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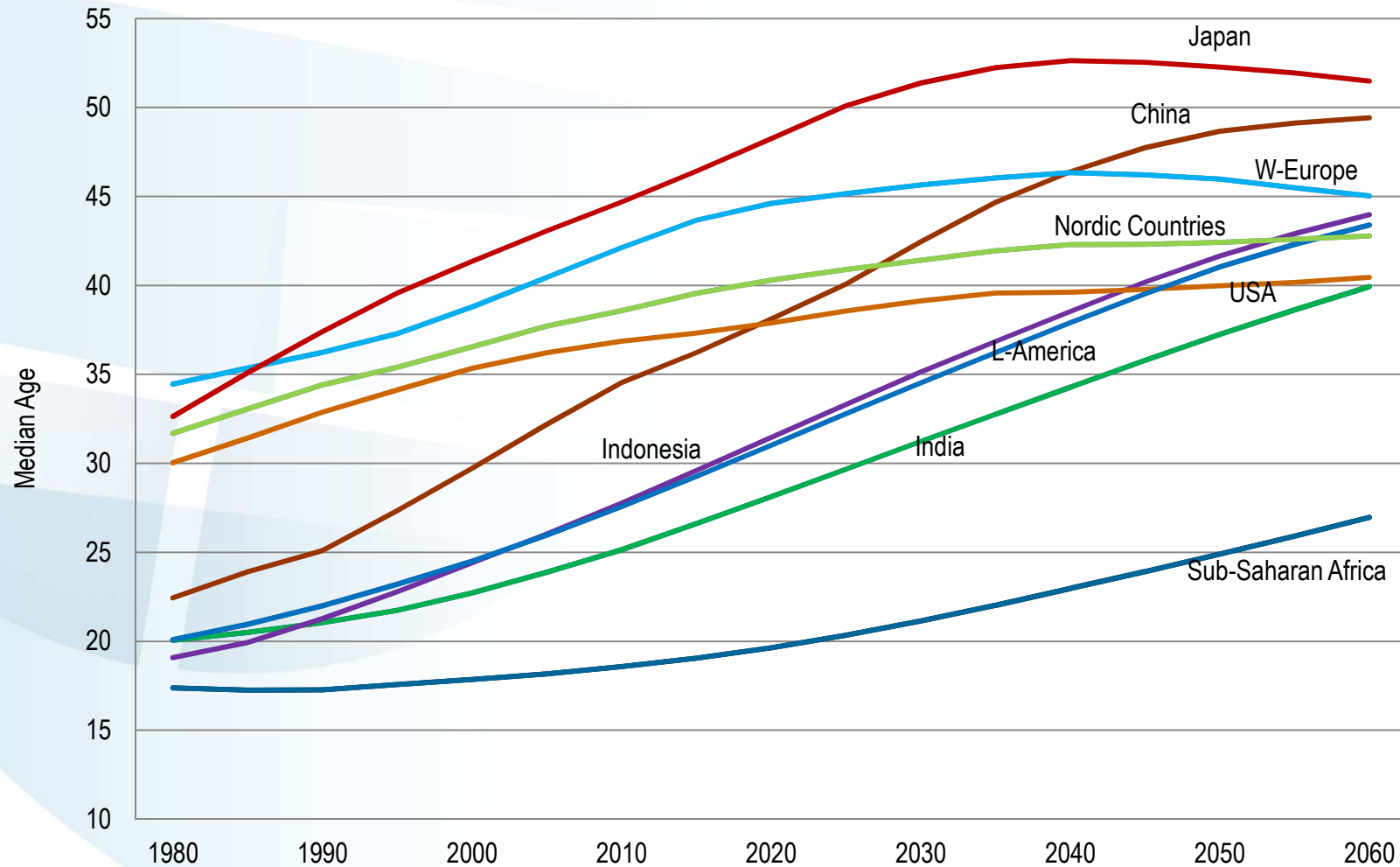
# Demographic Change and Productive Potential Across the Globe

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# Median age increases – but is this a problem?

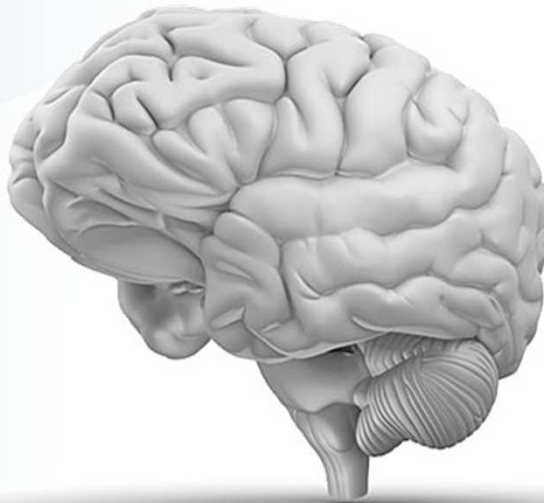


(UN 2011, medium variant population projections)

