New Opportunities to Enhance or Replace Conventional Web Survey Data

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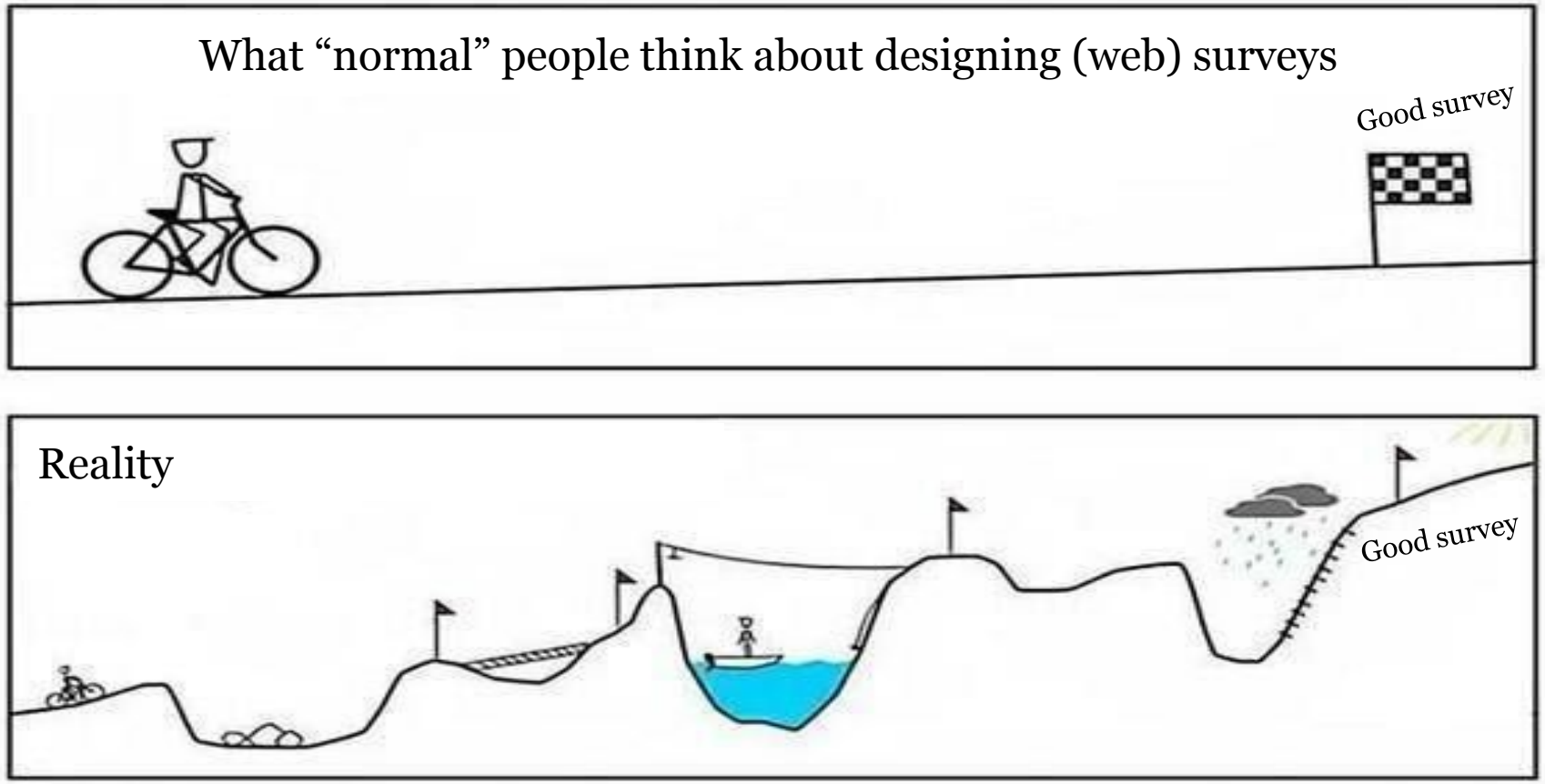
Why do we need to enhance or replace web survey data?

Importance of (web) surveys

- Surveys: most frequently used method for collecting data in many disciplines
- Results used by key actors to take decisions
- Web surveys: more and more common nowadays
  - 35% spent on research using (mobile) web, vs 11% for telephone and 8% for face-to-face (ESOMAR, 2019)
  - With pandemic, switch from other modes to web mode even quicker

WHY DO WE NEED TO ENHANCE?

Problem: Designing good (web) surveys is (very) hard



WHY DO WE NEED TO ENHANCE?

