

GENDER, CULTURE AND COGNITION IN LATER LIFE

5th SHARE User Conference
Luxembourg, November 2015

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CONTEXT: COGNITIVE AGEING

- Older individuals face many challenges associated with physical and mental impairments. Among these, age-related decline in cognitive functioning has been well documented (Baltes, Lindenberger, & Staudinger, 2006; Dixon et al. 2004; Petersen et al., 1992; Small, 2001).
- Cognitive impairments, even those not reaching the threshold for dementia diagnosis, are associated with a loss of productivity and quality of life, increased disability, and higher health-related expenditures (Albert et al., 2002; Tabert et al. 2002).

CONTEXT: GENDER AND COGNITIVE AGEING

- While cognitive ageing is a challenge for both men and women, the incidence of cognitive impairments appears to be more problematic for women.
 - The femininity ratio (females per 100 males) is higher at older ages: worldwide in 2010 it was 110 among the 50 plus and 200 among the 80 plus (UNPD 2015).
 - The prevalence of dementia has been found to be higher for women than men in most regions of the world, with an increasing discrepancy at oldest ages (Prince et al. 2013).
 - Cognition plays an important role in the decision process underlying important aspects of life such as health (Goldman and Smith 2002) and wealth (Christelis et al. 2010) management. This is especially important for women given they often outlive their husband and need to take decisions on their own at older age (Lei et al. 2012).

CONTEXT: GENDER DIFFERENCES IN COGNITION

- Most of the literature on gender differences in cognition focuses on young adults, and only few studies have approached the question of gender differences at older age (Lee et al., 2014; Lei et al. 2012; Maurer 2011; Yount 2008).
- However, all studies about gender differences in cognition at older age are carried out at the national level and preclude the inclusion of cultural factors such as gender-role attitudes to explain gender differences in cognition at older age.
- The only studies that have looked at the role of gender-role attitudes on cognitive outcomes focused mainly on math and academic achievement at younger age (Guiso et al., 2008; Reilly, 2012; Stoet and Geary, 2013; Ceci et al. 2014).

AIM OF THIS STUDY

- The aim of the study is to analyse to which extent culture affects gender differences in cognition at older age across countries.
- We focus on gender-role attitudes, defined as beliefs about the roles of men and women in society.
- The availability of cross-country comparable surveys including measures of cognition is quite recent and opens the black box underlying the cross-country differences in performance at older age.
- To our knowledge, there is no other study having looked at this hypothesis before.

CONCEPTUAL FRAMEWORK

- The conceptual framework underlying the hypothesis is based on the model of human capital (Becker, 1964).
- Culture/social norms can influence individual outcomes through two channels: Beliefs/values (preferences) and institutions (constraints).
- Several studies have found that traditional gender-role attitudes result in substantial reductions in human capital investment and female labor supply (Vella 1994; Fortin 2005; Fernandez and Fogli 2009).
- Education, labour market participation, and lifestyle are protective against cognitive ageing (e.g. Schneeweis et al. 2014; Bonsang et al. 2012; Fratiglioni et al. 2004)
- The lack of norms and/or opportunities to engage in cognitively stimulating activities over the life course is thus likely to translate into poorer cognitive performance of older women.

DATA: THE SURVEYS

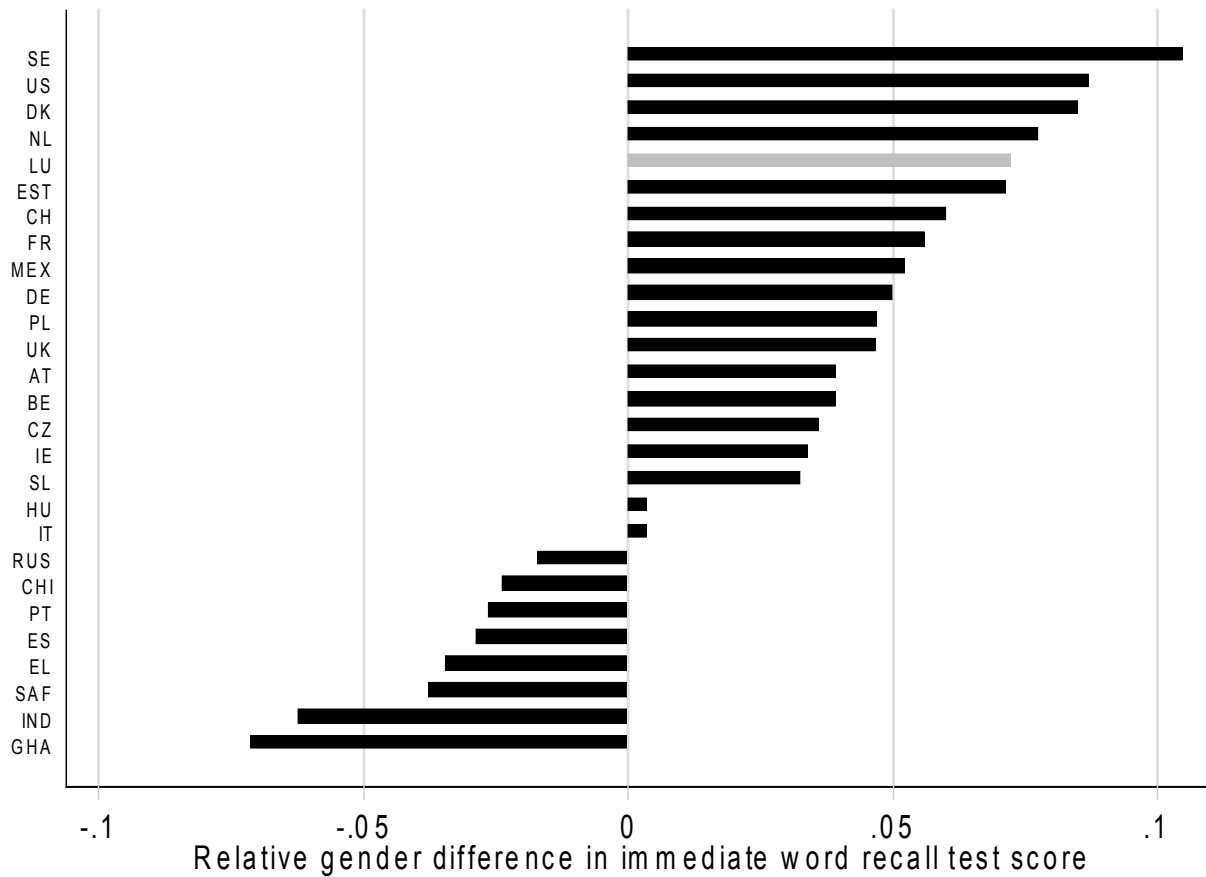
- For the empirical analysis we use standardized questions based on nationally representative sample of 50+ individuals from 27 countries in Africa, America, Asia, and Europe, covering about one-half of the world population.
- Those international comparable surveys of older individuals include:
 - the Survey of Health, Ageing and Retirement in Europe (SHARE),
 - the Health and Retirement Study (HRS),
 - World Health Organization (WHO) Study on global AGEing and adult health (SAGE),
 - The English Longitudinal Survey on Ageing (ELSA).
- All of them include measures of cognitive functioning that are operationalized comparably across all surveys.
- Sample selection: All 50+ individuals born between 1920 and 1959 with available cognitive test scores: 223,491 observations