# Ageing increases the need to lengthen the working life

## What determines our potential for retiring later?

- **Physical labour market demands falling**  
(Dey et al. 2011, Hilton 2008)
- **Cognitive abilities predict job performance better than other individual characteristics and importance is growing over time** (Schmidt and Hunter 2004, Romeu Gordo and Skirbekk 2012)

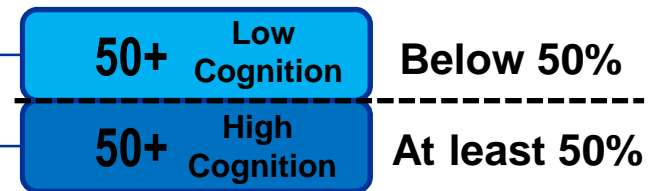


# Cognitively Adjusted Dependency Ratio: CADR

$$\text{OADR} = \frac{65+}{15 - 64}$$

$$\text{CADR} = \frac{50+ \text{ Low Cognition}}{15 - 49 + 50+ \text{ High Cognition}}$$

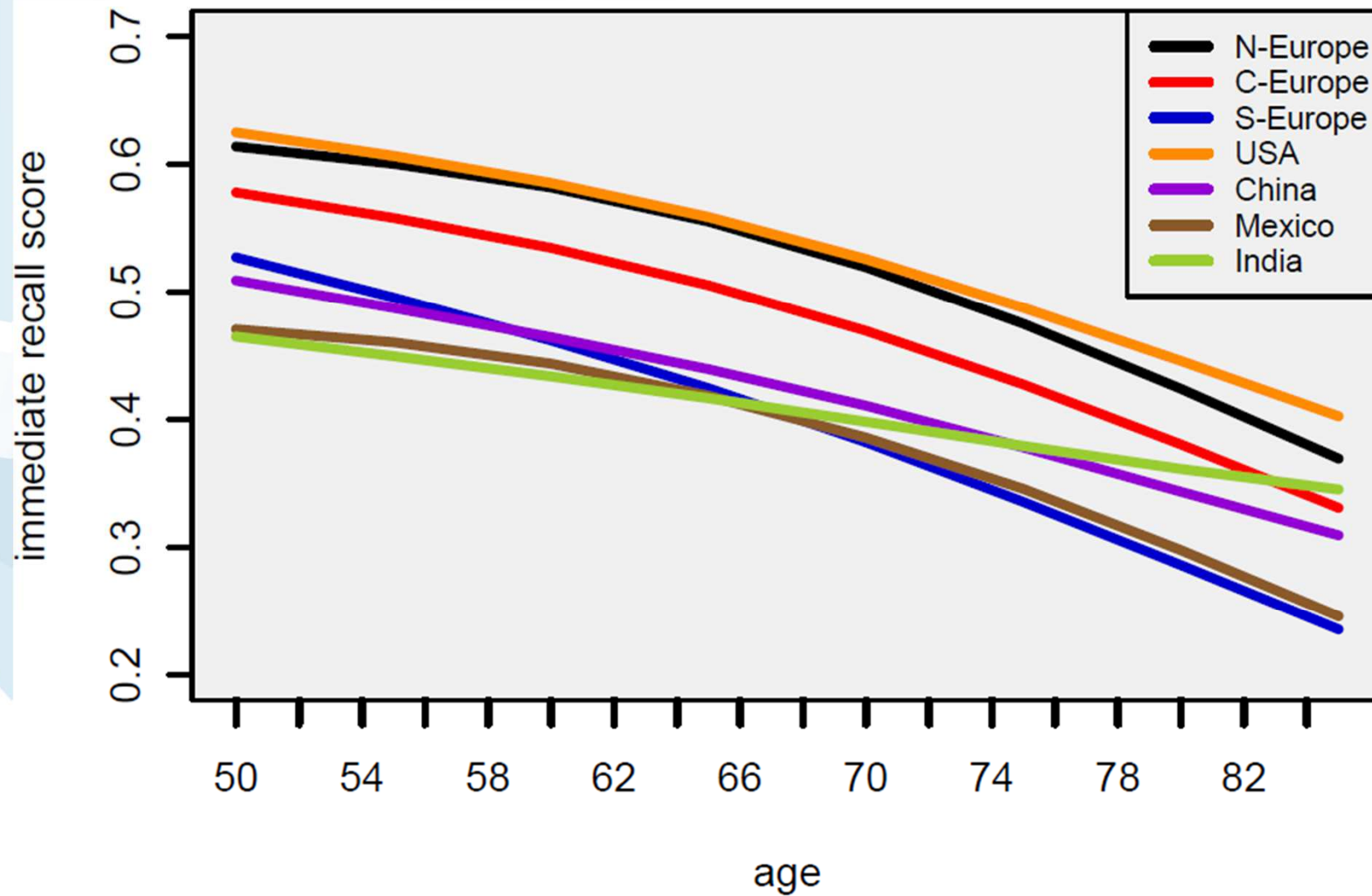
Short-term memory  
Words in Test



## Cognitive test - Immediate recall

- Standardized memory test, always given in local language
- Respondents have 1 minute for recalling 10 basic words
- Proportion correct determines cognitive performance