Surveys suffer from errors

- Both on representation and measurement sides

Very difficult to implement true random sampling

Even when this is possible, non-contact and non-response are usually high
(e.g., RR=30.6% only in Germany in ESS[1] Round 8)

Selection bias in who participate vs not

Final sample of respondents often differ from target population on key variables

Weighting can help but sometimes it creates even more bias

[1] http://www.europeansocialsurvey.org/docs/round8/methods/ESS8_quality_matrix.pdf

WHY DO WE NEED TO ENHANCE?

Surveys suffer from errors

- Both on representation and measurement sides

People do not know everything surveys ask about

Remembering-self ≠ experiencing-self (Kahneman & Riis, 2005)

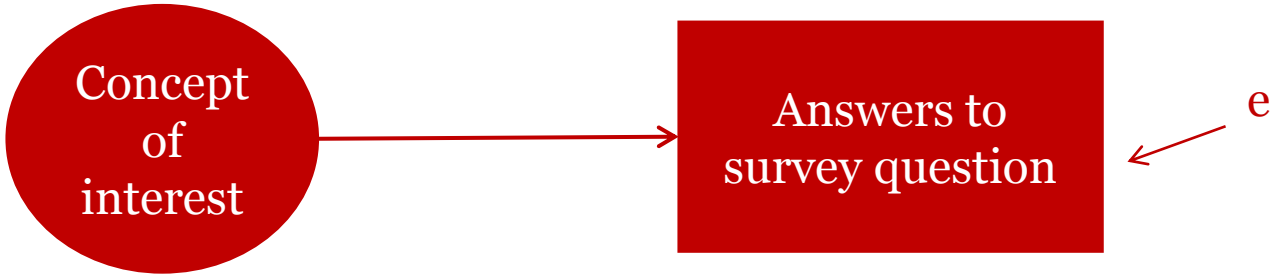
To err is human

Lack of effort / satisficing

Social desirability

Errors on measurement side

- Measurement errors in surveys are large overall
  - Average **measurement quality** for 67 ESS questions across up to 41 country-language groups **= 0.65** (Poses et al. 2021)



Errors on measurement side

- Measurement errors in surveys are large overall
  - Average **measurement quality** for 67 ESS questions across up to 41 country-language groups **= 0.65** (Poses et al. 2021)

- These errors can affect the results substantially

Table 6 Estimates of the parameters with and without correction

	Without correction On allow immigration	With correction for errors On allow immigration
By		
Better life	−.265*	−.609*
Economic threat	−.133*	.001
Cultural threat	−.154*	−.140*
Total explained (R^2)	.254	.547

Source: Saris & Revilla, 2016

→ Wrong decisions

Overall, need to improve measurement for many concepts

- But… How?
  - Need for improvement has been clear for decades
  - Lot of knowledge already on survey errors and how to reduce them
    - E.g., avoid agree-disagree scales
  - But still large measurement errors
  - **What else can we do?**

How could we enhance web survey data?

Main idea

Taking advantage of **new measurement opportunities linked mainly to the growing use of smartphones** to reduce measurement errors in (mobile) web surveys

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Taking advantage of **new measurement opportunities linked mainly to the growing use of smartphones** to reduce measurement errors in (mobile) web surveys

Smartphones are **everywhere**

More people have smartphones than toilets worldwide[1]

Including in **web surveys**

On average, Millennials answer 79% of the surveys using smartphones and Boomers 36% (US Netquest panel 2017/2018; Bosch et al. 2018a)

