A New Experiment On The Use Of Images To Answer Web Survey Questions

Oriol J. Bosch | The London School of Economics / RECSM-UPF

Melanie Revilla | RECSM-UPF

Daniel Qureshi | University of Mannheim

Jan K. Höhne | University of Mannheim/ RECSM-UPF

BACKGROUND

Using Images in Web Surveys

3 potential opportunities

1) Potential for improving how we collect data and studying new research questions

BACKGROUND

Using Images in Web Surveys

3 potential opportunities

1) Potential for improving how we collect data and studying new research questions
   - Images can provide **rich and detailed information**

BACKGROUND

Using Images in Web Surveys

3 potential opportunities

1) Potential for improving how we collect data and studying new research questions
   - Images can provide **rich and detailed information**
   - Images are **free of human memory limitations**.

BACKGROUND

Using Images in Web Surveys

3 potential opportunities

1) Potential for improving how we collect data and studying new research questions
   - Images can provide **rich and detailed information**
   - Images are **free of human memory limitations**.
   - Images can allow to better collect **objective data** (e.g. receipts), **physical information** (e.g. height) **or device information** (e.g. screenshots of app use).

BACKGROUND

Using Images in Web Surveys

3 potential opportunities

1) Potential for improving how we collect data and studying new research questions
   - Images can provide **rich and detailed information**
   - Images are **free of human memory limitations**.
   - Images can allow to better collect **objective data** (e.g. receipts), **physical information** (e.g. height) **or device information** (e.g. screenshots of app use).

2) Taking and sharing images is one of the **most popular online activities**. Images can make surveys **more engaging**.

BACKGROUND

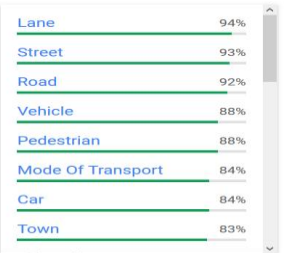
Using Images in Web Surveys

3 potential opportunities

1) Potential for improving how we collect data and studying new research questions
   - Images can provide **rich and detailed information**
   - Images are **free of human memory limitations**.
   - Images can allow to better collect **objective data** (e.g. receipts), **physical information** (e.g. height) **or device information** (e.g. screenshots of app use).

2) Taking and sharing images is one of the **most popular online activities**. Images can make surveys **more engaging**.

3) Computer vision allows to use and develop algorithms to **automatically extract information** from images



Using Images in Web Surveys

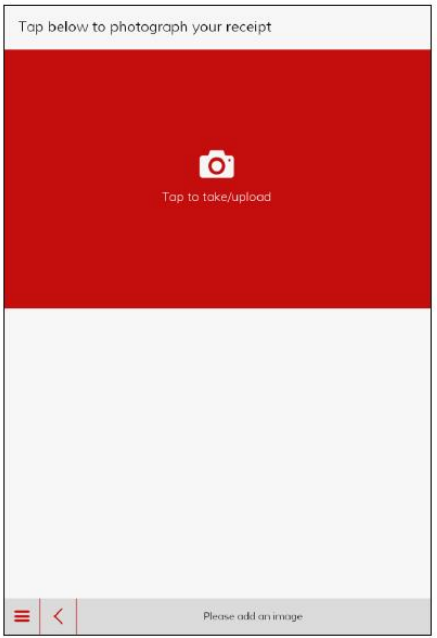
Previous literature

- Jackle et al. (2019): upload **photos of receipts** to fill in **consumption diaries**.

Using Images in Web Surveys

Previous literature

- Jackle et al. (2019): upload **photos of receipts** to fill in **consumption diaries**.

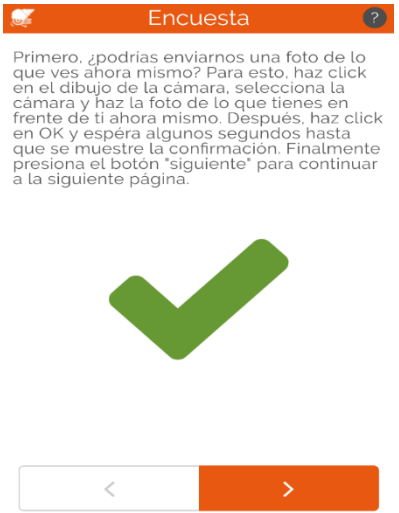


Wenz and Jackle (2018). *Quality of expenditure data collected with a receipt scanning app in a probability household panel*. Paper presented at the General Online Reseaerch 2018 conference.