DATA: COGNITIVE TEST SCORES

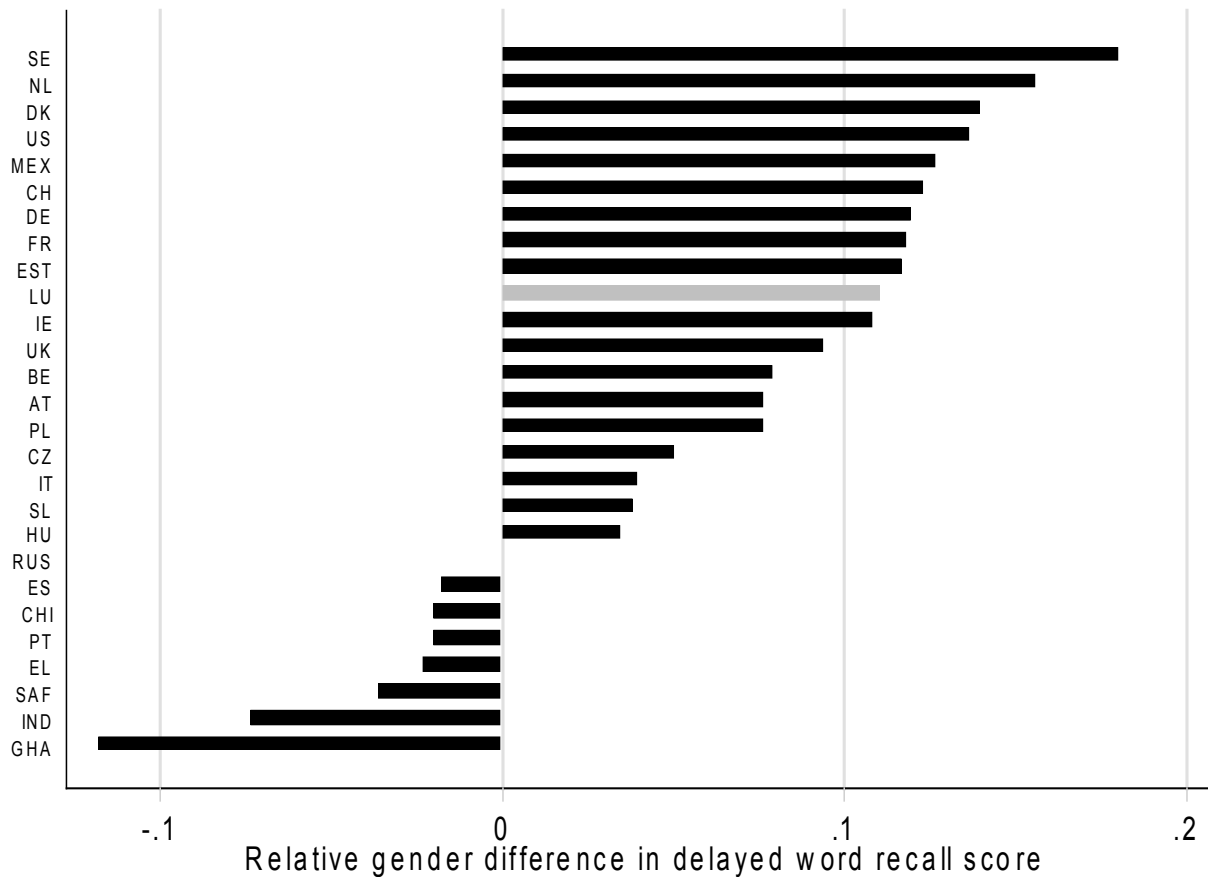
Measures of cognitive functioning

- The three surveys assess cognitive functioning of all respondents by using short and simple tests of episodic memory (learning and recall) and executive functioning (verbal fluency).
- In the episodic memory task, participants were asked to memorize ten common words, and to list as many of these words as they could remember in one minute.
- For the fluency task, respondents had to name as many different animals as possible in one minute (not available for US).

