A Connectionist Illustration of Pre-literate Adult Immigrants’ Language Acquisition

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Aim of the presentation

- Teachers report poor language acquisition in pre-literate adults

- This presentation will
  - Introduce a connectionist reading model to explain this
  - Discuss educational implications
Structure of the presentation

Reading theory: Connectionism
Cross-language comparisons
Research
Educational implications
Time for discussion?
Reading process

Reading comprehension hierarchy:

Top: Conceptual knowledge
- the world in general
- textual framework
- semantics
- idiomatic constructions
- syntax
- word class
- (inner) lexicon
- morphology

Bottom: Linguistic knowledge
- orthography and phonology
Word recognition

Dual Route Theory

- meaning
- phonological processing
- orthographic decoding
- phonological decoding
- Letter detection
- Visual input

Connectionism

- meaning
- orthography
- phonology
- hidden units
- visual input
- articulated output

Venezky (1970)

Seidenberg (1992)
Connectionist model of the reading process

- **Textual expectations**: context and schemas
- **Linguistic competences**: vocabulary, syntax, etc.
- **Orthography**
- **Phonology**
- **Letter detector system**

**Meaning**

Reading theory: Connectionism
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Reading in different languages (dual route)

- **Orthographic depth hypothesis**

<table>
<thead>
<tr>
<th>Shallow orthography</th>
<th>Deep orthography</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serbo-Croatian</td>
<td>English</td>
</tr>
<tr>
<td>German</td>
<td>Danish</td>
</tr>
</tbody>
</table>

*One-to-one correspondence between grapheme and phoneme*

*More complex connections between grapheme and phoneme*
Arabic script

القراءة باللغة العربية
القراءة باللغة العربية
Arabic script

Det arabiske alfabet

Det arabiske vokaliseringssystem

Øvrige arabiske diakritiske tegn og bogstaver
# Arabic letter architecture

- **Roman minuscules**

<table>
<thead>
<tr>
<th>Envelope</th>
<th>Letters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vertical lines</td>
<td>n, m, u</td>
</tr>
<tr>
<td>Triangular</td>
<td>r, v, w</td>
</tr>
<tr>
<td>Rectangular</td>
<td>a, s, z, x</td>
</tr>
<tr>
<td>Circular</td>
<td>e, o, c</td>
</tr>
<tr>
<td>Up - wide</td>
<td>d, h, k, b</td>
</tr>
<tr>
<td>Up - narrow</td>
<td>t, i, l, f</td>
</tr>
<tr>
<td>Down</td>
<td>g, p, j, y, q</td>
</tr>
</tbody>
</table>

- **Arabic medials**

<table>
<thead>
<tr>
<th>Envelope</th>
<th>Identical base</th>
<th>Others</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vertical line</td>
<td></td>
<td>ل</td>
</tr>
<tr>
<td>Triangular</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diagonal/open curve</td>
<td></td>
<td>ك</td>
</tr>
<tr>
<td>Closed curve</td>
<td></td>
<td>ه</td>
</tr>
<tr>
<td>Up - wide</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drop</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Under the line</td>
<td></td>
<td>و</td>
</tr>
<tr>
<td>On the line</td>
<td></td>
<td>ل</td>
</tr>
</tbody>
</table>

Bouma (1971)
# Arabic morphology

<table>
<thead>
<tr>
<th>الجذر</th>
<th>الفعل</th>
<th>اسم الفاعل</th>
<th>اسم المكان</th>
</tr>
</thead>
<tbody>
<tr>
<td>لَكَتَبْ</td>
<td>[کَتَبَ]</td>
<td>[کاتِبِ]</td>
<td>[مکتَب]</td>
</tr>
<tr>
<td>(he wrote)</td>
<td>(writer)</td>
<td>(office)</td>
<td></td>
</tr>
<tr>
<td>شَهَدَ</td>
<td>[شَهِدَ]</td>
<td>[شَهَدِ]</td>
<td>[مِشَهَد]</td>
</tr>
<tr>
<td>(he looked)</td>
<td>(spectator/witness)</td>
<td>(view)</td>
<td></td>
</tr>
<tr>
<td>عَمَلَ</td>
<td>[عَمَلَ]</td>
<td>[عَمَلِ]</td>
<td>[مَعْمَل]</td>
</tr>
<tr>
<td>(he worked)</td>
<td>(worker)</td>
<td>(factory)</td>
<td></td>
</tr>
</tbody>
</table>
Arabic morphology

- Some Arabic words from the root كتاب (k-t-b)
  - كتاب (k-t-b) [he] wrote
  - كتاب (k-t-a-b) book
  - مكتب (m-k-t-b) office
  - مكتبة (m-k-t-b-t*) library

- Example of homographic vocabulary in Arabic
  -أكل ('-k-l) ate
  -أكل ('-k-l) feed
  -أكل ('-k-l) was eaten
  -أكل ('-k-l) food
Word recognition in English and Arabic

