Looking up the right answer:
Errors of optimization when answering political knowledge questions in web surveys

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General Online Research Conference
Cologne (Germany) – March 6 to 8, 2019

Introduction I

- Political knowledge is a key determinant affecting outcomes in public opinion research.

- Many surveys employ political knowledge questions.
  - *American National Election Study (ANES).*
  - *Eurobarometer.*

- In interviewer-based surveys, respondents who do not know the answer have two options.
  - *Confessing their lack of knowledge.*
  - *Guessing the answer.*

Introduction II

- In self-administered web surveys there is a further option.
  - *Looking up answers on the Internet.*

- Looking up answers causes measurement error.
  - *Drawing on "procedural" instead of "declarative" memory.*
  - *Researchers usually want to know what respondents can recall.*

- Unlike errors committed by satisficing, errors caused by looking up answers can be seen as a kind of "optimization error".

- Only few studies provide insights into the prevalence and factors of optimization errors in political knowledge questions.

Introduction III

- This gap of knowledge is partially closed by researchers relying on …
  - *self-reports,*
  - *response times,*
  - *comparing knowledge scores across survey modes,*
  - *comparing proportions of right answers with expected proportions by chance.*
- These methods do not provide strong evidence of optimization errors when answering political knowledge questions.
- Thus, we conducted a web survey experiment exploring optimization errors using JavaScript "onblur" functions.
  - *Detecting tab and window switching during question answering.*
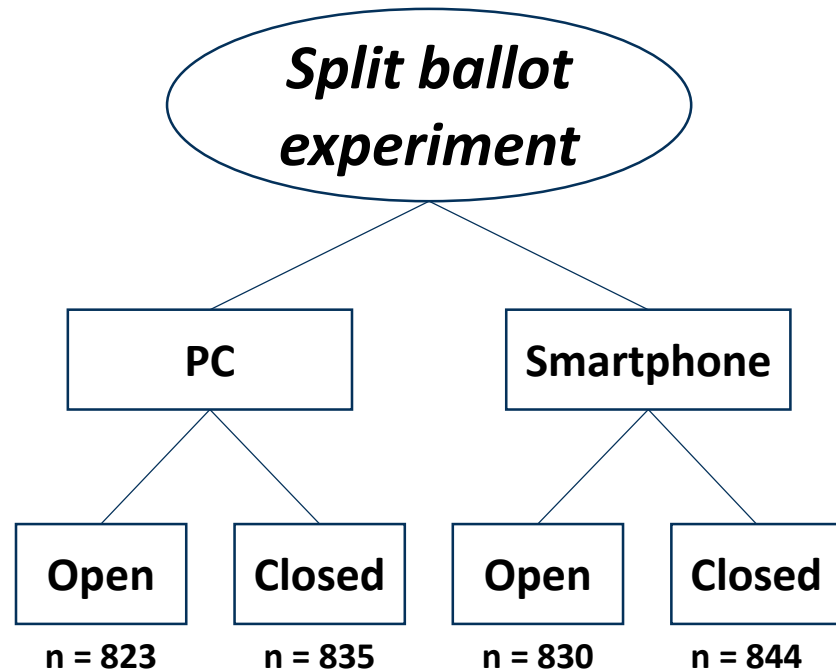
Research Questions

What is the prevalence …

… of optimization errors in political knowledge questions with open and closed response formats in multi-device web surveys? (RQ1)

… of correct answers to political knowledge questions with open and closed response formats in multi-device web surveys? (RQ2)

What are the factors …

… of correct answers to political knowledge questions with open and closed response formats in multi-device web surveys? (RQ3)

Methods: Research Design

```
        ┌─────────────────┐
        │   Split ballot  │
        │   experiment    │
        └─────────────────┘
           /           \
     ┌────────┐    ┌────────────┐
     │   PC   │    │ Smartphone │
     └────────┘    └────────────┘
      /      \        /      \
  ┌──────┐ ┌──────┐ ┌──────┐ ┌──────┐
  │ Open │ │Closed│ │ Open │ │Closed│
  └──────┘ └──────┘ └──────┘ └──────┘
  n = 823  n = 835  n = 830  n = 844
```

- We drew a cross-quota sample based on age, education, and gender.
  - *The quota plan was designed to represent the German population regarding these three demographic characteristics.*
- Respondents were first randomly assigned to a device (PC or smartphone).
- Then, they were randomly assigned to a response format (open or closed).

Methods: Political Knowledge Questions

Note. Question on the president of the European Commission (Jean-Claude Juncker). We randomized the order of the answer options in the closed response format to limit order effects.