Using Images in Web Surveys

Previous literature

- Jackle et al. (2019): upload **photos of receipts** to fill in **consumption diaries**.
- Bosch et al. (2018)
  - **53.1%** uploaded a photo taken in-the-moment
  - **58.6%** uploaded an already saved image



Research questions

RQ1) What is the effect of answering open-ended survey questions with images instead of typing text on:

- break-off
- item nonresponse
- completion time
- question evaluation?

RQ2) What is the effect of including a motivational message on the same four aspects?

RQ3) How PC and smartphone respondents differ in terms of the same aspects?

OUR STUDY

OUR STUDY

Experimental Design

Two-step random assignment

1) Respondents randomly invited to answer through PC or Smartphone. Half of the sample answered with PCs, half with Smartphones.

2) Within PC and Smartphone groups, respondents assigned to:

1) Control group answering open-ended questions using text entry
2) Treatment group answering open-ended questions with images
3) Second treatment group answering open-ended questions with images but including a motivational message

OUR STUDY

Experimental Design

Two-step random assignment

1) Respondents randomly invited to answer through PC or Smartphone. Half of the sample answered with PCs, half with Smartphones.

2) Within PC and Smartphone groups, respondents assigned to:

1) Control group answering open-ended questions using text entry
2) Treatment group answering open-ended questions with images
3) Second treatment group answering open-ended questions with images but including a motivational message

	PC			**Smartphone**		
	Text	Image	ImagePush	Text	Image	ImagePush
Answer format	Text	Image	Image	Text	Image	Image
Motivational message	No	No	Yes	No	No	Yes

OUR STUDY

Data

Population of interest

Population aged between 18 and 70 years living in Germany

Quotas

Quotas for age and gender using the German Microcensus

Data collection

15th July – 8th August 2019

Respondi opt-in online panel

Final sample for analyses

3,043 respondents completed the survey until the end of our experiment.

OUR STUDY

Data

Population of interest

Population aged between 18 and 70 years living in Germany

Quotas

Quotas for age and gender using the German Microcensus

Data collection

15th July – 8th August 2019

Respondi opt-in online panel

Final sample for analyses

3,043 respondents completed the survey until the end of our experiment.

Survey experiment

- Experiment placed at the end of the survey
- A maximum of 86 questions before
- Variety of topics: politics, work, and personality
- Questions
  - PC: 2 open questions
  - Smartphone: 4 open questions
  - Satisfaction and usability questions afterwards

OUR STUDY

Data

The questions

Name	Question
Vacation (All)	Think about your last vacation. Please, describe the favorite place that you visited (e.g. landscape or monument). *Please type in your answer in the open field below.*
Dish (All)	Now think about your favorite dish. Please, tell us what your favorite dish is. *Please type in your answer in the open field below.*
Location (S)	From where are you answering this survey? Please describe what you see right now. *Please type in your answer in the open field below.*
Feeling (S)	Please describe how you feel right now. *Please type in your answer in the open field below.*

