

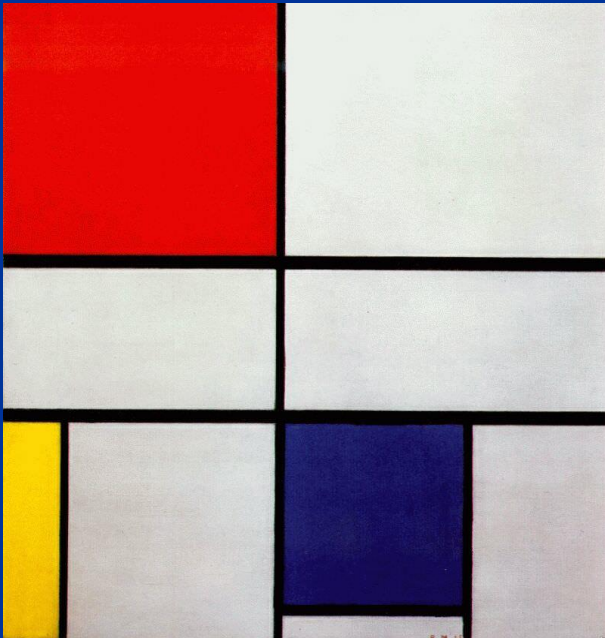
Bilingualism & executive functions: an interdisciplinary approach
CUNY, 18-20 May 2015

**The influence of bilingualism
on cognitive aging & dementia:
Competence, communication & context**

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Two cultures...



Bilingualism, executive functions & dementia *in an ideal world*

Bilingualism ->

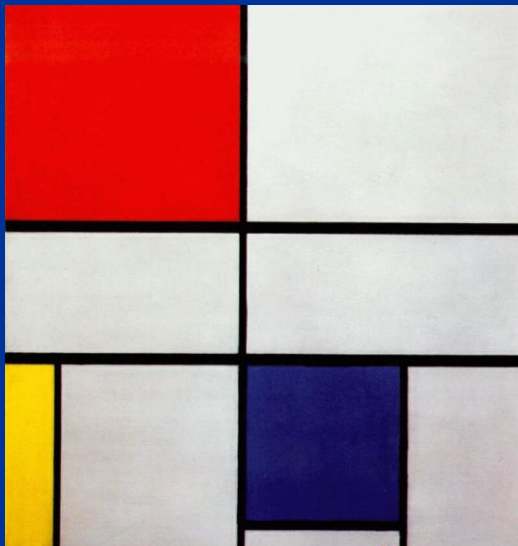
- early
- simultaneous
- balanced

Executive functions ->

- specific functions
- specific tests
- “task purity”

Brain lesions

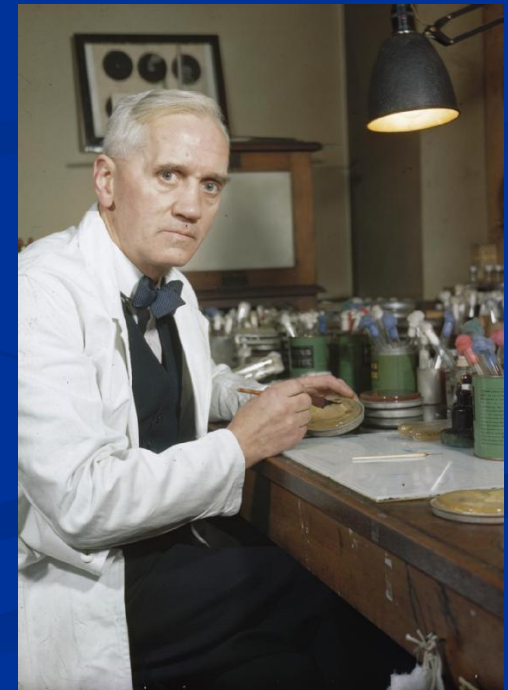
- specific lesion
- specific effect





Medicine is messy: *from monocausal infections to modern polymorbidity*

- Interaction of different pathological mechanisms:
 - Neurodegeneration, inflammation, infection
 - Genetic & environmental
- Interplay of:
 - Risk factors (hypertension, diabetes etc)
 - Protective factors (diet, exercise etc)
- Theories often follow empirical findings



Bilingualism, executive functions & dementia *in the real world*

Bilingualism ->

- AoA
- Proficiency
- Dominance
- Use**
- Social context

Executive functions ->

- many functions
- partly independent
- interacting with other functions (e.g. memory)