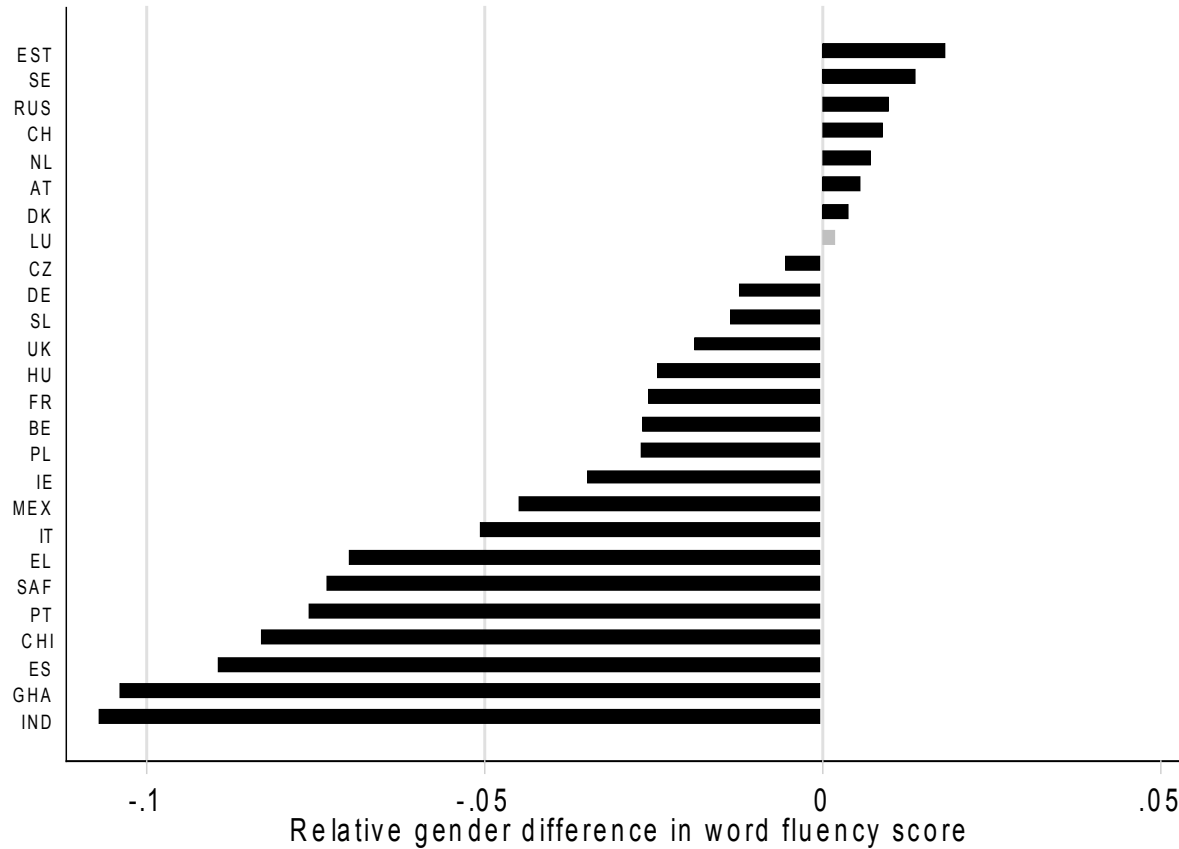
DATA: Relative female advantage ($(C_f - C_m) / C_m$) in immediate word recall scores across countries



DATA: Relative female advantage in delayed word recall scores across countries



DATA: Relative female advantage in word fluency scores across countries



DATA: GENDER-ROLE ATTITUDES

Measures of gender-role attitudes

- The measure is obtained from the most recent four waves of the World Values Survey and the European Values Survey, a compilation of national surveys on values and norms.
- Respondents are given the following statement:

"When jobs are scarce, men should have more right to a job than women"

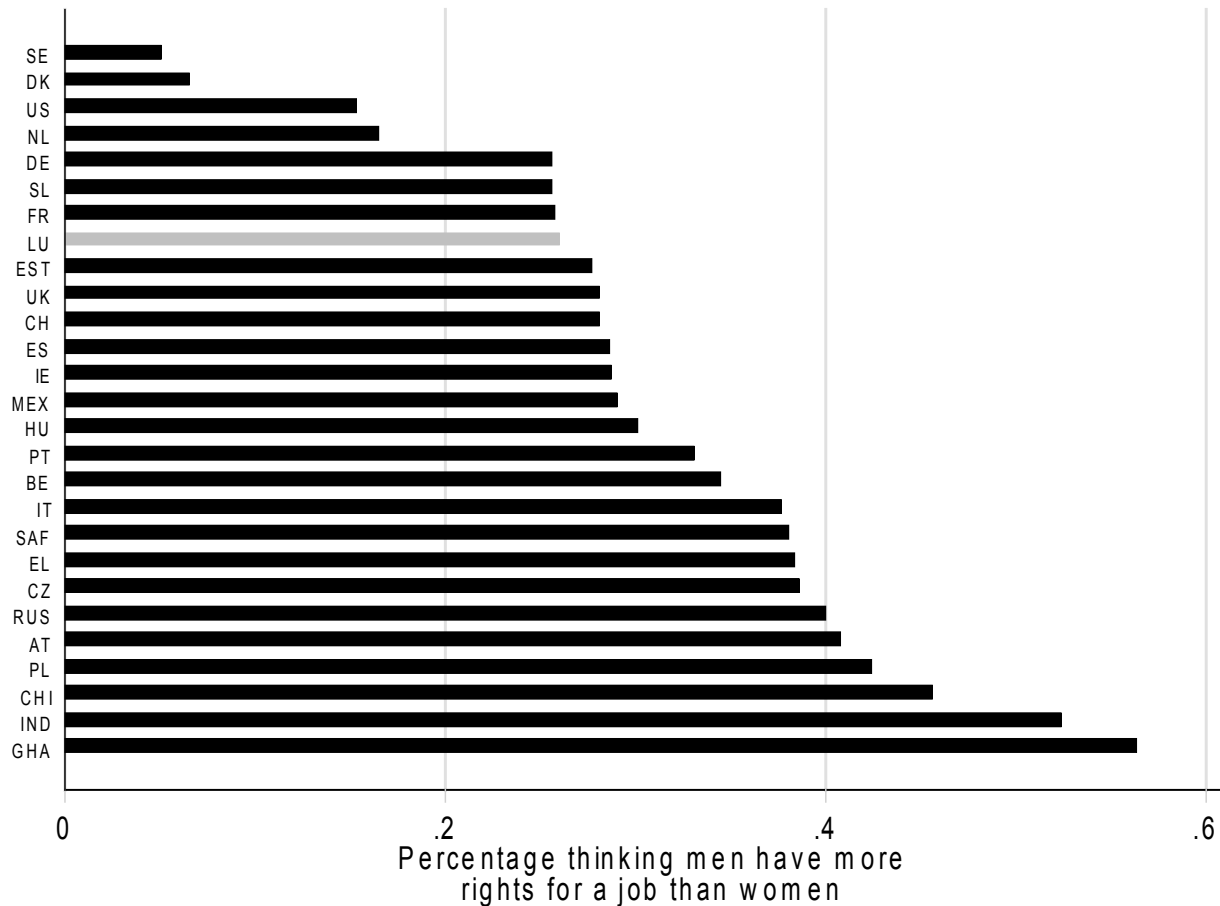
The respondents are then asked to choose between: 'agree', 'neither', and 'disagree'.