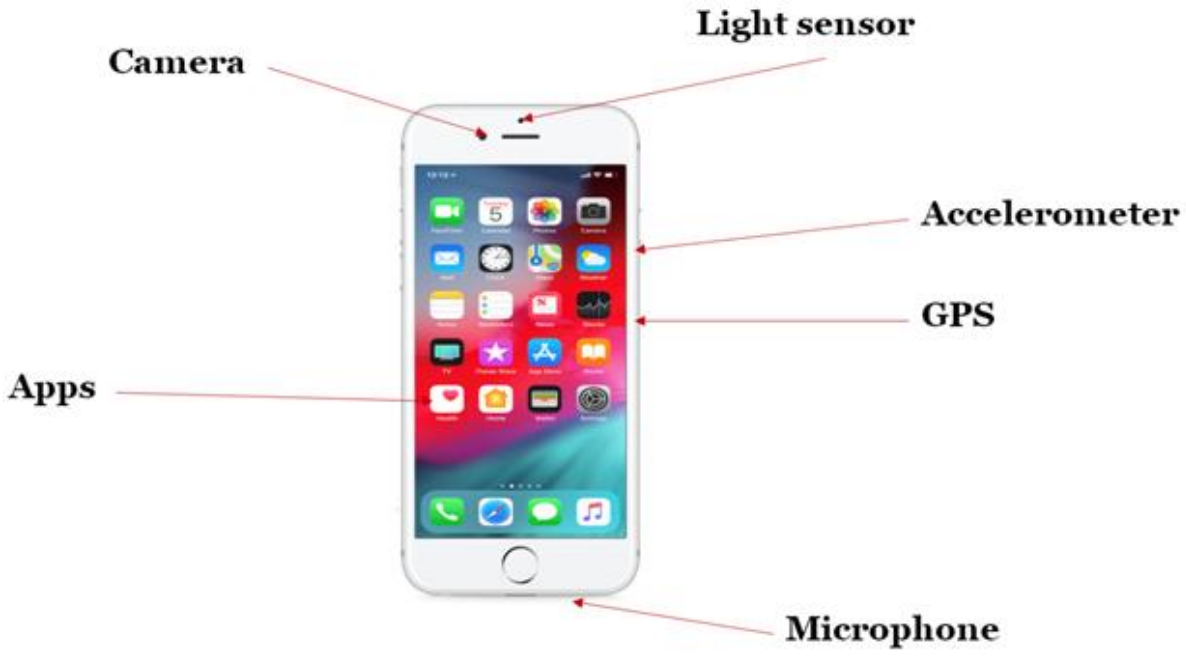
→ **Create both new challenges and new opportunities**

My focus

[1] https://www.globalcitizen.org/en/content/access-denied-toilets-Harpic-Waterorg-RB/

New opportunities

- Opportunities at different levels (e.g., contact respondents)
- Focus on possibility to collect other data types
  - Lots of different data types
  - Each one has its own potential benefits and risks
  - Important to study them separately
  - But also a lot in common



HOW COULD WE ENHANCE?

New data types considered

In-the-moment surveys triggered by such data

METERED DATA

Obtained through a tracking application ("meter") installed by the participants on their devices to register at least the URLs of the webpages visited

GEOLOCATION DATA

Obtained through a tracking application installed on participants' devices to register at least the GPS coordinates

Most of those data can also be collected for PCs

VISUAL DATA

Screenshots
Photos/videos taken in-the-moment
Visual files saved on (or accessible from) the device

VOICE DATA

Dictation
Voice recording

These new data are already used in substantive research

- A few examples
  - Metered data
    - Fake news consumption (e.g., Guess et al. 2020)
    - Time spent online (e.g., Festic et al. 2021)
  - In-the-moment surveys
    - Of people leaving polling stations, to predict an election outcome (e.g., Frankovic, 2012)
    - To evaluate consumers' exposure to advertisement campaigns or access to health services (e.g., Clemens & Ginnis, 2017)
  - Visual data
    - Mosquitoes presence (e.g., Mosquito Alert project[1])
    - Plants diseases (e.g., Kaur et al. 2019)
  - Voice data
    - Level of literacy (ask respondents to read loud some text)
    - Survey panelists' children

[1] http://www.mosquitoalert.com/en/

How could these data help?

HOW COULD THE NEW DATA TYPES HELP?

Expected benefits

Researchers

- Reduce some of the issues related to measurement errors

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- Massive amount of data
- Real time / continuous (passively collected data)

Participants

- Reduce time dedicated to provide information
- Reduce efforts

→ Potential to **answer new research questions**

HOW COULD THE NEW DATA TYPES HELP?

Expected benefits

Nutrition Facts

Chicken with Mushroom Gravy

Serving Size: 1 Serving (328g)

Amount Per Serving	
Calories 398	Calories from Fat 155
	% Daily Value*
Total Fat 17g	26%
Saturated Fat 7.8g	39%
Trans Fat 0.4g	
Polyunsaturated Fat 6g	
Monounsaturated Fat 1.8g	
Cholesterol 152mg	51%
Sodium 730mg	30%
Potassium 569mg	16%
Total Carbohydrates 8.5g	3%
Dietary Fiber 0.9g	4%
Sugars 0.7g	
Protein 50g	
Vitamin A	6.3%
Vitamin C	2.3%
Calcium	1%
Iron	15%

* Percent Daily Values are based on a 2000 calorie diet.

→ Potential to **answer new research questions**

HOW COULD THE NEW DATA TYPES HELP?