OUR STUDY

Data

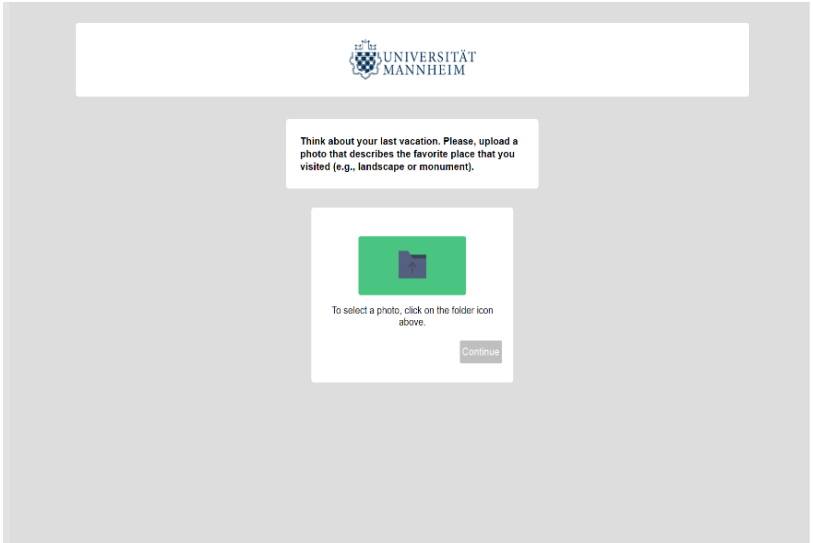
The questions

Name	Question
Vacation (All)	Think about your last vacation. Please, upload a photo that describes the favorite place that you visited (e.g. landscape or monument). *To select a photo, click on the folder icon above.*
Dish (All)	Now think about your favorite dish. Please, tell us what your favorite dish is. *Please type in your answer in the open field below.*
Location (S)	From where are you answering this survey? Please describe what you see right now. *Please type in your answer in the open field below.*
Feeling (S)	Please describe how you feel right now. *Please type in your answer in the open field below.*

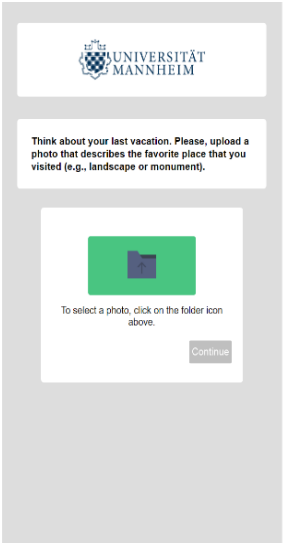
OUR STUDY

Image Tool Design

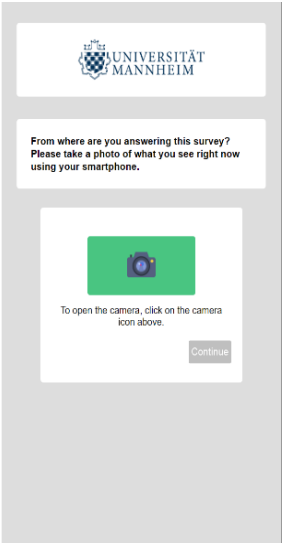
Desktop



Smartphone-Upload



Smartphone-Take



Experimental groups are compared for each question with respect to:

1. **Break-off:** proportion of participants abandoning the survey
2. **Item nonresponse:** for those who did not break-off, proportion of respondents not answering
3. **Completion time:** for those who answered, difference between the time a respondent clicked “next” on the survey page minus the time he/she entered the page, controlling for outliers
4. **Question evaluation:** proportion of those that liked and found the questions easy to a certain or great extent

OUR STUDY

Analyses

Comparisons

RQ1. Effect of asking respondents to upload an image or to take a photo in-the-moment instead of typing in text to answer open-ended questions:

PC			**Smartphone**		
Text	Image	ImagePush	Text	Image	ImagePush

OUR STUDY

Analyses

Comparisons

RQ2. Effect of adding a motivational message:

PC			Smartphone		
Text	Image	ImagePush	Text	Image	ImagePush

RQ3. Examine the differences between PC and smartphone respondents:

PC			Smartphone		
Text	Image	ImagePush	Text	Image	ImagePush

MAIN RESULTS

Break-off

Proportion of participants breaking-off for each question and group

	PC			Smartphone		
	Text	Image	ImagePush	Text	Image	ImagePush
Vacation (%)	.0	1.5**	**.4**	.0	1.8**	1.8**
Dish (%)	.0	**.0**	**.2**	.0	1.4**	1.4**
Location (%)				.2	.2	1.2*
Feeling (%)				.0	.6	.2

*Note: *p < .05. **p < .01. Asterisks in the Image and ImagePush treatment group columns indicate significant differences between the text and image groups. Bold in PC columns indicates a significant difference between devices within a given group. † in ImagePush columns indicates a significant difference between the Image and ImagePush groups*

MAIN RESULTS

Break-off

Proportion of participants breaking-off for each question and group

	PC			Smartphone		
	Text	Image	ImagePush	Text	Image	ImagePush
Vacation (%)	.0	1.5**	**.4**	.0	1.8**	1.8**
Dish (%)	.0	**.0**	**.2**	.0	1.4**	1.4**
Location (%)				.2	.2	1.2*
Feeling (%)				.0	.6	.2

*Note: *p < .05. **p < .01. Asterisks in the Image and ImagePush treatment group columns indicate significant differences between the text and image groups. Bold in PC columns indicates a significant difference between devices within a given group. † in ImagePush columns indicates a significant difference between the Image and ImagePush groups*

RQ1: image groups present significantly higher break-off rates than text groups for 6 out of 12 comparisons