Our measure is based on a dummy equal to one when the respondent agrees with this statement.

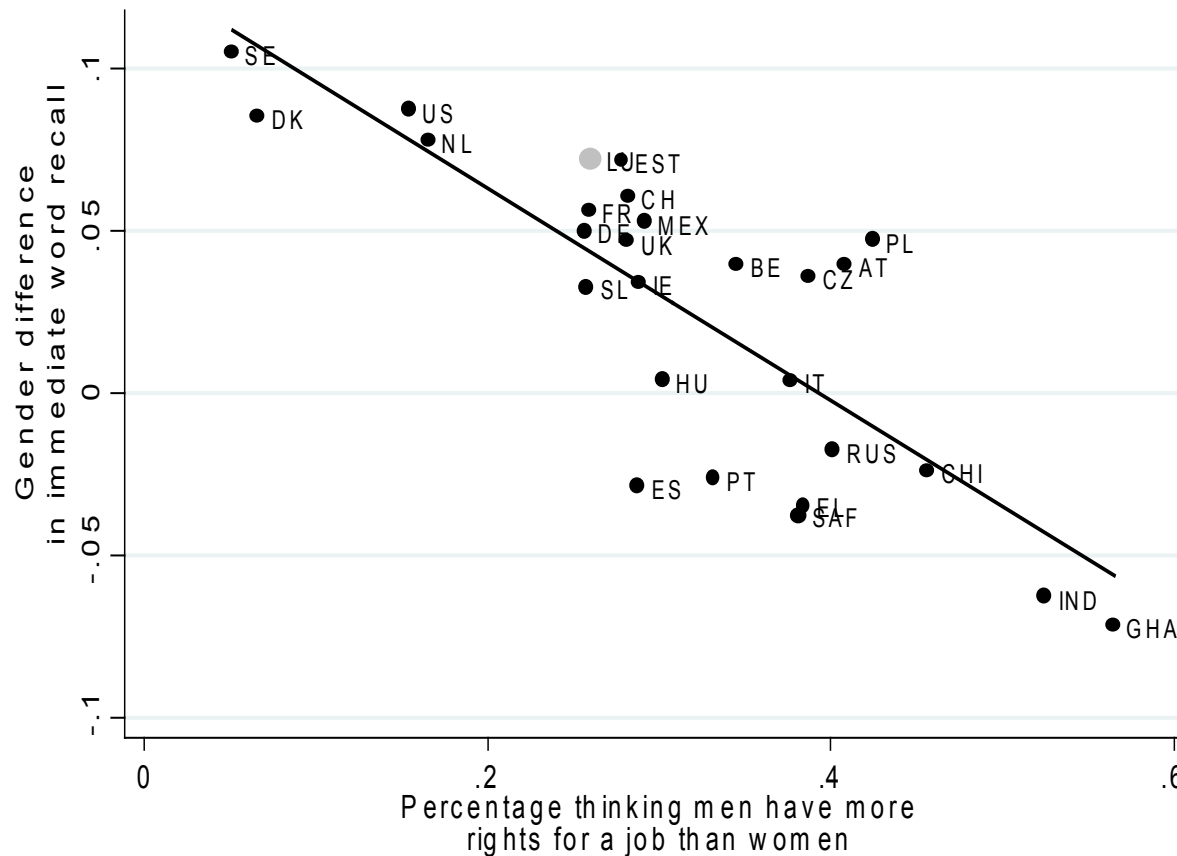
DATA: MERGING THE DATA

- The data are merged at the country and cohort level.
- One caveat is that the measure of gender-role attitudes has been asked at a different time than the measure of cognitive functioning.
- However, studies found that age has only small impact on gender-role attitudes, while cohorts are much more important drivers (see e.g. Lynott and Mc Candless, 2000).