Expected benefits

Researchers

- Reduce some of the issues related to measurement errors
- Massive amount of data
- Real time / continuous (passive data)

Participants

- Reduce time dedicated to provide information
- Reduce efforts
- More enjoyable

→ Potential to **answer new research questions**

What about the disadvantages?

POTENTIAL PROBLEMS

Expected disadvantages as well

Researchers

- Selection bias in who participates
- New types of errors (e.g., technological errors)
- Need to adapt tools for data collection
- New skills needed for analyses
- More expensive
- Dependence on private companies
- Ethical / data protection issues

Participants

- Privacy issues
- Loss of control
- New skills needed (e.g. install an app)

Do they really help?

Do we observe in practice the expected benefits?

- First studies do not provide strong support
- But it depends on:
  - the concepts of interest
  - the data types
  - how we use these data exactly
  - the target population
  - etc.
- More research needed
- It is clear that these new data types cannot enhance/replace all conventional survey questions

Are the benefits higher than the disadvantages?

- Need to balance benefits and disadvantages
- Considering both researchers and participants
- Not enough research yet to know if benefits > disadvantages
- Surely depends on many aspects (concept of interest, etc)
- Researchers need to consider each specific case
- Problem: not yet enough information to take informed decisions

→ Working in different directions to learn more about these data

Some of the research we did or are doing

WHAT WE DID OR ARE DOING

Metered data

Create a framework

Total error framework for metered data = adaptation of the total survey error (TSE) framework to metered data → explain all possible errors (Bosch & Revilla, 2021)

Apply the framework

Estimate the size of tracking undercoverage

Study the validity of metered measures

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Total error framew … urvey error (TSE) framework to mete … Revilla, 2021)

Error components	Specific error causes
Specification error	– Measuring concepts from which not enough data is available – Inferring attitudes – Defining valid information
Measurement error	– Non-trackable target – Meter not installed – Uninstalling the meter – New non-tracked device – Technology limitations – Technology errors – Hidden behaviours – Shared device – Social desirability – Extraction error
Processing error	– Coding error – Aggregation at the domain level – Data anonymization
Coverage error	– Non-trackable individuals
Sampling error	– Same error causes than for surveys
Missing data error	– Noncontact – Non-consent – Non-trackable target – Meter not installed – Uninstalling the meter – New non-tracked device – Technology limitations – Technology error – Hidden behaviour – Social desirability – Extraction error

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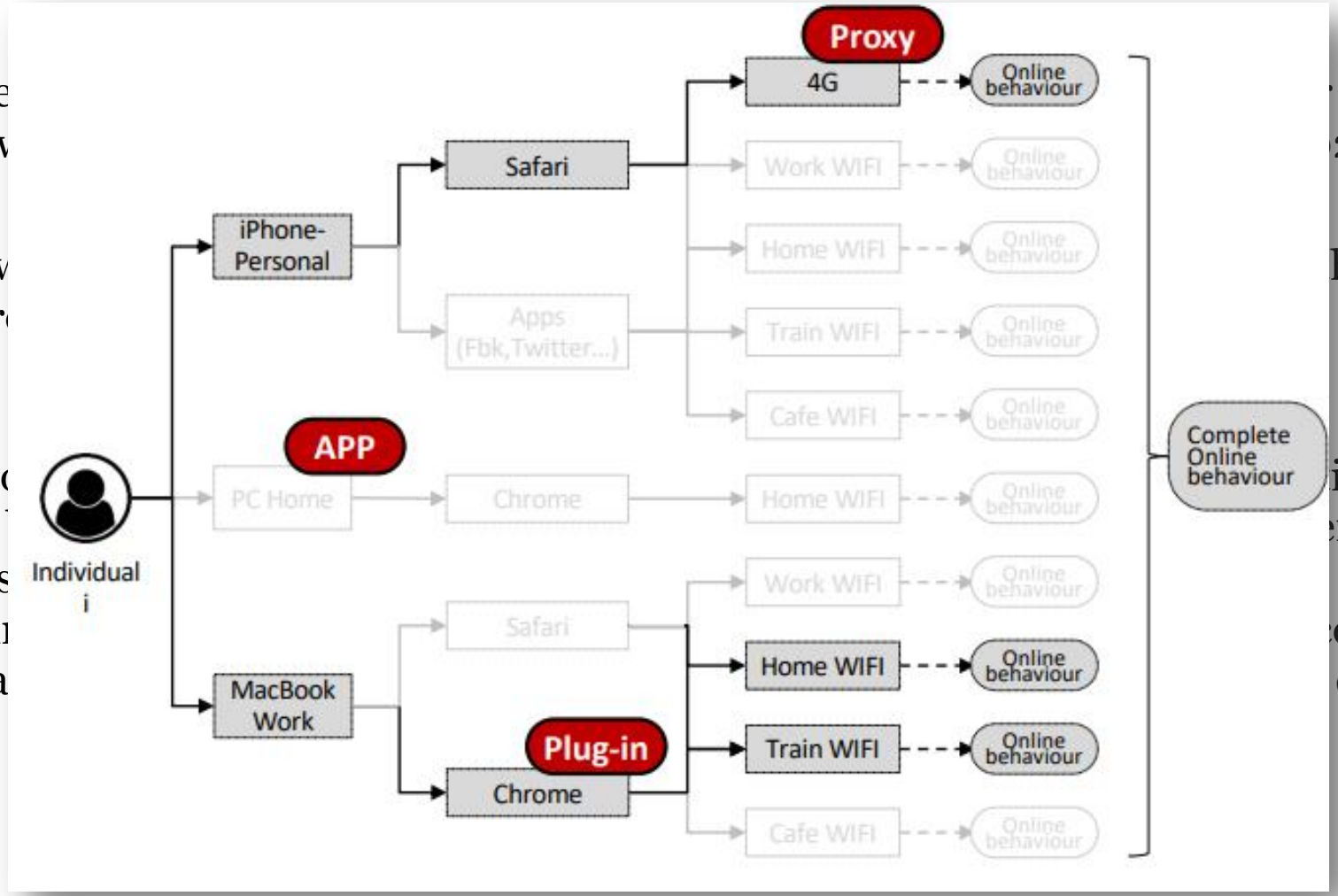