Brain lesions

- Dementias
- AD, VascDem
- FTD subtypes
- Mixed pathology

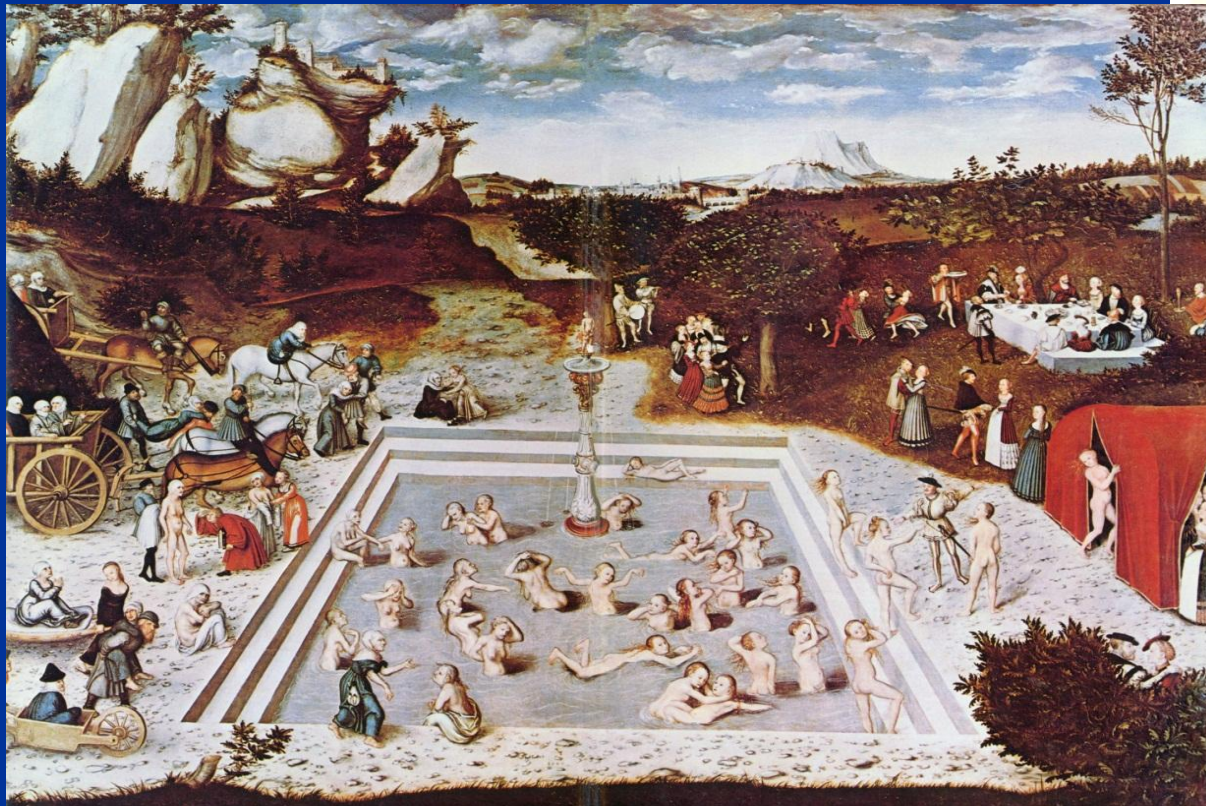
=> Different studies are bound to produce different results:

- Depending on subjects, diseases, measures, environment etc

■ *Medicine as an exercise in humbleness*

Bad news first...

Bilingualism \neq immortality
(or the fountain of youth)



JUAN PONCE DE LEÓN



People Who Are Bilingual Are Smart, Creative And Better Lovers



35k
SHARES



... good news second

No need to throw out the baby with the bathwater:

*Not everything written on bilingualism & cognition
is complete rubbish*

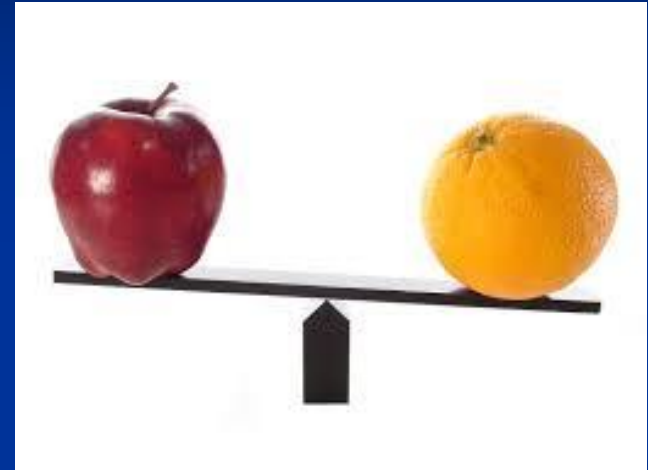


Factors influencing results of bilingualism studies



■ Within the bilinguals:

- Age of acquisition
- Proficiency
- Patterns of use



■ Mono vs bilinguals:

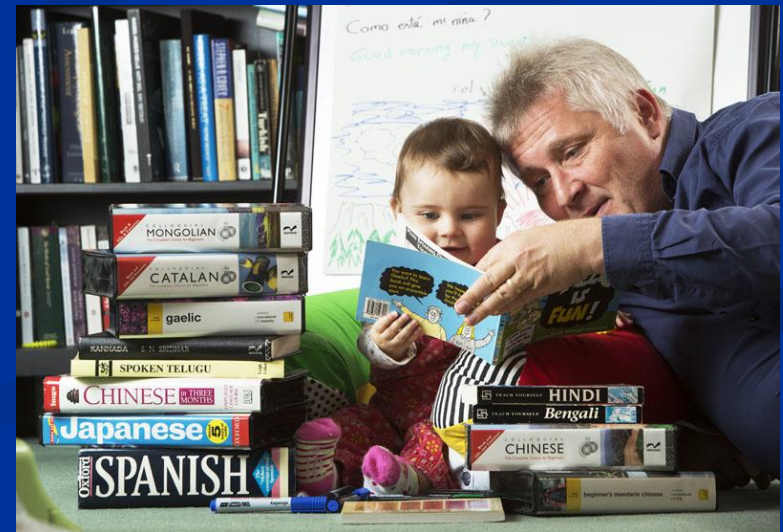
- Immigration
- Education, SES, lifestyle
- Intelligence

Types of bilingualism...



Bilingualism of a non-ideal speaker, who...

- Missed all the critical periods
- Has never reached perfection
- Is not perfectly balanced
 - Domain-specific language use
- *It works in everyday life*
- => cognitive implications?



Vega-Mendoza, Sorace & Bak, *Cognition* 2015

- 197 Edinburgh students:

- Languages
- Humanities

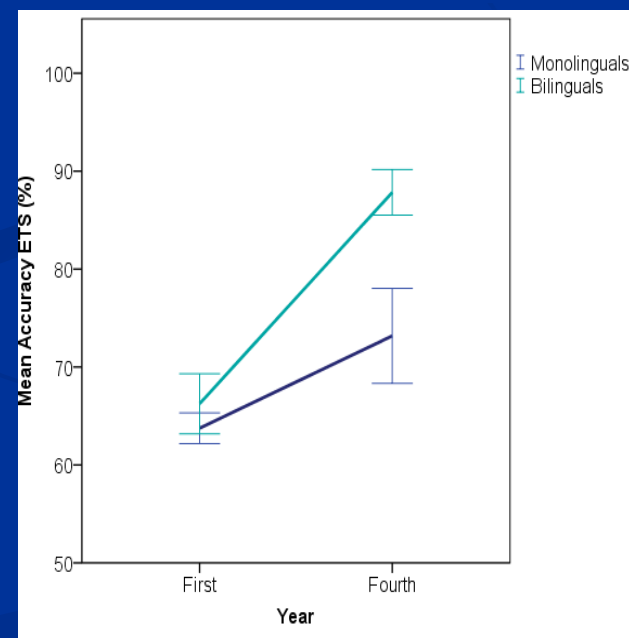


- Year 1 (initial):