# Immediate word recall



(Skirbekk, Loichinger & Weber, PNAS, 2012)

# Comparison OADR and CADR

*A young population does not imply a low ageing burden*

<b>Country</b>	<b>OADR 2005 (65+/15-64)</b>
United States of America	<b>4</b> (0.19)
Northern Europe (Denmark, England, Ireland, Sweden)	<b>5</b> (0.24)
India	<b>1</b> (0.07)
Mexico	<b>2</b> (0.09)
China	<b>3</b> (0.12)
Continental Europe (Austria, Belgium, Czech Republic, France, Germany, Netherlands, Poland, Switzerland)	<b>6</b> (0.25)
Southern Europe (Greece, Italy, Spain)	<b>7</b> (0.27)

OADR = Old Age Dependency Ratio,

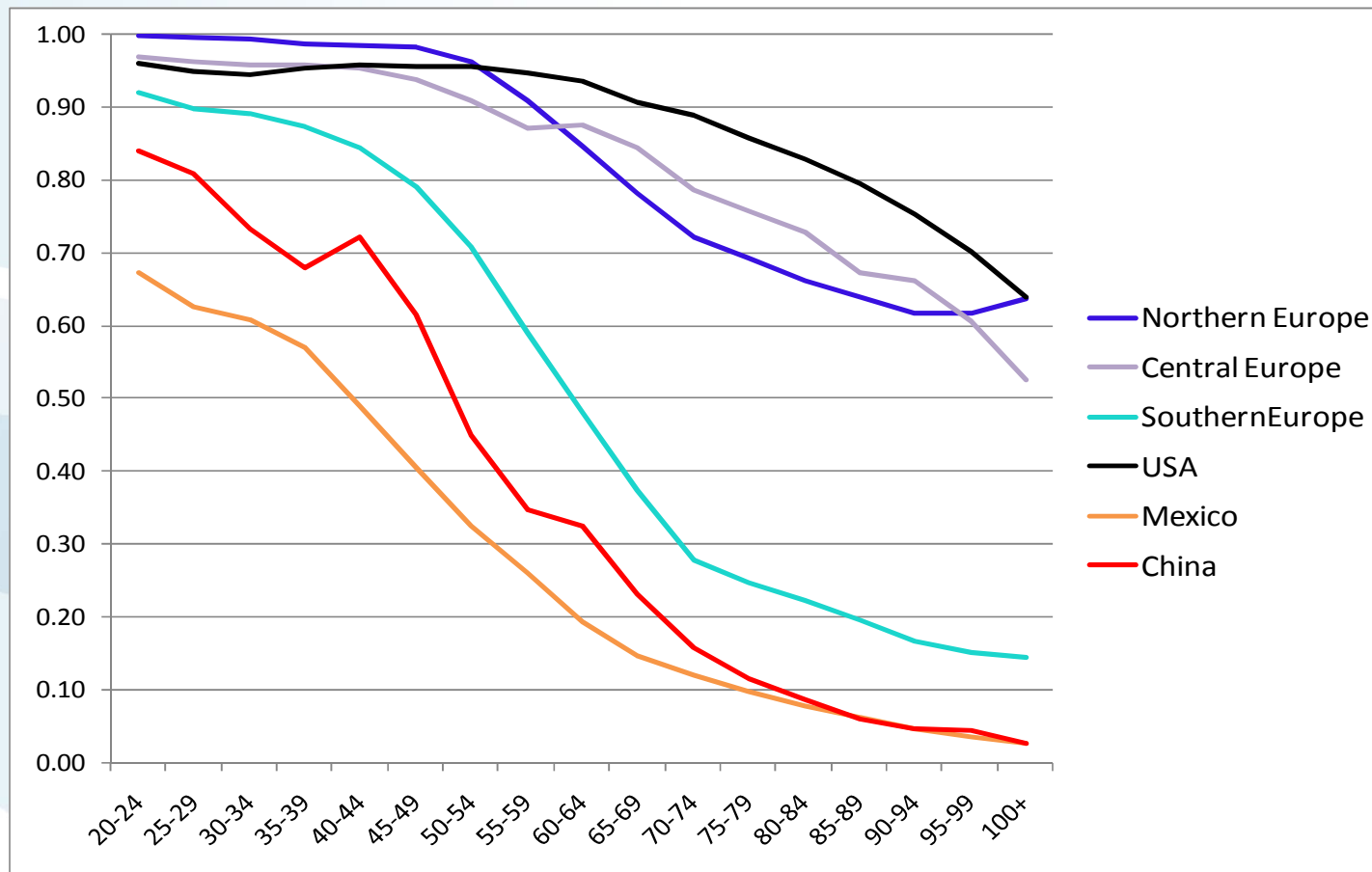
CADR = Cognitively Adjusted Dependency Ratio