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web data opp

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Study the validity of metered measures	Most research using metered data assume the measurement is perfect. Clearly not true, but to what extent? Focus on "online news media exposure" (Bosch & Revilla, 2022b). Study convergent and predictive validity (using political knowledge as correlate). Look at the impact of different design choices (e.g., which list of media news domain was used, how many media on those lists, how many days of metered data collection, etc.).

WHAT WE DID OR ARE DOING

In-the-moment surveys

Create a tool

Acceptance and coverage of fast invitation methods

Study the willingness and its determinants

Implement experiments

WebdataNow: allows implementing in-the-moment surveys triggered by metered data or by geolocation data.

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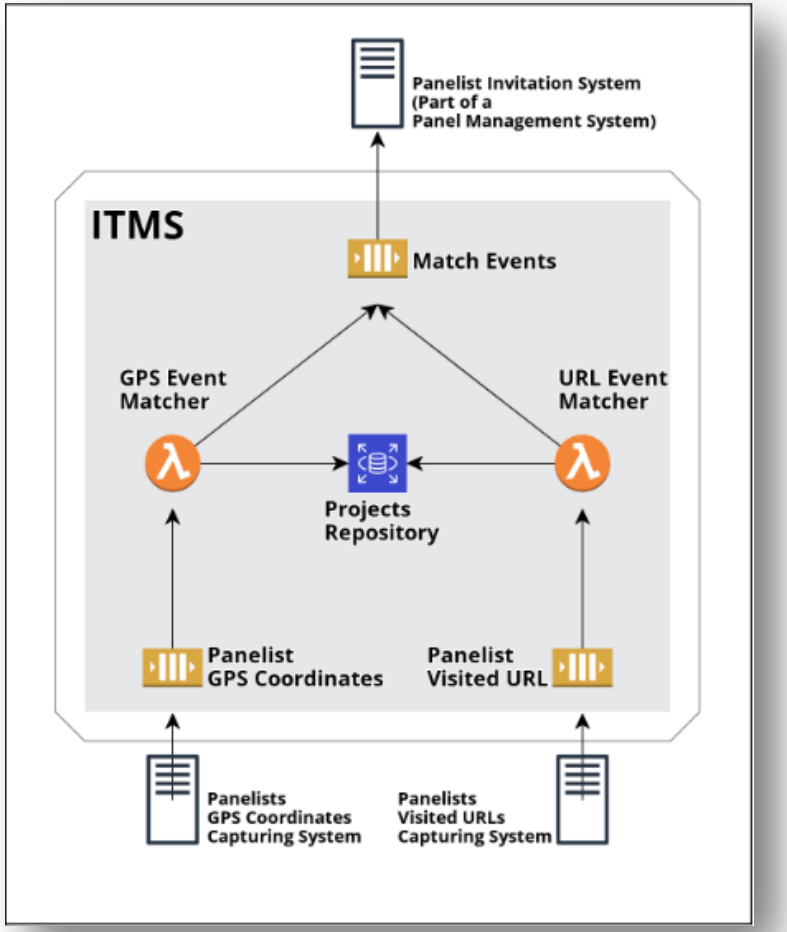

