Smarter every day
The deceleration of population ageing in terms of cognition

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Ageing

- Increase in life expectancy
- Postponement of the onset of degenerative ageing (Vaupel 2010)
- Steadily increasing average scores on common tests of cognitive functioning, i.e., **Flynn effect**
  - Scant evidence on older populations (Baxendale 2010; Cristensen et al. 2013; Gerstorf et al. 2011; Rönnlund & Nilsson 2008; Rotrou et al. 2013; Skirbekk et al. 2013)
  - Little attention has been paid to subgroup differences, e.g. across education

Cognitive functioning

- Characteristic of the individual that is associated with but not determined by chronological age
- Central component of successful aging (Rowe & Kahn 1987)
- Useful measure of differential ageing
  - Some parts of the population start aging (in terms of cognition) earlier than others, education being a central factor in this regard

Research questions

### Do we observe a deceleration of population ageing?

- Focus on cognitive functioning
→ Do we observe a **Flynn effect**?
→ What can explain it?

Data

- German Socio-Economic Panel 2006 & 2012
  - Age 50+
  - **Symbol-Digit Task** (SDT 30, 60, 90) taps abilities based on the mechanics of cognition

- English Longitudinal Survey of Ageing 2002 & 2008*
  (* refresher sample)
  - Age 50-74
  - **Immediate** (IR) & **delayed** (DR) **recall**, a compound of fluid and crystallized intelligence
  - **Animal Naming Task** (ANT) strongly based on the pragmatics of cognition
  - **Letter Cancellation Task** (LCT), a measure of accuracy
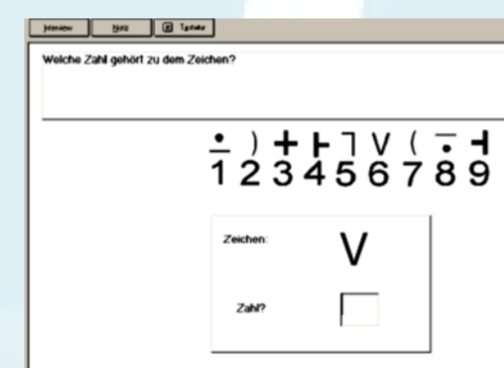
Descriptives

	Mean (s.d.)	Mean (s.d.)	min	max
SOEP	**2006 (N = 2,013)**	**2012 (N = 2,878)**		
SDT30	7.1 (3.4)	7.4 (3.3)	0	24
SDT60	15.2 (6.5)	16.2 (6.0)	0	38
SDT90	23.2 (9.0)	24.9 (8.1)	0	54
ELSA	**2002 (N = 8,170)**	**2008 (N = 1,402)**		
ANT	20.4 (6.1)	21.6 (6.3)	0	55
IR	5.8 (5.8)	6.1 (1.6)	0	10
DR	4.4 (2.0)	4.8 (1.9)	0	10
LCT	79.8 (13.8)	82.0 (12.0)	0	100

Table 1. Mean and s.d. of the cognitive test scores.

Method

- Repeat cross-sectional approach to identify, quantify, and explain the Flynn effect
  1. estimate the difference in mean cognitive test scores across 2 points in time
     - explanatory variable: Flynn effect (i.e. wave dummy)
     - controls: age, sex, education
  2. calculate the 'constant characteristics age' (Sanderson & Scherbov, 2013) and the 'age gain'

Score S at age x_1 in earlier wave w_1	Age x_2 in later wave w_2 at which S is obtained	Age gain = $x_2 - x_1$

  3. test if increasing technology explains the observed Flynn effect
     - additional controls: use of PC and mobile