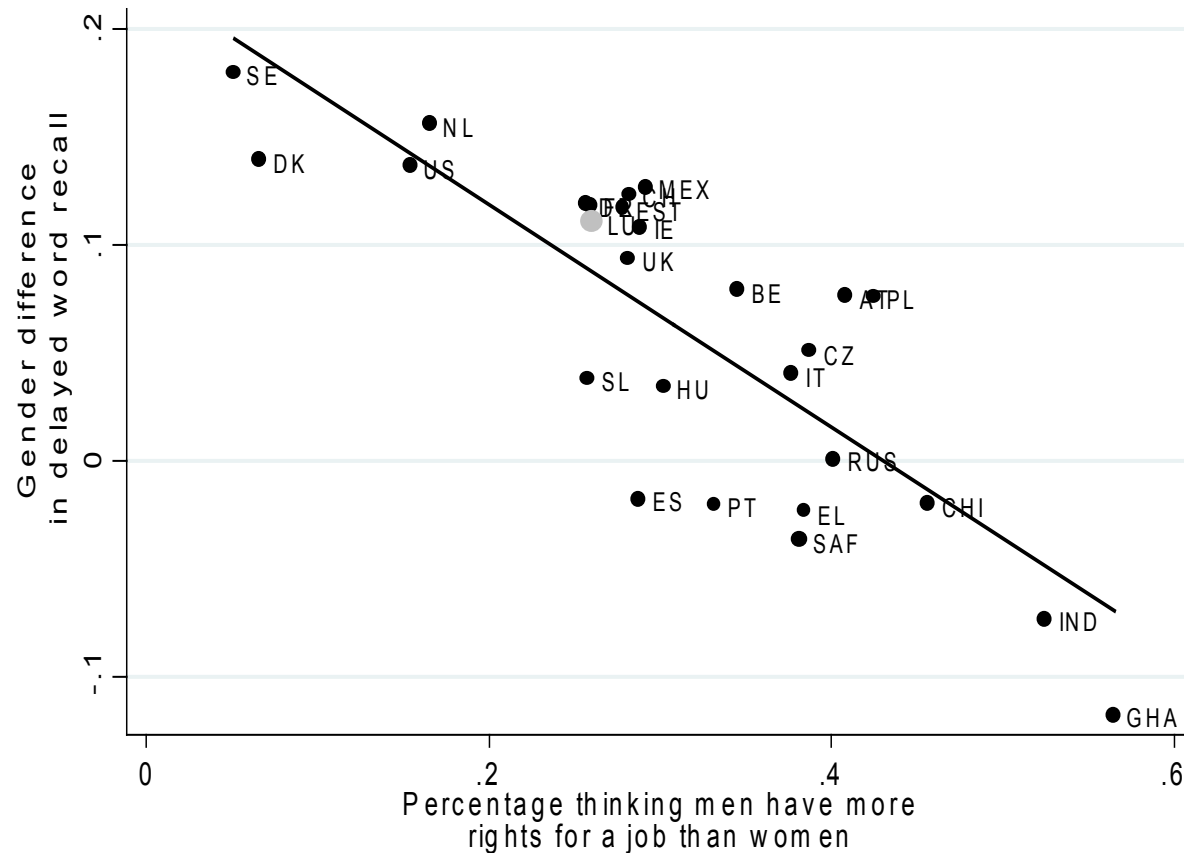
DATA: PERCENTAGE INDIVIDUALS BORN BETWEEN 1920 AND 1959 THINKING MEN SHOULD HAVE MORE RIGHT TO A JOB



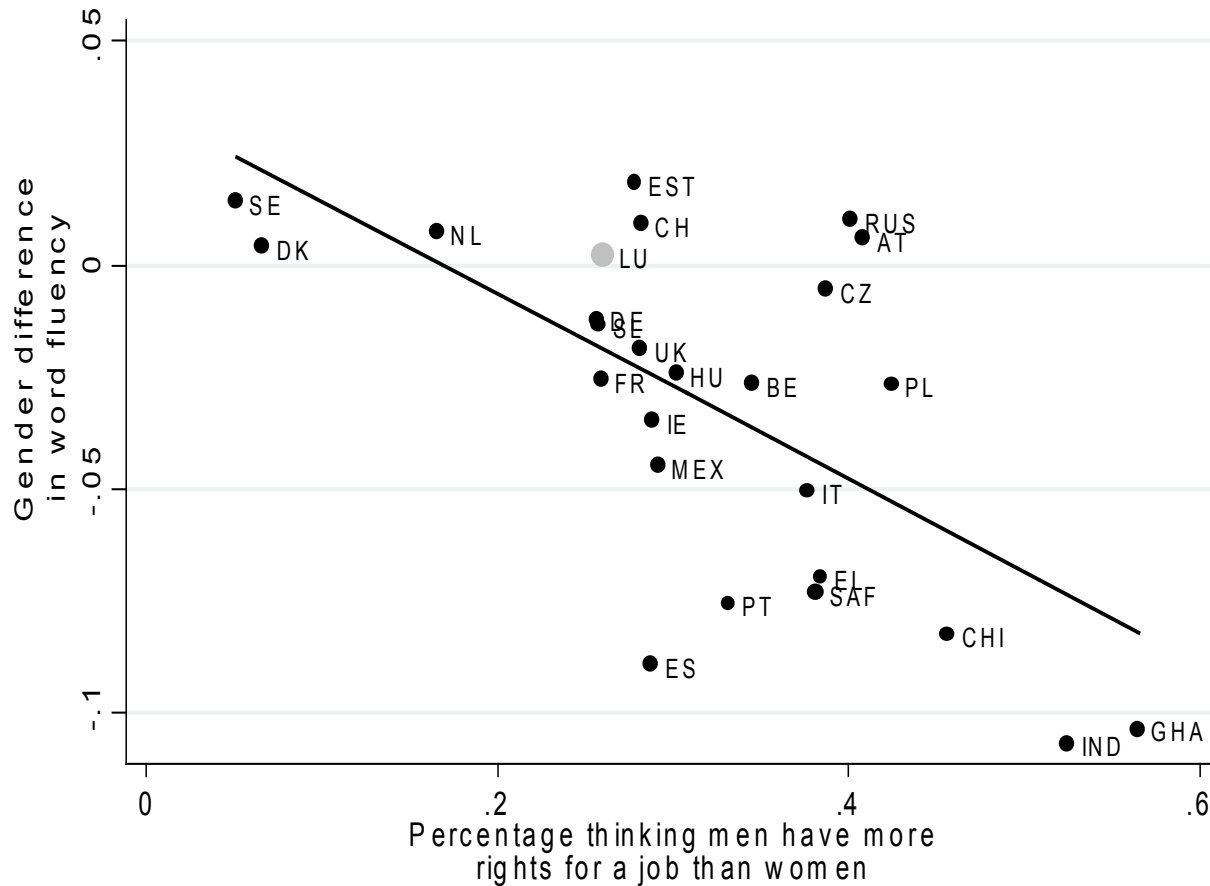
GENDER-ROLE ATTITUDES AND RELATIVE FEMALE ADVANTAGE IN COGNITION



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GENDER-ROLE ATTITUDES AND RELATIVE FEMALE ADVANTAGE IN COGNITION

	Relative female advantage in:		
	Immediate recall	Delayed recall	Fluency
Gender-role attitudes	-0.240*** (0.060)	-0.376*** (0.089)	-0.163** (0.067)
America	0.016 (0.021)	0.028 (0.032)	-0.023 (0.032)
Asia	-0.031 (0.020)	-0.045 (0.030)	-0.011 (0.023)
Africa	-0.048* (0.024)	-0.086** (0.035)	-0.037 (0.026)
Intercept	0.107*** (0.018)	0.187*** (0.027)	0.026 (0.020)
R ²	0.716	0.743	0.456
N	27	27	26

