Week 15.1

Bilingualism and cognitive functions

12/3/2018
Roadmap

• Bilingualism and cognition
• Individual differences in bilingualism
• Individual differences in cognition
• Cognitive styles
  ➢ Field-dependence/independence
  ➢ Reflectivity/Impulsivity
• Cognitive aging
Learning objectives

1. What can the study of bilingualism tell us about cognition?
2. What are the debates in bilingualism?
3. What are the benefits of being bilingual?
4. What may cause individual differences in bilingualism? And in cognition?
5. What is cognitive style?
6. How are field-dependence and impulsivity tested?
7. What are some factors contributing to cognitive aging?
Bilingualism

• What can bilingualism tell us about our mind?
  ➢ Representation of concepts
  ➢ Competition vs. Facilitation
  ➢ Memory
  ➢ Perception

• Monolinguals vs. Bilinguals vs. Trilinguals. vs. Quadrilinguals...
Bilingualism

When balanced become unbalanced...

• Cognitive/internal factors
  ➢ Frequency of use
  ➢ Similarity between two languages
  ➢ The more similar the better?
Bilingualism

When balanced become unbalanced...

- Social/external factors
  - Parents’ attitude
  - Peer influence
  - Social attitude
Bilingualism

Debates:

• Two or one unified mental lexicon?

➤ What is *mental lexicon*?

• Two lexicons but one conceptual representation?

• Critical period hypothesis

• Bilingualism and cognitive functions
Bilingualism

Defines in terms of proficiency
• Dominant bilinguals
• Balanced bilinguals

Defined in terms of time of acquisition
• Early bilinguals
• Late bilinguals
Hierarchical model of bilingual memory (Kroll & Stewart 1994)
Bilingual lexicosemantic organization (Duyck & Brysbaert 2007)
Bilingualism and cognition

Benefits of being bilingual?

• Metalinguistic awareness
• Better inhibitory control
• Better performance in cognitive tasks
Bilingualism and cognition

Benefits of being bilingual?

Krizman et al. (2012)
Bilingualism and cognition

Benefits of being bilingual?

Krizman et al. (2012)
Bilingualism and cognition

Inhibitory control (Bialystok et al. 2004)

- Simon Task
  - Ss see a dot on the screen each time.
  - The dot on either left or right edge.
  - If Red dot, press their right-hand key.
  - If Blue dot, press their left-hand key.
  - Two conditions:
    - Congruent: red dot on right edge.
    - Incongruent: red dot on left edge.
Bilingualism and cognition

Table 2
Mean Accuracy and Reaction Time (RT; in Milliseconds) by Age and Language Group in Study 1

<table>
<thead>
<tr>
<th>Age and language group</th>
<th>Congruent</th>
<th>Incongruent</th>
<th></th>
<th></th>
<th>Simon effect</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Accuracy (%)</td>
<td>RT (in ms)</td>
<td>Accuracy (%)</td>
<td>RT (in ms)</td>
<td></td>
</tr>
<tr>
<td>Younger</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monolingual</td>
<td>100</td>
<td>770 (132.8)</td>
<td>86.4</td>
<td>1,304 (273.0)</td>
<td>535 (231.2)</td>
</tr>
<tr>
<td>Bilingual</td>
<td>100</td>
<td>497 (252.5)</td>
<td>97.1</td>
<td>536 (273.0)</td>
<td>40 (32.2)</td>
</tr>
<tr>
<td>Older</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monolingual</td>
<td>99.2</td>
<td>1,437 (560.6)</td>
<td>72.1</td>
<td>3,150 (1,309.6)</td>
<td>1,713 (971.7)</td>
</tr>
<tr>
<td>Bilingual</td>
<td>100</td>
<td>911 (374.2)</td>
<td>100</td>
<td>1,659 (1,151.0)</td>
<td>748 (806.6)</td>
</tr>
</tbody>
</table>

Note. Standard deviations are in parentheses.
Bilingualism and cognition

Why bilinguals show better inhibitory control?

• Suppress L1-based processing
• Attention shift
• Switch of language mode
Individual differences in bilingualism

• Age of acquisition

• Cognitive abilities
  ➢ Memory
  ➢ Attention
  ➢ Executive function
Individual differences in cognition

- Cognitive abilities and intelligence
- Cognitive styles
- Cognitive aging
Cognitive styles

• What style do you have?

• Personality

• Motivation

→ Can be influenced by external factors (e.g., substance use)
Cognitive styles

- Field-dependent vs. Field independent

⇒ External vs. Internal

⇒ Dependent vs. Autonomous
Cognitive styles

• Field-dependence/independence

Embedded Figure Test (EFT)
Cognitive styles

- Field-dependence/independence
- Block design task
Cognitive styles

• Field-dependence/independence

Block design task
Cognitive styles

- Field-dependence/independence

Block design task

Solid line: Autism group
Dashed line: learning disability group
Cognitive styles

- **Field-dependence/independence**
  - Weak central coherence
  - Better at extracting the embedded picture
  - ”Detail-focused”
  - Found in Autism Spectrum Disorder
Cognitive styles

• Reflectivity/Impulsivity Matching Familiar Figure Test

https://goo.gl/SJN4p4
Cognitive styles

• Reflectivity/Impulsivity Matching Familiar Figure Test

• Does it only measure reflectivity and impulsivity?

• What else does it measure?
Cognitive styles

- Reflectivity/Impulsivity

Matching Familiar Figure Test

<table>
<thead>
<tr>
<th></th>
<th>MDMA (n=19, ♂)</th>
<th>Cannabis (n=19, ♂)</th>
<th>Controls (n=19, ♂)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Σ errors (number)</td>
<td>8.16 (4.09)</td>
<td>5.95 (4.36)</td>
<td>6.47 (4.23)</td>
</tr>
<tr>
<td>Mean latency to first response (s)</td>
<td>49.5 (19.3)</td>
<td>53.3 (21.7)</td>
<td>60.5 (29.9)</td>
</tr>
<tr>
<td>Impulsivity score (z-score)</td>
<td>0.76 (1.43)</td>
<td>0.12 (1.49)</td>
<td>0.00 (1.77)</td>
</tr>
<tr>
<td>Efficiency score (z-score)</td>
<td>−0.03 (0.82)</td>
<td>0.36 (0.99)</td>
<td>0.00 (0.93)</td>
</tr>
</tbody>
</table>
Cognitive styles

- Reflectivity/Impulsivity

Matching Familiar Figure Test

⇒ What else can it test for?

⇒ Attention Deficit/Hyperactivity Disorder
Cognitive aging

https://goo.gl/vU9BD9
Cognitive aging

• Everyone follows the same pattern of cognitive decline?

• What may contribute to cognitive aging?
Cognitive aging

• What may contribute to individual diff. in cognitive aging?

To name just a few:

- Living environment
- Stimulus
- Education
- Health history
- Cognitive style