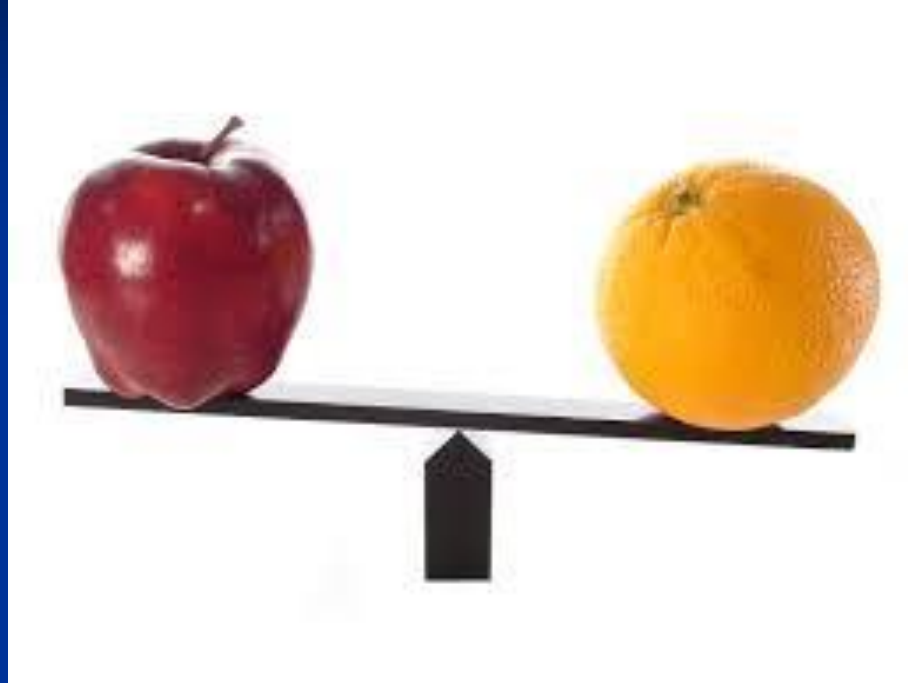
- No difference in switching

- Year 4 (final) year:

- Significant difference in switching



Confounding (or rather interacting) variables



A variable unevenly distributed between mono- & bilinguals:

- can produce “bilingualism effects” where they do not exist
- can mask existing differences, where they do exist

Immigration

- “Healthy migrant effect”
 - *Into the second generation?*
- Traumatic experiences
- Socioeconomic disadvantages
- Increased risk of psychiatric diseases
- Immigration can be associated with mono- & bilingualism



Bilingualism & dementia: why Hyderabad?

- Bilingualism is:
 - Frequent (c. 60%)
 - Established for centuries
 - Telugu, Dakkhini, Hindi, English
- NOT associated with:
 - Immigration or ethnic status
- Excellent clinical services:
 - Interdisciplinary dementia clinic
 - Standardised tests in local languages
 - Multilingual staff



Alladi, Bak et al (*Neurology* 2013)



- 648 patients
- Ca. 60% bilingual
- Defined through
 - Ability to communicate
- Bilinguals develop dementia 4 y. later than monolinguals
- Biggest effect in $FTD > AD > VascD > DLB$
- No additional effects of more than two languages

How to deal with conflicting evidence?

Option I

“I am right and you are wrong” approach

How to deal with conflicting evidence?

Option II

*“Mea culpa, mea culpa,
mea maxima culpa”*



It would be unfair to close with the impression that the malpractices discussed here are the private domain of psychology. A few minutes of browsing through experimental journals in biology, chemistry, medicine, physiology, or sociology show that the same usages are widespread throughout the sciences” (Theodore Sterling 1959).

Looking for a nice place in the British Isles...

- Edinburgh: 704.3 mm
- New York: 1268.5mm
- De Bruin et al (n=104):
 - 63% vs. 36%
- Easterbrook et al (n=487):
 - 68% vs. 7%



Freedman, Bialystok, Chertkow, ..., Alladi, Bak (*Behavioural Neurology* 2014)



- **Montréal:** effects of multilingualism (*Chertkow 2010*)
- **Tel-Aviv:** relationship between cognition & the number of languages (*Kave 2008*)
- **Hyderabad:** no additional effect of multilingualism
- *Different sociolinguistic context?*
- *Relationship between multilingualism & switching?*

Mortimer vs. Alladi, Bak et al, *Neurology* 2014:

- Prof. Mortimer/Florida: could the bilingual delay be due to a lower mortality in the bilingual group ?
- “Why rural dwelling does not matter, but the type of dementia does - a response to Mortimer”
- Different types of dementia have a different average *Age of Presentation (AoP)*:
 - $FTD < VaD < AD < DLB$
- Bilingual advantage:
 - $FTD > VaD > AD > DLB$



EDUCATION

Iyer, Alladi, Bak 2014, Dementia & Neuropsychologia

- Western World:
 - Bilingualism - Higher education
 - Lower education – deprivation
- But in India:
 - languages learned not primarily at school...
 - ...but on the street
- > 150 illiterates (not deprived)
- 6 years later onset in bilinguals
- Are they brighter to start with?