GENDER-ROLE ATTITUDES AND RELATIVE FEMALE ADVANTAGE IN COGNITION

	Relative female advantage in:		
	Immediate recall	Delayed recall	Fluency
Gender-role attitudes	-0.213*** (0.066)	-0.307*** (0.095)	-0.134* (0.074)
Log(GDP per capita)	0.007 (0.008)	0.019 (0.011)	0.009 (0.009)
America	0.021 (0.022)	0.040 (0.031)	-0.012 (0.034)
Asia	-0.021 (0.023)	-0.019 (0.033)	0.002 (0.026)
Africa	-0.036 (0.027)	-0.056 (0.039)	-0.022 (0.030)
Intercept	0.023 (0.091)	-0.026 (0.131)	-0.074 (0.103)
R ²	0.727	0.773	0.482
N	27	27	26

EMPIRICAL ANALYSIS

- Next we turn to an empirical analysis that exploits the cross-country variations in the cohort-related changes in gender-roles attitudes.
- 27 countries and 3 cohorts: 1920-1939; 1940-1949; 1950-1959.
- We estimate the following model by OLS:

$$\Delta C_{ct} = \sum_{c=1}^C \beta_{1_c} country_c + \sum_{t=1}^T \beta_{2_t} cohort_t + \beta_3 GRA_{ct} + \varepsilon_{ct}$$

ΔC_{ct} : Relative female advantage in cognition scores for country c in cohort t.

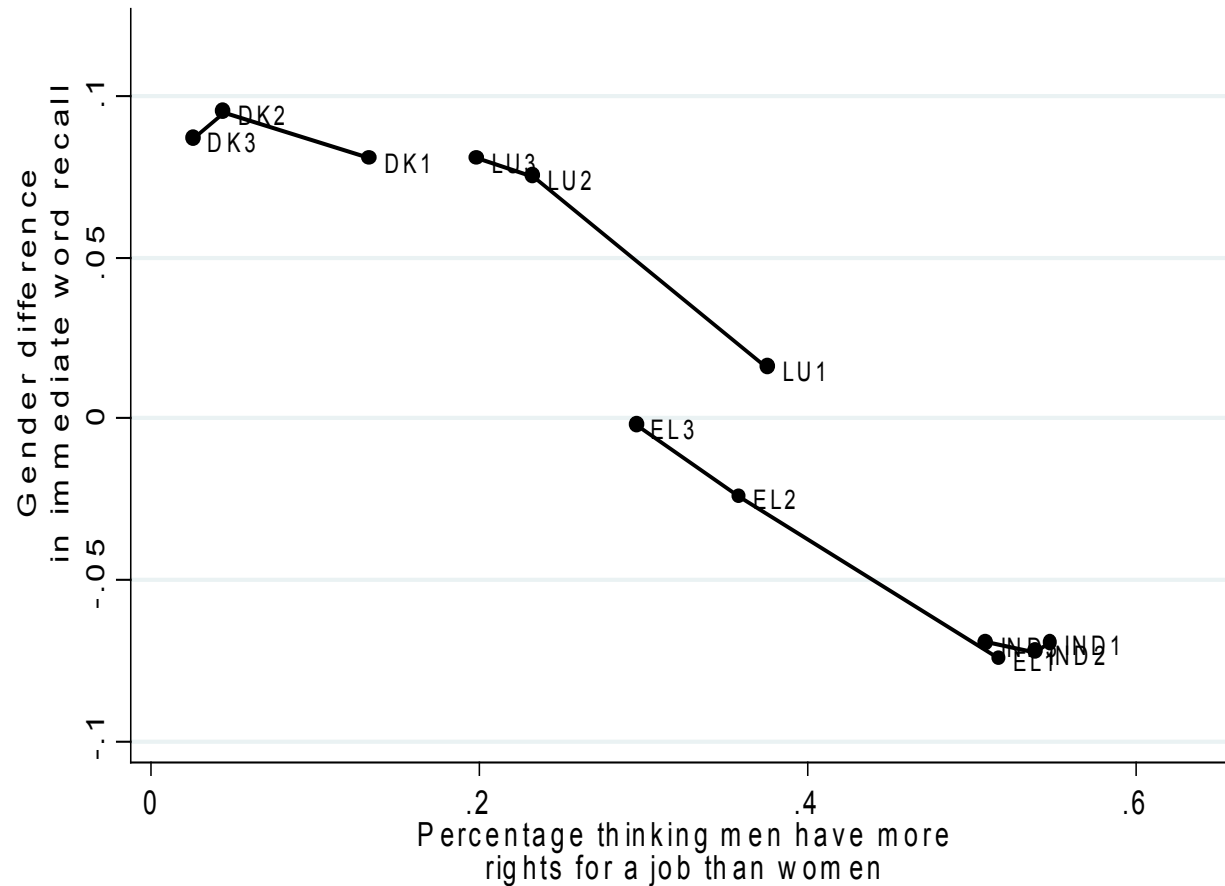
$country_c$: Country dummies

$cohort_t$: Cohort dummies

GRA_{ct} : Gender-role attitudes

ε_{ct} : Error term

COHORT DIFFERENCES IN RELATIVE FEMALE ADVANTAGE IN COGNITION AND GENDER-ROLE ATTITUDES



GENDER-ROLE ATTITUDES AND RELATIVE FEMALE ADVANTAGE IN COGNITION

	Relative female advantage in:		
	Immediate recall	Delayed recall	Fluency
Gender-role attitudes	-0.154** (0.070)	-0.373*** (0.115)	-0.160*** (0.059)
Country fixed effects	Yes	Yes	Yes
Cohort fixed effects	Yes	Yes	Yes
R ²	0.915	0.911	0.928
N	81	81	78

ROBUSTNESS CHECKS

- Gender-role attitudes may not be exogenous. Attitudes may be affected by the status of women: if the share of women in higher education or the women's share in the labour force is low, their subordinate status may be reflected in gender-role attitudes.
- We assess the robustness of our findings by using a proxy for gender-role attitudes for which reverse causality is unlikely to be an issue.
- Several studies argue that formal religious institutions, which shape cultural norms, have an impact on gender-roles attitudes (Inglehart and Norris, 2003).
- We propose to use religion background as a proxy for gender-role attitudes.