- We developed 3 questions dealing with the EU.
  - *Including an instruction asking to answer as accurately as possible.*
- Questions were in German.
- We used an optimized survey layout.
  - *Avoiding horizontal scrolling and facilitating navigation.*
  - *Increasing device comparability.*

Methods: Sample Characteristics

The study was conducted in Germany in September/October 2018.

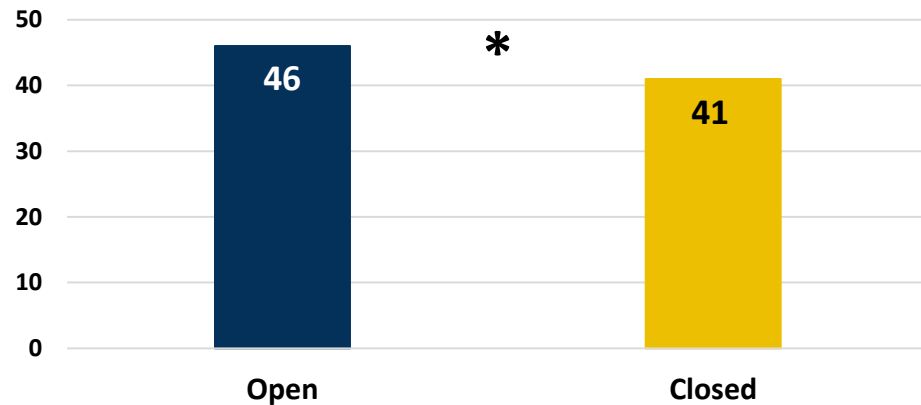|	
Final sample size:	*N = 3,332 (participation rate: 9.1%)*
Age (in years):	*Mean = 47.1*
Gender:	*49.9% female*
Education:	*37.0% lower secondary school (low)*
	30.4% intermediate secondary school (middle)
	32.6% at least college preparatory secondary school (high)
Daily usage:	*PC: 63.2%, smartphone: 87.8%, and internet: 94.5%*
Survey participation:	*Mean = 65.6 (last 12 months)*

Note. There were no statistically significant differences regarding age, gender, education, and internet usage between the four experimental groups. However, there were statistically significant differences regarding computer usage, smartphone usage, and survey participation.

Methods: Analytical Strategy

- Prevalence of optimization errors (percentages) across all three questions.
  - *Browser tab or window switching (JavaScript onblur functions).*
    - *Tests showed that it takes ~5 sec (PC) and ~10 sec (smartphone) to look up the answer online.*
- Prevalence of correct answers (percentages) across all three questions.
- Factors of correct answers across all three questions.
  - *Multivariate binary logistic regression.*
  - *Each question was treated as single observation.*
    - *Adjusted model to account for clustering observations within respondents.*
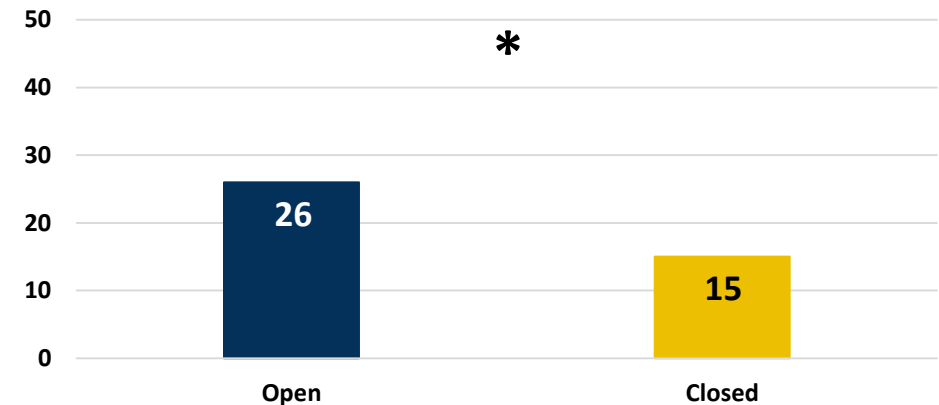
Results: Prevalence of Optimization Error