MAIN RESULTS

Break-off

Proportion of participants breaking-off for each question and group

	PC			Smartphone		
	Text	Image	ImagePush	Text	Image	ImagePush
Vacation (%)	.0	1.5**	**.4**	.0	1.8**	1.8**
Dish (%)	.0	**.0**	**.2**	.0	1.4**	1.4**
Location (%)				.2	.2	1.2*
Feeling (%)				.0	.6	.2

*Note: *p < .05. **p < .01. Asterisks in the Image and ImagePush treatment group columns indicate significant differences between the text and image groups. Bold in PC columns indicates a significant difference between devices within a given group. † in ImagePush columns indicates a significant difference between the Image and ImagePush groups*

RQ2: no significant difference between Image and ImagePush

MAIN RESULTS

Break-off

Proportion of participants breaking-off for each question and group

	PC			Smartphone		
	Text	Image	ImagePush	Text	Image	ImagePush
Vacation (%)	.0	1.5**	**.4**	.0	1.8**	1.8**
Dish (%)	.0	**.0**	**.2**	.0	1.4**	1.4**
Location (%)				.2	.2	1.2*
Feeling (%)				.0	.6	.2

*Note: *p < .05. **p < .01. Asterisks in the Image and ImagePush treatment group columns indicate significant differences between the text and image groups. Bold in PC columns indicates a significant difference between devices within a given group. † in ImagePush columns indicates a significant difference between the Image and ImagePush groups*

RQ3: Smartphones overall present significantly higher break-off rates

MAIN RESULTS

Item Nonresponse

Proportion of item nonresponse for each question and group

	PC			Smartphone		
	Text	Image	ImagePush	Text	Image	ImagePush
Vacation (%)	1.8	**38.9****	**33.1****	2.2	25.1**	25.3**
Dish (%)	1.6	**51.6****	**44.9**†**	.9	39.1**	34.9**
Location (%)				.5	35.8**	33.3**
Feeling (%)				.3	51.5**	44.9**†

*Note: *p < .05. **p < .01. Asterisks in the Image and ImagePush treatment group columns indicate significant differences between the text and image groups. Bold in PC columns indicates a significant difference between devices within a given group. † in ImagePush columns indicates a significant difference between the Image and ImagePush groups*

MAIN RESULTS

Item Nonresponse

Proportion of item nonresponse for each question and group

	PC			Smartphone		
	Text	Image	ImagePush	Text	Image	ImagePush
Vacation (%)	1.8	**38.9****	**33.1****	2.2	25.1**	25.3**
Dish (%)	1.6	**51.6****	**44.9**†**	.9	39.1**	34.9**
Location (%)				.5	35.8**	33.3**
Feeling (%)				.3	51.5**	44.9**†

*Note: *p < .05. **p < .01. Asterisks in the Image and ImagePush treatment group columns indicate significant differences between the text and image groups. Bold in PC columns indicates a significant difference between devices within a given group. † in ImagePush columns indicates a significant difference between the Image and ImagePush groups*

RQ1: image groups present significantly higher item nonresponse rates than text groups

MAIN RESULTS

Item Nonresponse

Proportion of item nonresponse for each question and group

	PC			Smartphone		
	Text	Image	ImagePush	Text	Image	ImagePush
Vacation (%)	1.8	**38.9****	**33.1****	2.2	25.1**	25.3**
Dish (%)	1.6	**51.6****	**44.9**†**	.9	39.1**	34.9**
Location (%)				.5	35.8**	33.3**
Feeling (%)				.3	51.5**	44.9**†

*Note: *p < .05. **p < .01. Asterisks in the Image and ImagePush treatment group columns indicate significant differences between the text and image groups. Bold in PC columns indicates a significant difference between devices within a given group. † in ImagePush columns indicates a significant difference between the Image and ImagePush groups*

RQ2: for some questions, motivational messages significantly reduce item nonresponse

MAIN RESULTS

Item Nonresponse

Proportion of item nonresponse for each question and group

	PC			Smartphone		
	Text	Image	ImagePush	Text	Image	ImagePush
Vacation (%)	1.8	**38.9****	**33.1****	2.2	25.1**	25.3**
Dish (%)	1.6	**51.6****	**44.9**†**	.9	39.1**	34.9**
Location (%)				.5	35.8**	33.3**
Feeling (%)				.3	51.5**	44.9**†