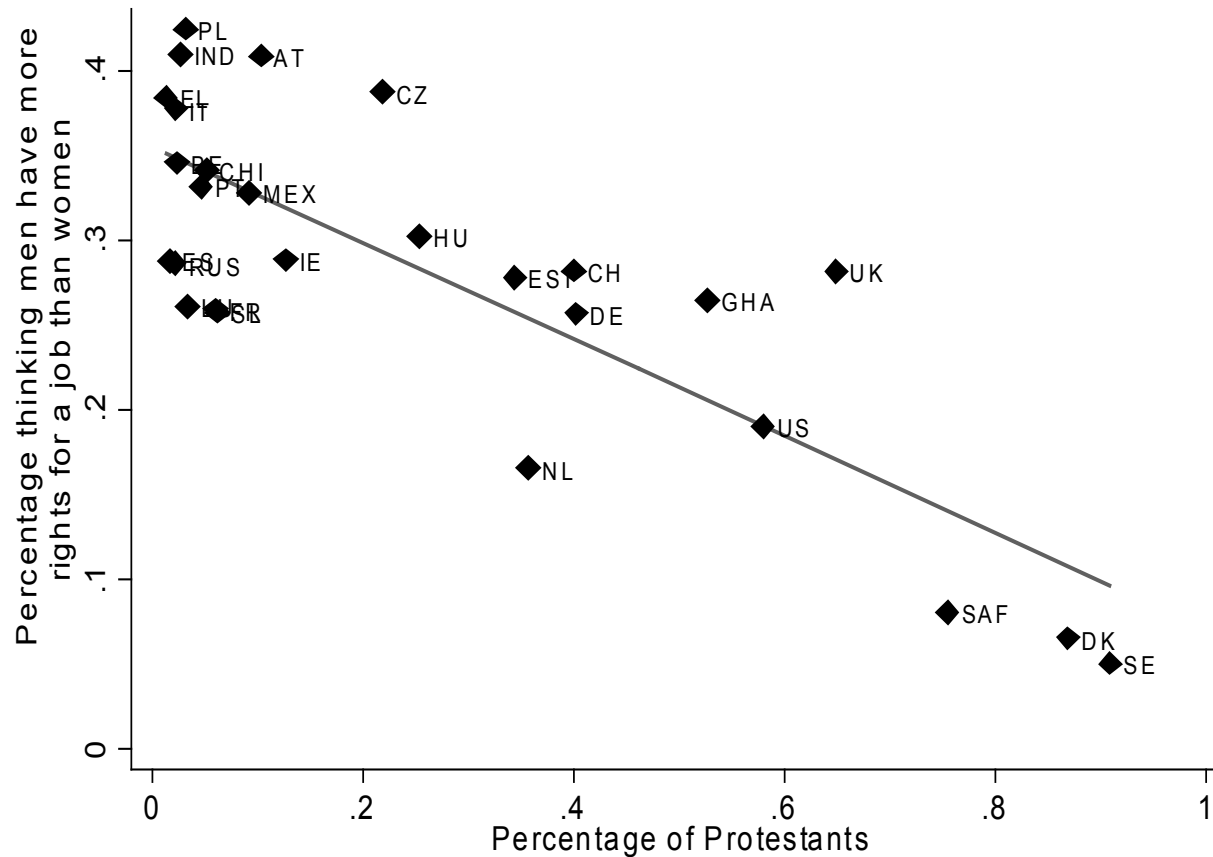
GENDER-ROLE ATTITUDES AND PROTESTANTISM

- We propose to use, as a proxy for gender-role attitudes across country, the proportion of individuals being Protestant in the country.
- Protestantism has been found to be the religious belief that is least likely to emphasize traditional roles for women among sizeable denominations (Kenworthy and Malami, 1999).
- During the second half of the twentieth century, Protestant churches altered theological practices about the role of women. For instance, an increasing number of Protestant churches are accepting women into the Clergy (Korpi, 2000).