**PC – Questions 1 to 3
(% switching)**

50		
40	46	41
30		
20		
10		
0	Open	Closed

*

Note.*p < 0.05. Result of a chi-square test. We used only switching events that lasted at least 5 sec.
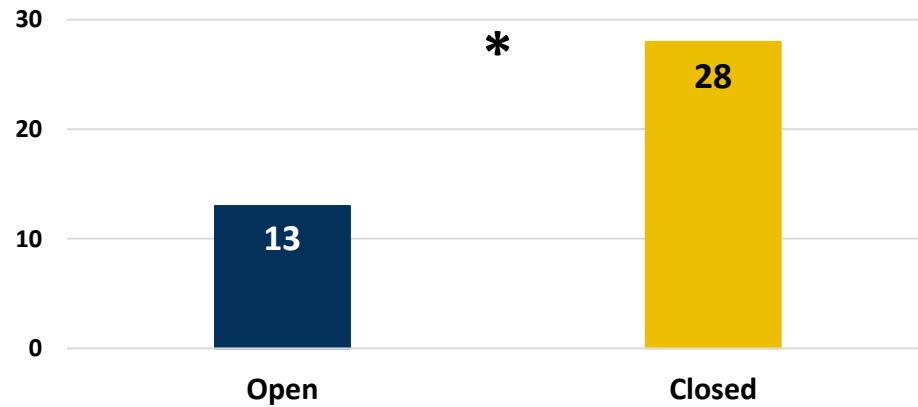
**Smartphone – Questions 1 to 3
(% switching)**

*

Note.*p < 0.05. Result of a chi-square test. We used only switching events that lasted at least 10 sec.

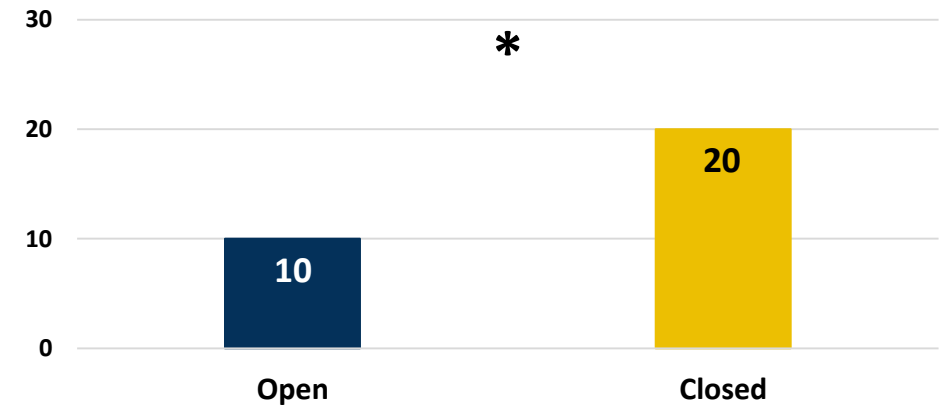# Results: Prevalence of Correct Answers

PC – Questions 1 to 3
(% correct answers)

*Note.*p < 0.05. Result of a chi-square test.*

Smartphone – Questions 1 to 3
(% correct answers)

*Note.*p < 0.05. Result of a chi-square test.*

Results: Factors of Correct Answers

Independent variables	Odds ratio	Robust standard errors
Smartphone	1.13[+]	0.07
Open	0.42*	0.02
Switching	6.67*	0.42
Survey difficulty	0.94*	0.02
Survey enjoyment	1.05*	0.02
Need for cognition	1.03*	0.01
Education low (ref.: high)	0.76*	0.05
Education middle (ref.: high)	0.85*	0.05
Age	1.01*	0.00
Female	0.81*	0.04

Observations: 8,172
Wald $\chi^2(17)$: 1,149
Pseudo R^2: 0.22

*Note. [+]$p < 0.10$; *$p < 0.05$. Logistic regression. We treated each question as single observation and adjusted for clustering observations within respondents. Dependent variable: correct answers. The intercept is statistically significant.*

Discussion and Conclusion

- There is a high prevalence of optimization errors in political knowledge questions.
- The prevalence of correct answers varies across devices and response formats.
- There are several factors affecting correct answers.
- Optimization errors in political knowledge questions artificially inflate political knowledge scores.
- JavaScript onblur functions are a promising method to explore optimization errors in web surveys.

Future Perspectives

- Testing more questions with different topics.
  - *Systematically varying question difficulty.*
- Conducting cross-national/cultural comparisons.
  - *For instance, across countries in the European Union.*
- Using probability-based samples.
  - *Less experienced respondents.*
  - *Increasing generalizability of the results.*

Many thanks for your attention!

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Appendix: Political Knowledge Questions I

- Member states of the European Union (closed response format only)

    How many member states does the European Union consist of?

    Please, answer the question as accurately as possible.

    Answer options: 12; 19; 26; 28; 33 (correct answer: 28)

- President of the European Union (closed response format only)

    Who is the current President of the European Commission?

    Please, answer the question as accurately as possible.

    Answer options: José Manuel Barroso; Mario Draghi; Jean-Claude Juncker; Antonio Tajani; Donald Tusk (correct answer: Jean-Claude Juncker)*

Appendix: Political Knowledge Questions II

- Delegates of the European Parliament (closed response format only)

    How many delegates does the European Parliament currently comprise?

    Please, answer the question as accurately as possible.

    Answer options: 498; 553; 631; 702; 751 (correct answer: 751)