# Education causally affects cognition

- Longitudinal studies show that education raises cognition net of initial ability (Whalley and Deary 2001)
- Studies on monozygotic twins with different education suggest that schooling significantly improves cognitive functioning (Haworth, Daleb and Plomina 2008)
- Neurological structures change following intense training (Mårtensson et al. 2012)

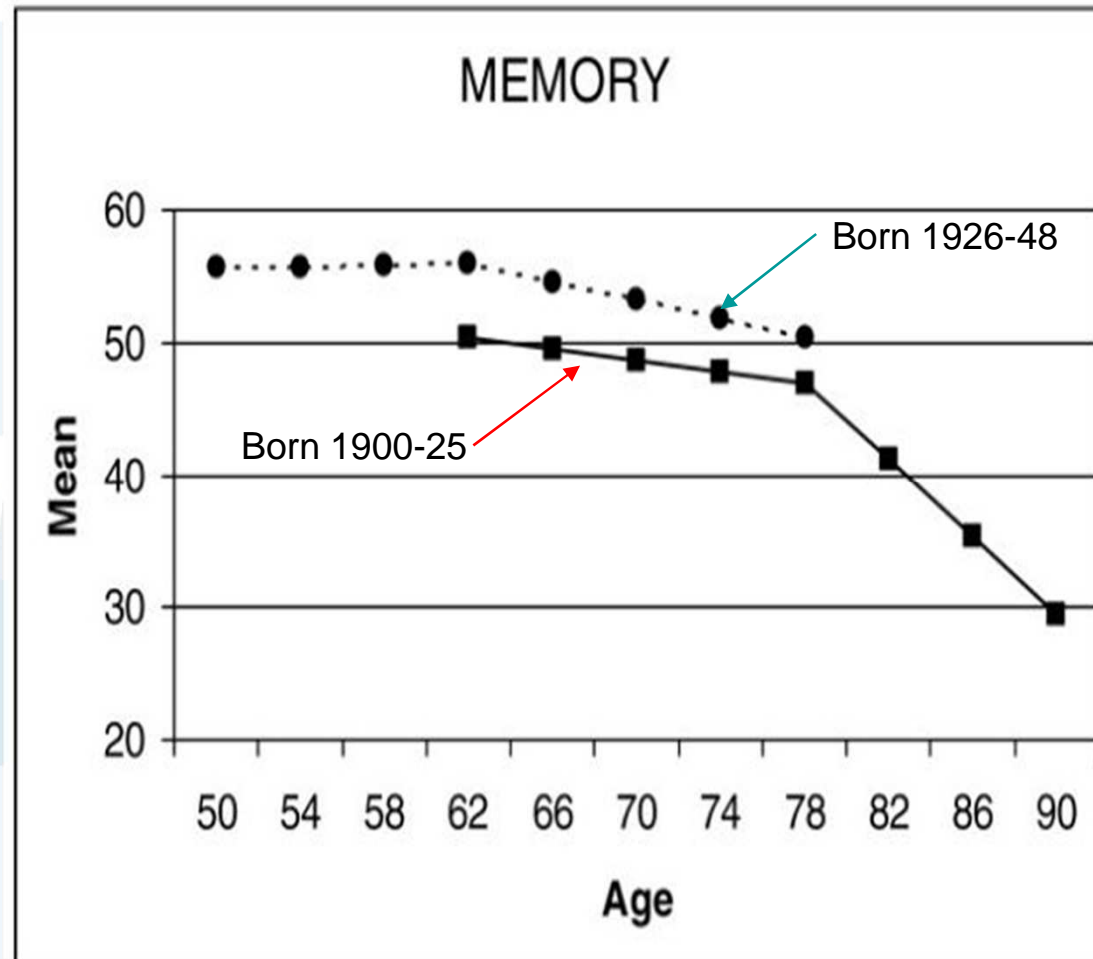


# International variation in productivity potential, Secondary education, 2005



(IIASA education estimates, available from World Bank website)

## Cognitive abilities by cohort, Sweden



(Finkel et al. 2007)

## Conclusion

- Ageing is inevitable
- Productivity variation is more important than demographic variation in terms of determining "the burden of ageing"
- Stronger investments in cognition through for instance education alleviate some negative consequences of ageing