Bilingualism & Ageing – chicken & egg

- *Multilingualism*
- \Rightarrow *better cognition*

OR

- *Better cognition*
- \Rightarrow *Multilingualism*



Scottish Mental Survey 1947

THE SCOTTISH COUNCIL FOR RESEARCH IN EDUCATION

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THE TREND OF SCOTTISH INTELLIGENCE

A COMPARISON OF THE
1947 AND 1932 SURVEYS OF THE INTELLIGENCE
OF ELEVEN-YEAR-OLD PUPILS

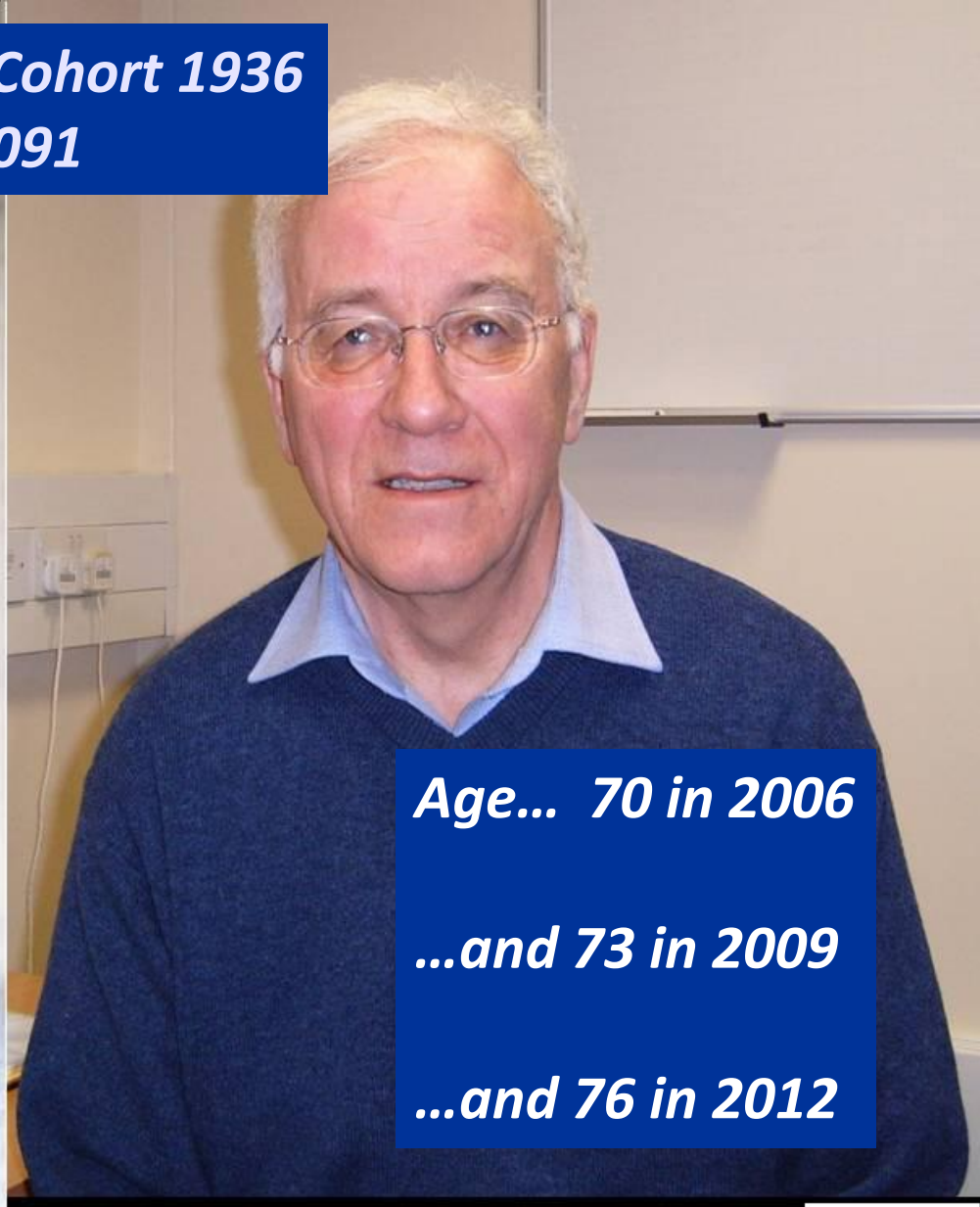
LBC
1936



Lothian Birth Cohort 1936
N = 1091



Age 11 in 1947



Age... 70 in 2006

...and 73 in 2009

...and 76 in 2012

Deary et al. (2007) BMC Geriatrics, 7, 28.