GENDER-ROLE ATTITUDES AND PROTESTANTISM

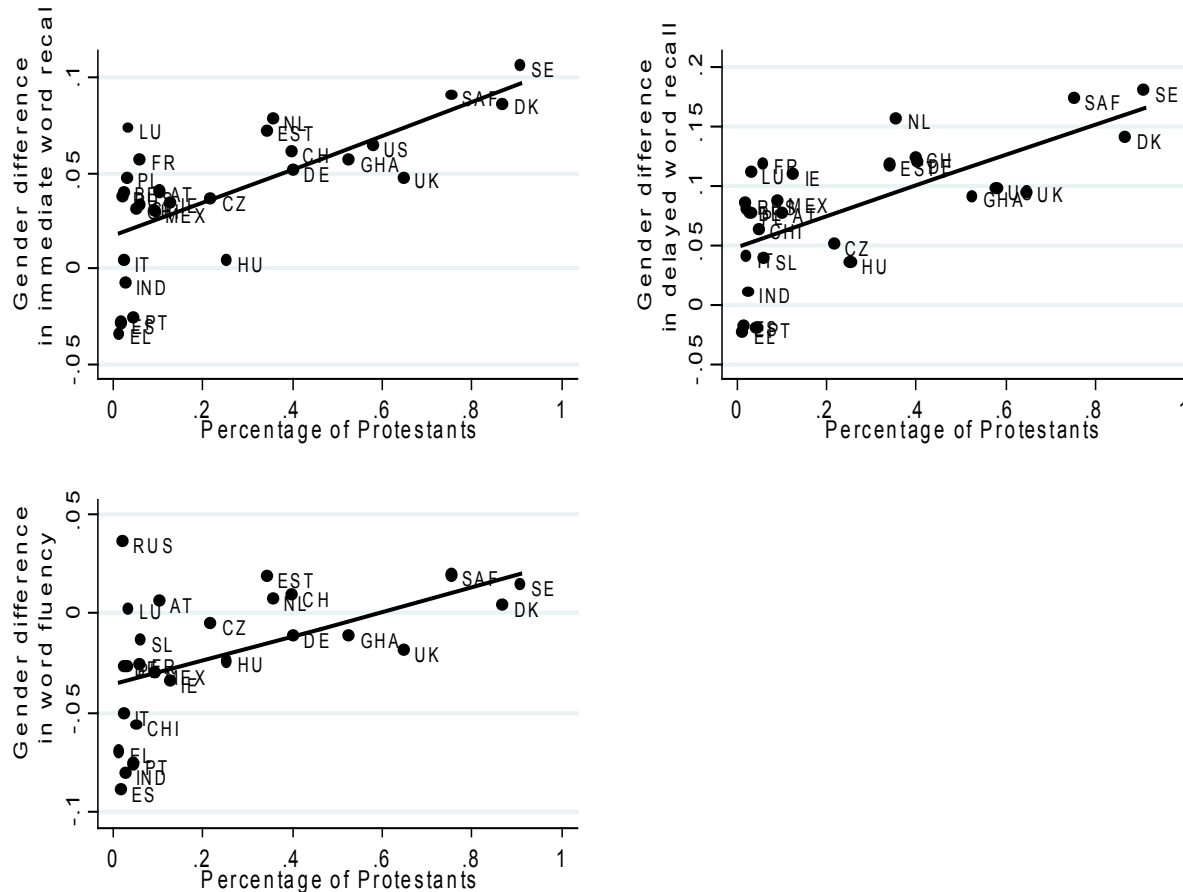
- Moreover, women had the right to vote by 1920 in most historically Protestant countries but until after the World War II in most Catholic ones, and still later in other cultural zones (Inglehart, Norris, and Welzel, 2002).
- Reynolds (1999) found, on a worldwide scale, that the largest difference in the proportion of women in legislative and Cabinet offices was observed between Christians (whether Protestant or Catholic) and all other religions, including Islamic, Buddhist, Confucian and Hindu faiths.
- Studies have shown that the proportion of women in the parliament is negatively associated with the historical prevalence of Catholicism in developed countries (Rule, 1987).
- Becker and Woessmann (2008) showed that a larger share of Protestants decreased the gender gap in literacy among the adult population in 1871 in Prussia.

GENDER-ROLE ATTITUDES AND PROTESTANTISM



Note: This is the relationship between the proportion of Protestants and gender-role attitudes, conditional on the continent fixed effects.

RELATIVE FEMALE ADVANTAGE IN COGNITION AND PROTESTANTISM



Note: This is the relationship between the proportion of Protestants and gender difference in measures of cognition, conditional on the continent fixed effects.

GENDER DIFFERENCES IN COGNITION, GENDER-ROLE ATTITUDES AND PROTESTANTISM

	Gender-role attitudes	Relative female advantage in:		
		Immediate word recall	Delayed word recall	Fluency
		2SLS	2SLS	2SLS
First stage				
Gender-role attitudes		-0.307*** (0.079)	-0.456*** (0.117)	-0.241** (0.095)
% Protestants	-0.285*** (0.050)			
America	-0.037 (0.048)	0.012 (0.022)	0.023 (0.033)	-0.019 (0.034)
Asia	0.115** (0.041)	-0.019 (0.023)	-0.030 (0.034)	0.004 (0.026)
Africa	0.300*** (0.051)	-0.035 (0.026)	-0.071* (0.039)	-0.018 (0.030)
Intercept	0.355*** (0.019)	0.126*** (0.023)	0.210*** (0.035)	0.036 (0.028)
F-tests of the excluded instrument	32.60			
Wu-Hausman Endogeneity test (p-value)		0.182	0.282	0.250
N	27	27	27	26

GENDER-ROLE ATTITUDES AND RELIGIOSITY

- Alternative instrument: Secularization (the historical process in which religion loses social and cultural significance).
- While Protestantism is the most progressive religion regarding gender-role, all religions still have a traditional view on gender norms and the family (Guiso, Sapienza and Zingales, 2003; Seguino, 2011).
- One advantage of using secularization as an instrument is that it varies not only across countries but also across cohorts.
- The question is available in the World Values Survey: "How important is religion in your life? Very important/quite important/not important/not at all important."

GENDER DIFFERENCES IN COGNITION , GENDER-ROLE ATTITUDES AND RELIGIOSITY

	Gender-role attitudes	Relative female advantage in:		
		Immediate recall	Delayed recall	Fluency
	First stage	2SLS	2SLS	2SLS
Gender-role attitudes		-0.316*** (0.114)	-0.648*** (0.188)	-0.170* (0.091)
% religion very important	0.582*** (0.096)			
Country fixed effects	Yes	Yes	Yes	Yes
Cohort fixed effects	Yes	Yes	Yes	Yes
F-test of excluded instrument	36.81			
Endogeneity test (p-value)		0.051	0.042	0.897
N	81	81	81	78

CONCLUSIONS

- Using comparable data about cognition from 27 countries, covering one-half of the world population, we analyse the relationship between gender-role attitudes and gender differences in cognition at older age.
- Gender differences in cognition are strongly associated with gender-role attitudes across countries.
- This association is robust to the inclusion of country fixed effects and cohort fixed effects.
- Further results tend to suggest that this association is not driven by reverse causality.
- Those results highlight another important aspect to take into account in assessing the outcomes associated to policies promoting gender equality, especially in an ageing society where cognition is playing an increasing role for the well-being of older individuals.

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