</td>
<td>a. KIPSER</td>
</tr>
<tr>
<td><strong>27</strong></td>
<td>Lek med ....handdockor.</td>
<td>a. SLAZK</td>
</tr>
</tbody>
</table>
Test meaning:

- FULP?
  - Äppler
  - Racket
  - Handskar
  - Handdockor
Vera describes the picture
Scoring the Cookie Theft task

a. total number of words
b. total number of correct content units
c. total number of correct words within content units
d. total number of correct grammatical endings
e. total silence (in sec)
f. total number of ‘uh’

Index of Lexical Efficiency: a/b
Index of Grammatical Support: (c+d)/b

Speech Rate: a/30, Communication Rate: b/30
Silence Rate: e/30, Hesitation Rate: f/a
Components of L2 speech production

- Lexical Efficiency and Grammatical Support: .29
- Speech Rate and Communication Rate: .79
- Silence Rate and Hesitation Rate: .016

Component Matrix

<table>
<thead>
<tr>
<th>Component</th>
<th>Component 1</th>
<th>Component 2</th>
<th>Component 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lexical Efficiency</td>
<td>-.579</td>
<td>.693</td>
<td>-.126</td>
</tr>
<tr>
<td>Grammatical Support</td>
<td>.167</td>
<td>.855</td>
<td>.255</td>
</tr>
<tr>
<td>Speech Rate</td>
<td>.852</td>
<td>.365</td>
<td>-.113</td>
</tr>
<tr>
<td>Communication Rate</td>
<td>.952</td>
<td>-.196</td>
<td>-.027</td>
</tr>
<tr>
<td>Silence Rate</td>
<td>-.540</td>
<td>-.181</td>
<td>.727</td>
</tr>
<tr>
<td>Hesitation Rate</td>
<td>-.623</td>
<td>-.059</td>
<td>-.640</td>
</tr>
</tbody>
</table>

Extraction Method: Principal Component Analysis.

a. 3 components extracted.
Are we ready for B-G research on SLL?

- Yes, we can now directly assess the performance of the students
- We need to work on an efficient protocol of data collection
- We need to start thinking about different language combinations and about effects of different educational systems/teaching methods
- A plausible hypothesis?
  - aptitudes are highly heritable, whereas abilities depend on environments
  - do genes seek their environments?
General Conclusions

• Not much research to date with rigid methodology and appropriate statistics

• Language aptitudes and abilities may well be multi-faceted

• Therefore, much more and better research is needed
• http://www.youtube.com/watch?v=s-mOy8VUEBk

Thank you!