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Acceptance and coverage of fast invitation methods

Participation in in-the-moment surveys require that invited units see the survey notification quickly enough. Thus, information about acceptance and coverage of different invitation methods (e.g., sms, app-notification, etc) and which one participants see first is crucial. Results show that invitation through a mobile app is the best option and that using more than one method is recommended (Ochoa & Revilla, 2022a).

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Study the willingness and its determinants

2 online surveys including conjoint experiments, one for surveys triggered by metered data and one for surveys triggered by geolocation data. Willingness to participate in in-the-moment survey is high. Main limitation is willingness to share the passive data needed to trigger the surveys. Different attributes (incentive, length of the survey, etc) affect the willingness to participate (Ochoa & Revilla, 2022b).

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Implement experiments	Crucial because willingness is not enough to guarantee participation. Practical issues can play an important role.

WHAT WE DID OR ARE DOING

Visual data

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Implement experiments

Try to disentangle the mechanisms behind non-response

Prepare a guide about classification of images

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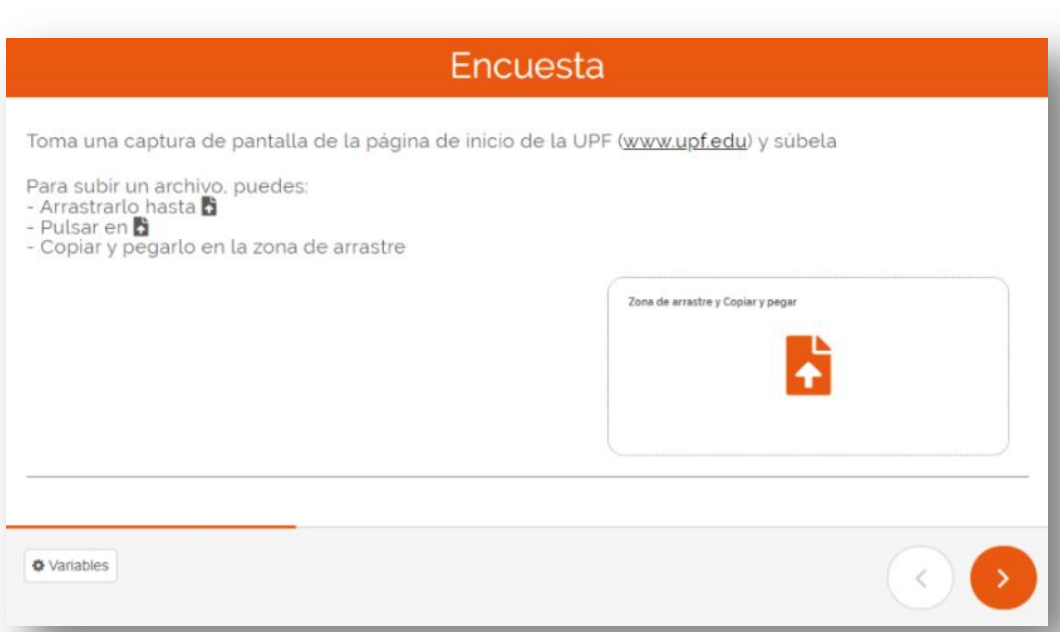