Results

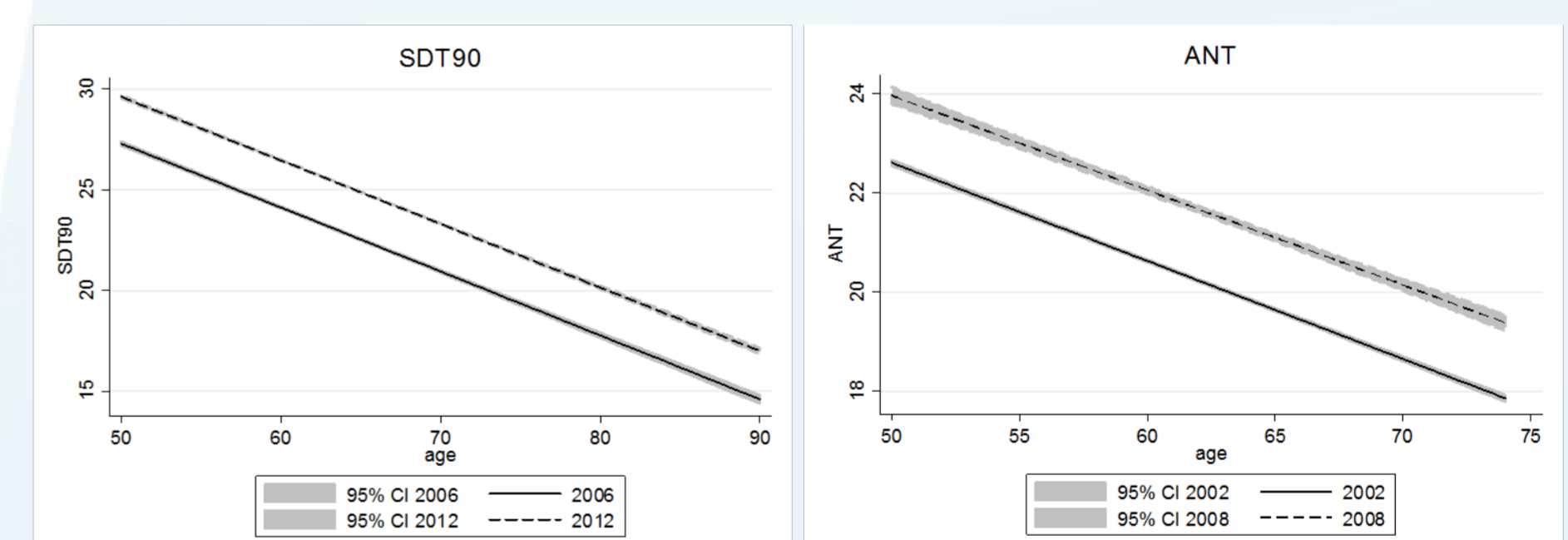- People interviewed 6 years later match 2 symbols more and name 1 animal more

Figure 1. Predicted age-cognition profiles by survey wave. Linear fit over age, by survey year; controls: education, sex.

	SOEP			ELSA			
	SDT30	SDT60	SDT90	ANT	IR	DR	LCT
Age gain	4.9	6.4	7.9	6.2	4.8	5.7	7.5

Table 2. Age-gains for the different cognitive tests.

The contribution of technology

	SOEP		ELSA	
	SDT90 – M1	SDT90 – M2	ANT – M1	ANT – M2
Age	-0.294***	-0.249***	-0.146***	-0.120***
	(0.012)	(0.013)	(0.009)	(0.009)
Flynn effect	**2.334***	**1.933***	**0.904***	**0.488****
	(0.227)	(0.231)	(0.169)	(0.172)
Education[1]	0.604***	0.489***	4.076***	3.402***
	(0.042)	(0.044)	(0.153)	(0.164)
PC / internet[2]	-	1.752***	-	1.314***
		(0.281)		(0.142)
Mobile[3]	-	1.248***	-	0.540***
		(0.336)		(0.135)
N	4,891	4,891	9,572	9,572
R2	0.166	0.179	0.125	0.147

Table 3. Coefficients and se from linear regressions. Notes: 1. Years of education in SOEP, High vs. low in ELSA; 2. in household in SOEP, use in ELSA; 2. in household in SOEP, owner in ELSA. All models control also for sex.

Conclusion

- The results of this study show the existence of a Flynn effect on 50+ year olds
  - The Flynn effect remains constant over age and education
  - The age-cognition profile does not vary with the educational attainment of test participants

- Increasing levels of education over cohorts may have driven a good part of the Flynn effect in earlier decades
- Technology in terms of PC and mobile phone use contributes, to a certain extent, to the explanation of the Flynn effect
- Other possible explanations that require further research:
  - "Social multiplier" effect
  - Modern technology use in everyday life, other than use of PC and mobile phone.

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The German Socio-Economic Panel Study

ELSA English Longitudinal Study of Ageing