*Note: *p < .05. **p < .01. Asterisks in the Image and ImagePush treatment group columns indicate significant differences between the text and image groups. Bold in PC columns indicates a significant difference between devices within a given group. † in ImagePush columns indicates a significant difference between the Image and ImagePush groups*

RQ3: Smartphones present significantly lower item nonresponse rates

MAIN RESULTS

Completion Time

Average completion time in seconds for each question and group

	PC			Smartphone		
	Text	Image	ImagePush	Text	Image	ImagePush
Vacation (%)	42.0	**76.7****	**83.1****	40.3	63.3**	64.2**
Dish (%)	28.5	60.3**†	71.3**	28.7	62.8**	61.5**
Location (%)				27.5	43.8**	42.2**
Feeling (%)				17.5	53.5**	47.4**

*Note: *p < .05. **p < .01. Asterisks in the Image and ImagePush treatment group columns indicate significant differences between the text and image groups. Bold in PC columns indicates a significant difference between devices within a given group. † in ImagePush columns indicates a significant difference between the Image and ImagePush groups*

MAIN RESULTS

Completion Time

Average completion time in seconds for each question and group

	PC			Smartphone		
	Text	Image	ImagePush	Text	Image	ImagePush
Vacation (%)	42.0	**76.7****	**83.1****	40.3	63.3**	64.2**
Dish (%)	28.5	60.3**†	71.3**	28.7	62.8**	61.5**
Location (%)				27.5	43.8**	42.2**
Feeling (%)				17.5	53.5**	47.4**

*Note: *p < .05. **p < .01. Asterisks in the Image and ImagePush treatment group columns indicate significant differences between the text and image groups. Bold in PC columns indicates a significant difference between devices within a given group. † in ImagePush columns indicates a significant difference between the Image and ImagePush groups*

RQ1: image groups present significantly higher completion times than text groups

MAIN RESULTS

Completion Time

Average completion time in seconds for each question and group

	PC			Smartphone		
	Text	Image	ImagePush	Text	Image	ImagePush
Vacation (%)	42.0	**76.7****	**83.1****	40.3	63.3**	64.2**
Dish (%)	28.5	60.3**†	71.3**	28.7	62.8**	61.5**
Location (%)				27.5	43.8**	42.2**
Feeling (%)				17.5	53.5**	47.4**

*Note: *p < .05. **p < .01. Asterisks in the Image and ImagePush treatment group columns indicate significant differences between the text and image groups. Bold in PC columns indicates a significant difference between devices within a given group. † in ImagePush columns indicates a significant difference between the Image and ImagePush groups*

RQ2: mostly no significant effect of motivational messages on completion time

MAIN RESULTS

Completion Time

Average completion time in seconds for each question and group

	PC			Smartphone		
	Text	Image	ImagePush	Text	Image	ImagePush
Vacation (%)	42.0	**76.7****	**83.1****	40.3	63.3**	64.2**
Dish (%)	28.5	60.3**†	71.3**	28.7	62.8**	61.5**
Location (%)				27.5	43.8**	42.2**
Feeling (%)				17.5	53.5**	47.4**

*Note: *p < .05. **p < .01. Asterisks in the Image and ImagePush treatment group columns indicate significant differences between the text and image groups. Bold in PC columns indicates a significant difference between devices within a given group. † in ImagePush columns indicates a significant difference between the Image and ImagePush groups*

RQ3: For *Vacation*, Smartphones present significantly lower completion times

Survey Evaluation

Question evaluation indicators

	PC			Smartphone		
	Text	Image	ImagePush	Text	Image	ImagePush
Liked (%)	52.7	**20.0****	16.5**	47.3	12.4**	12.8**
Easy (%)	80.1	**54.2****	51.2**	79.0	45.9**	45.7**

*Note: *p < .05. **p < .01. Asterisks in the Image and ImagePush treatment group columns indicate significant differences between the text and image groups. Bold in PC columns indicates a significant difference between devices within a given group. † in ImagePush columns indicates a significant difference between the Image and ImagePush groups*

Survey Evaluation

Question evaluation indicators

	PC			Smartphone		
	Text	Image	ImagePush	Text	Image	ImagePush
Liked (%)	52.7	**20.0****	16.5**	47.3	12.4**	12.8**
Easy (%)	80.1	**54.2****	51.2**	79.0	45.9**	45.7**

*Note: *p < .05. **p < .01. Asterisks in the Image and ImagePush treatment group columns indicate significant differences between the text and image groups. Bold in PC columns indicates a significant difference between devices within a given group. † in ImagePush columns indicates a significant difference between the Image and ImagePush groups*