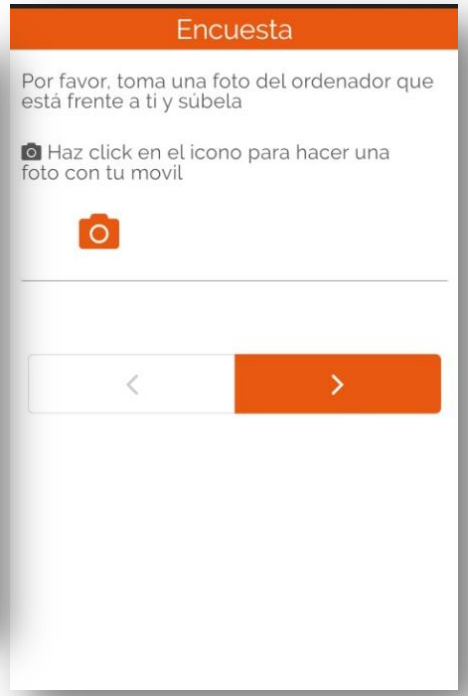

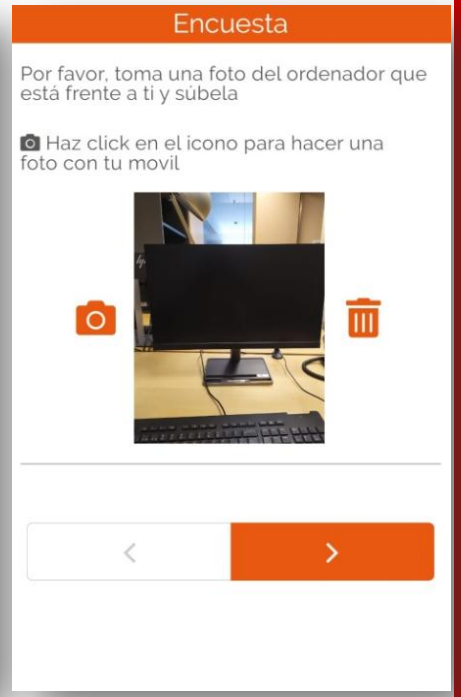

More information available at: https://www.upf.edu/web/webdataopp/tools

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Ask participants of opt-in online panels to share images during a survey. Results not as encouraging as we would like: 1) longer response time for images, 2) only around 50% of participants sending images in line with the questions, and 3) respondents did not like it so much (Bosch et al., 2018b; Bosch et al., 2022)

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Reasons why around 50% of participants did not sent images in line with the questions unclear. We tried to disantangle the role of skills + availability + willingness + burden by asking in an opt-in online panel about these 4 aspects in the same survey. Availability seems to be the most limiting factor for participation (Iglesias & Revilla, 2021)

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Prepare a guide about classification of images	Quality of the information obtained with images depends on the capacity to extract the needed information from the images. Thus how the images are classified is crucial. We prepared a guide for researchers interested in using images in their research (https://www.youtube.com/watch?v=IQ0KbO4XsZI)

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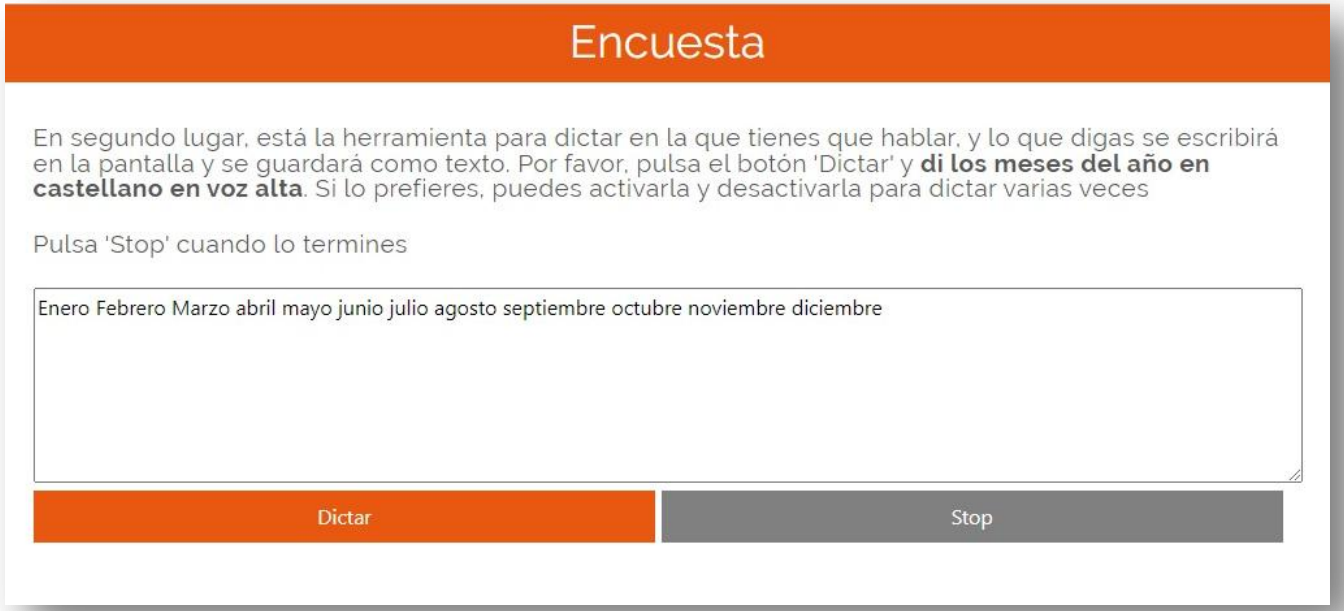

