The effects of language learning on brain, mind & health

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A strange medical condition…

- **Epidemiology:**
  - originally rare, now becoming an epidemic in Anglosaxon world

- **Bad news:**
  - Causes cognitive deficits (e.g. executive functions)
  - Accelerates cognitive ageing and the onset of dementia
  - Leads to more severe cognitive deficits after stroke

- **Good news:**
  - It is reversible if recognised & properly treated

=> **Monolingualism**
In the beginning…

- Early & late multilingualism common in hunters-gatherers
- Linguistic exogamy

=> Not only…

- **Bilingüisme biberoné**

But also…

- Different ages of acquisition
- Different levels of proficiency
- Specific contexts of use
- Shifting patterns over lifetime

“Healthy linguistic diet”
But doesn’t learning/using multiple languages take valuable time/space & divert resources?

Limited resources models

- Competition between different components
- Confusion

Vs.

Added value models

- Beneficial interaction between components
- Mutual reinforcement

Mehmedbegovic & Bak, 2017
Bilingualism & cognitive processes

- **Exposure to different languages**
  - => metalinguistic knowledge (spoken & written language)

- **Language switching/mixing person/context dependent:**
  - => theory of mind, perspective taking, social cognition

- **Simultaneous activation of different languages:**
  - => executive/attentional control mechanisms, switching

But bilingualism has also its price => slower lexical access
Vega-Mendoza et al, *Cognition* 2015

- 98 Edinburgh University students:
  - Early childhood bilinguals better on switching
  - Late childhood/early adulthood bilinguals better on inhibition

- 197 Edinburgh students:
  - Languages vs. Humanities

- Year 1 (initial):
  - No difference in switching

- Year 4 (final) year:
  - Significant difference in switching
Similar effects after an intensive language course?

33 participants vs. 34 controls (active & passive)

Improvement in switching after one week (in all age groups)

Lasting 9 month later in those who practice >5hr/week

The magic of Skye? Current study:
- Non-residential course (Edinburgh)
- Turkish & Norwegian vs. BSL
Bak et al 2014, *Annals of Neurology*

- Lothian Birth Cohort 1936:
  - First assessment in 1947
  - Re-assessments since 2006

- Performance age 11 predicts performance age 70+

- Bilingualism questionnaire:
  - 262/853 “able to communicate in L2”

- Effects of bilingualism on certain cognitive functions independent of childhood IQ
Bialystok et al 2007, Toronto

Bilingualism in Hyderabad:
- Frequent (c. 60%) for centuries
- Not associated with immigration

Excellent clinical services:
- Multilingual tests & multilingual staff

Results in 648 patients (60% bilingual)
- 4 years delay
- 6y. in illiterates!, n > 150

- 608 stroke patients (58% bilingual)

- Difference in *lifestyle/risk factors* => *later age of stroke*

- Difference in *cognitive reserve* => *different outcome*

- Results: age at stroke: 56 vs. 56.5 years

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Monolingual:</th>
<th>Bilingual:</th>
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<tbody>
<tr>
<td>Normal cognition</td>
<td>19.6%</td>
<td>40.4%</td>
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<tr>
<td>Vasc Dementia/MCI</td>
<td>68.7%</td>
<td>49.0%</td>
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Ramakrishnan et al, *Dementia* 2017

- 115 patients
  - with Mild Cognitive Impairment (MCI)
  - different educational background

- Bilingualism-related delay: 7.4 years
  - vs.

- Education-related delay: 3.5 years

- Conflicting evidence re education & dementia:
  - Years of education only a crude measure
  - Education outside school
  - Confounding variables
Gaelic/English bilinguals:
- Childhood: Gaelic at home, English at school
- Middle life: work dominated by English
- Later life: active vs. non-active bilinguals

Active bilinguals:
- Better on switching
- Slower retrieving words

Non-active bilinguals in the middle
Bilingualism: devil’s work or panacea?
“Beyond a simple yes and no” Bak 2015
Confounding variables & conflicting results

Finding a path in the forest of conflicting variables
Cooking pasta in La Paz: bilingualism, bias & the replication crisis.

Bak, *Linguistic Approaches to Bilingualism*, 2016

Methodological factors:
- Tests & measurements
- Analysis & interpretation

Social factors:
- Immigration, socio-economic status, education
- Beliefs & attitudes
Bak & Mehmedbegovic
Healthy Linguistic Diet
Languages, Society & Policy 2017

Mehmedbegovic & Bak
Towards an interdisciplinary lifetime approach to multilingualism: from implicit assumption to current evidence.
European Journal of Language Policy, 2017