Deary et al. (2012) International Journal of Epidemiology, 41, 1576-1584.

LBC
1936

LBC 1936 & bilingualism

- Homogeneous ethnically and culturally
- Most still living in or close to Edinburgh
- 13 participants born outside UK of Scottish parents:
 - The whole analysis done with them included & excluded -> no difference
- Bilingualism questionnaire:
 - 262 participants reported “ability to communicate in L2”
 - 170 use only English, 90 use also another language in daily life

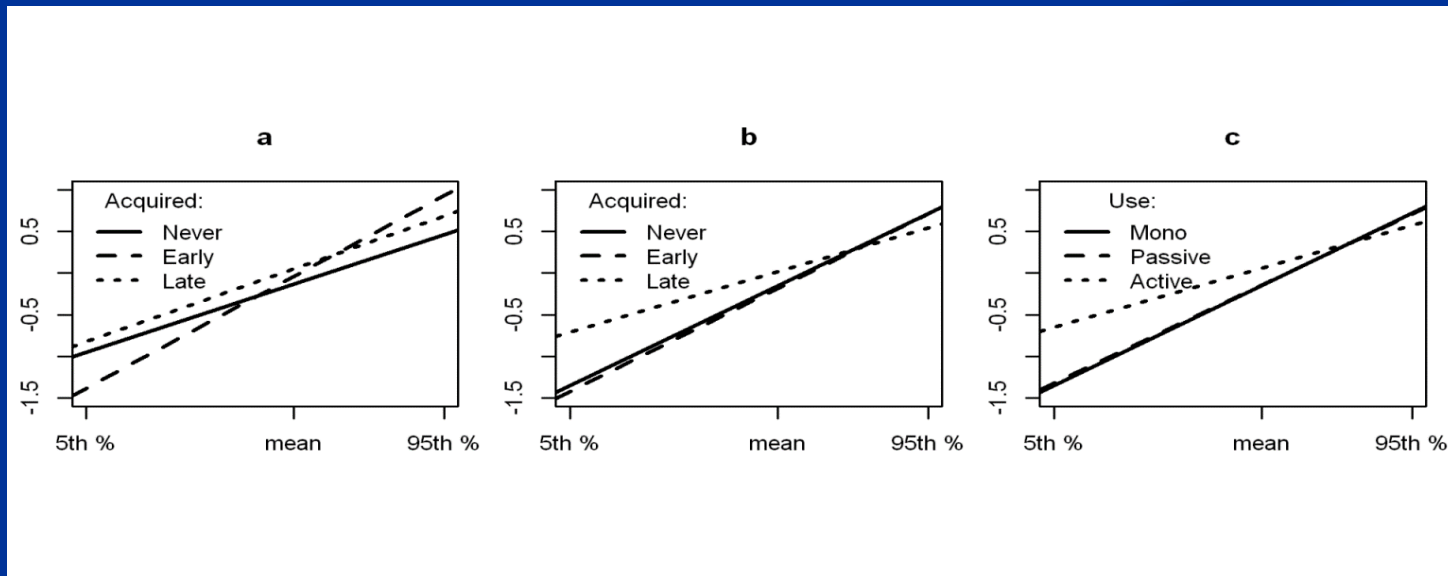


Bak, Nissan, Allerhand & Deary

Annals of Neurology, 2014

The influence of bilingualism on cognitive performance, taking into account baseline IQ:

- Strongest influence on general intelligence & reading
- Less on verbal fluency, little on speed, memory & MHT





Summary



- **Conflicting evidence** is **the natural state of healthy science**; diverging findings can give valuable clues
- Bilingualism **influences** cognitive functions, **interacting** with other variables, from genetics to social environment
- The topic of bilingualism is best interpreted in the broader context of *mental activity, neuroplasticity & cognitive reserve*