Comparison between the Arabic and the Roman alphabets:

- Letter forms more similar in Arabic
- Letter forms activate different scanning strategies
- Short vowels omitted in Arabic:
  - Reduced phonological representation
  - Many homographs
  - Readers rely on other resources:
    - Context
    - Experience with combinations of roots and patterns
Word recognition in English and Arabic

- Decoding strategies that don’t work in Arabic:
  - Experience with letter clusters and syllables:
    - **English:** ’dr’: well-known letter constellation = part of syllable
      ’dn’: indicates break between syllables (e.g. midnight)
    - **Arabic:** ’dr’: dar / dur / dir / dr
      ’dn’: dan / dun / din / dn

- Processing of bigrams and trigrams:
  - **English:** ’dur’: _du → dur → ur_
  - **Arabic:** ’dr’: dar / dur / dir / dr
Word recognition in English and Arabic

- Decoding strategies that don’t work in Arabic:
  - Neighbour-frequency effect:
    - Word frequency: High-frequency words are recognised faster than low-frequency words
    - Regularity effect: Regularly spelled words are recognised faster than irregularly spelled words
    - Neighbour-frequency effect:
      - Regular (high-frequency) ’neighbours’ are recognised faster:
        Ex: gave – save
      - For irregular (low-frequency) ’neighbours’ this effect is negative:
        Ex: gave – save – have
Word recognition in English and Arabic

- Decoding strategies that don’t work in Arabic:
  - Holistic word processing:

This example shows that when you read familiar words, it is not important that all letters are in the right place. If only the first and the last letters are in the right positions, it might look strange, but we will still be able to read it.
Word recognition in English and Arabic

- Word recognition in Arabic relies on knowledge of roots and patterns.

  - In English (and other Indo-European languages):
    - Pseudo-word: kvir flas (word-like)
    - Non-wordord: ikvr lfsa (not word-like)

  *Word-likeliness is determined by phono-and grapho-tactic constraints*

  - In Arabic (and other Semitic languages):

  *Word-likeliness is not dependent of letter constellations.*
  *In stead, it depends on whether the patterns are valid or not.*
Connectionist model of the reading process

Reading theory: Connectionism
Cross-language comparisons
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Research

- Children’s first reading acquisition in L1: 
  Plenty of research

- Reading acquisition in L2: 
  Some research, but we need much more…

- Adults’ First reading acquisition in L2: 
  We practically don’t know anything yet...

However:

Existing research supports the connectionist reading model: 
Inseparable connections between language and reading
Research: beginning readers

- Parallels in phonological awareness between pre-reading children and pre-literate adults:
  - Exclusion of a word’s initial consonant, e.g.:
    'tax' ÷ /t/ = /ax/
  - Addition of initial consonant, e.g.:
    /t/ + ’ax’ = /tax/
  - Naming words beginning with a specific phoneme, e.g.:
    /t/ => ‘tax’, etc....
Research: beginning readers

- Similar parallels at higher levels of the reading comprehension hierarchy:
  - Morphological and morpho-syntactic awareness, e.g.: combinations of word’s roots and conjugation patterns.
  - Semantic and ”visuo-lexical” awareness, e.g.: what is a word? Word length, repetition of pseudo-words, etc.
  - General understanding of script as a graphical representation of spoken language
Reading and cognition

- Reading changes "the architecture of the brain"
  - Short term memory is strengthened by reading e.g.: repetition of pseudo-words
  - Vocabulary and comprehension of abstract concepts are often developed through reading
  - Reading develops our general linguistic competences and expands our knowledge of the world:

More knowledge and better general linguistic competences => better reading
Reading => More knowledge and better general language competences
Adult pre-literacy: A multi-dimensional problem:

- Shortcomings in meta-linguistic awareness and linguistic abstractions at many levels:
  - Phonological and morpho-syntactic awareness
  - Awareness of written words as representations of spoken language
  - Knowledge of formal structures in written language
  - Strategic and sociolinguistic competences (e.g. discourses) and general understanding of the social practice of written language: *Who writes what to whom in which institutional/organisational/political contexts - and why?*
Adult pre-literacy: A multi-dimensional problem:

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Educational implications

- Should we just forget about reading skills and teach only spoken language?
- Connections between reading and general language skills
- Reading develops our ability to comprehend linguistic (and possibly other forms of) abstractions.
- Written language is an access point to new knowledge and intellectual development
- No or poor reading skills = “social disability”
Educational implications

- Conclusions:
  - A: L2 as a means of integration into society/work force
  - B: L2 as a general educational project

  *Reading acquisition should be an educational objective regardless of the political objective (?)*

- A: Use of L1 in L2-instruction works for LESL learners
- B: Reading acquisition requires a linguistic basis

  *Theoretically, there seems to be reason to teach pre-literate adults to read in L1 (?)*
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Literature


شكرًا على إهتمامكم

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