RQ1: image groups present significantly lower proportion of respondents that liked and found the questions easy

Survey Evaluation

Question evaluation indicators

	PC			Smartphone		
	Text	Image	ImagePush	Text	Image	ImagePush
Liked (%)	52.7	**20.0****	16.5**	47.3	12.4**	12.8**
Easy (%)	80.1	**54.2****	51.2**	79.0	45.9**	45.7**

*Note: *p < .05. **p < .01. Asterisks in the Image and ImagePush treatment group columns indicate significant differences between the text and image groups. Bold in PC columns indicates a significant difference between devices within a given group. † in ImagePush columns indicates a significant difference between the Image and ImagePush groups*

RQ2: no significant difference between Image and ImagePush

MAIN RESULTS

Survey Evaluation

Question evaluation indicators

	PC			Smartphone		
	Text	Image	ImagePush	Text	Image	ImagePush
Liked (%)	52.7	**20.0****	16.5**	47.3	12.4**	12.8**
Easy (%)	80.1	**54.2****	51.2**	79.0	45.9**	45.7**

*Note: *p < .05. **p < .01. Asterisks in the Image and ImagePush treatment group columns indicate significant differences between the text and image groups. Bold in PC columns indicates a significant difference between devices within a given group. † in ImagePush columns indicates a significant difference between the Image and ImagePush groups*

RQ3: For *Image*, Smartphones present significantly lower proportion of respondents that liked and found the questions easy

CONCLUSIONS

CONCLUSIONS

Main Results

Research Question	Break-off	Item-nonresponse	Completion time	Question evaluation
RQ1	Higher for Image/ImagePush	Higher for Image/ImagePush	Higher for Image/ImagePush	Lower for Image/ImagePush
RQ2	No significant difference	Lower for ImagePush (for some questions)	No significant difference	No significant difference
RQ3	Higher for Smartphone	Lower for Smartphone	Lower for Smartphone (for some questions)	Lower for Smartphone

CONCLUSIONS

Main Results

The impact of answering with images instead of text

Research Question	Break-off	Item-nonresponse	Completion time	Question evaluation
RQ1	Higher for Image/ImagePush	Higher for Image/ImagePush	Higher for Image/ImagePush	Lower for Image/ImagePush
RQ2	No significant difference	Lower for ImagePush (for some questions)	No significant difference	No significant difference
RQ3	Higher for Smartphone	Lower for Smartphone	Lower for Smartphone (for some questions)	Lower for Smartphone

CONCLUSIONS

Main Results

The effect of including a motivational message

Research Question	Break-off	Item-nonresponse	Completion time	Question evaluation
RQ1	Higher for Image/ImagePush	Higher for Image/ImagePush	Higher for Image/ImagePush	Lower for Image/ImagePush
RQ2	No significant difference	Lower for ImagePush (for some questions)	No significant difference	No significant difference
RQ3	Higher for Smartphone	Lower for Smartphone	Lower for Smartphone (for some questions)	Lower for Smartphone

CONCLUSIONS

Main Results

Differences between PC and smartphone

Research Question	Break-off	Item-nonresponse	Completion time	Question evaluation
RQ1	Higher for Image/ImagePush	Higher for Image/ImagePush	Higher for Image/ImagePush	Lower for Image/ImagePush
RQ2	No significant difference	Lower for ImagePush (for some questions)	No significant difference	No significant difference
RQ3	Higher for Smartphone	Lower for Smartphone	Lower for Smartphone (for some questions)	Lower for Smartphone

CONCLUSIONS

Limits and Next Steps

Limits

- Opt-in panel
- PC and Smartphone subsamples are unbalanced
- Not looked at data quality indicators (e.g. information conveyed)

Next steps

- Reduce break-off rates and item nonresponse
  - E.g. higher incentives and remark confidentiality without prompting privacy concerns
- New questions, applications and samples
  - Explore questions that might have a higher substantive interest
  - Explore the results for a probabilistic sample

Thank You!

Questions?

Oriol J. Bosch | o.bosch-jover@lse.ac.uk

- Comparing differences across experimental groups:
  - Z-tests for proportions.
  - T-tests for means.
  - Before running T-tests: Levene's tests to assess whether the variances between groups were equal or not.

- PC and Smartphone groups not equivalent & nonresponse affects comparability between groups
  - Logistic and OLS regressions to control for imbalance.