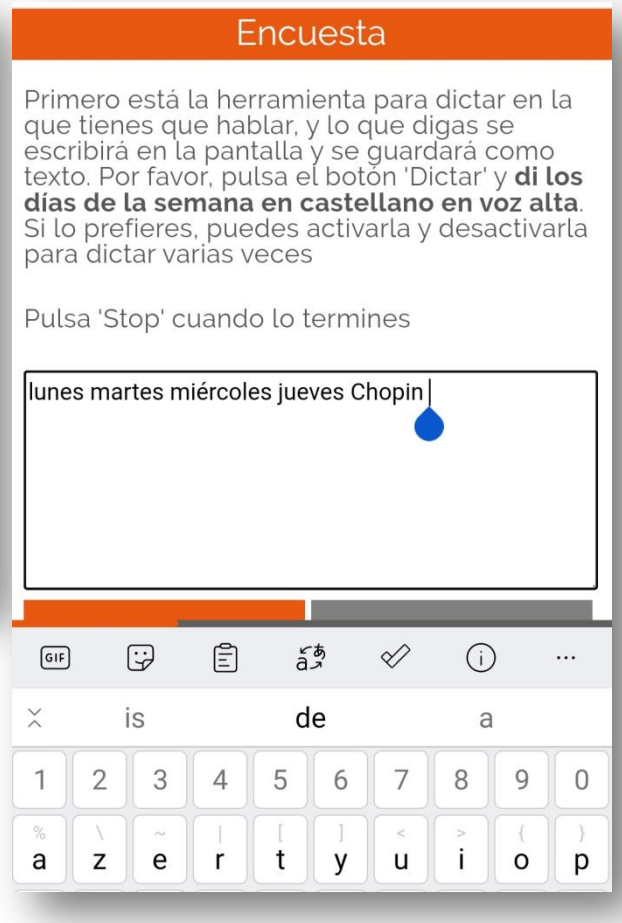

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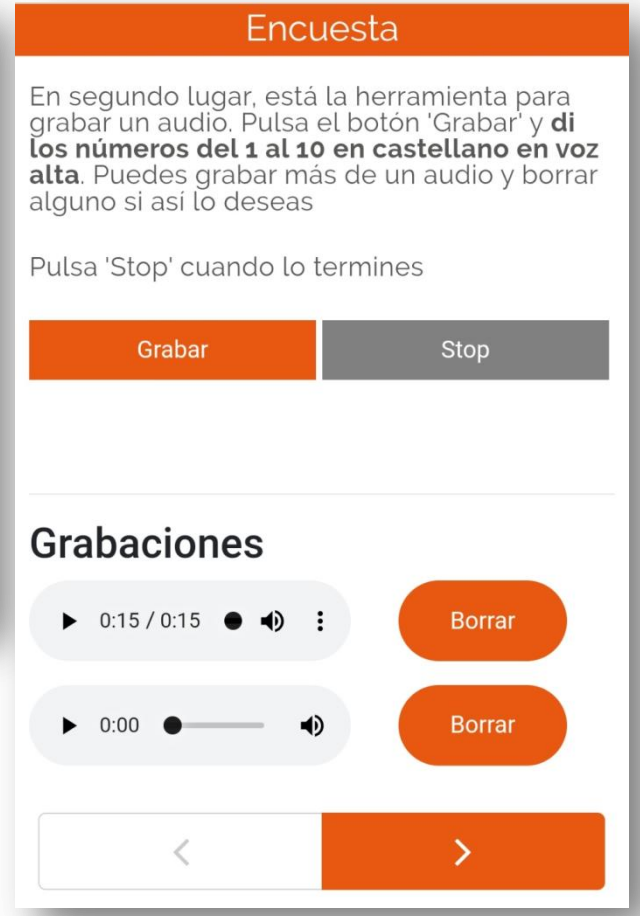

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Try to disentangle the mechanisms

Evaluation of the tool	
Easy to use (%)	62.9 to 66.1 (depending on the group)
Liked using the tool (%)	22.6 to 30.8 (depending on the group)

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Try to disentangle the mechanisms	Not clear why people do not answer or why they do not like it much. So try to understand the mechanisms behind such results (Revilla & Couper, 2021). Not much effect of instructions, some effects of context, preferences and technical/understanding problems.

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Ask parti ce recordings during a v some technical 2020; Revilla & Couper

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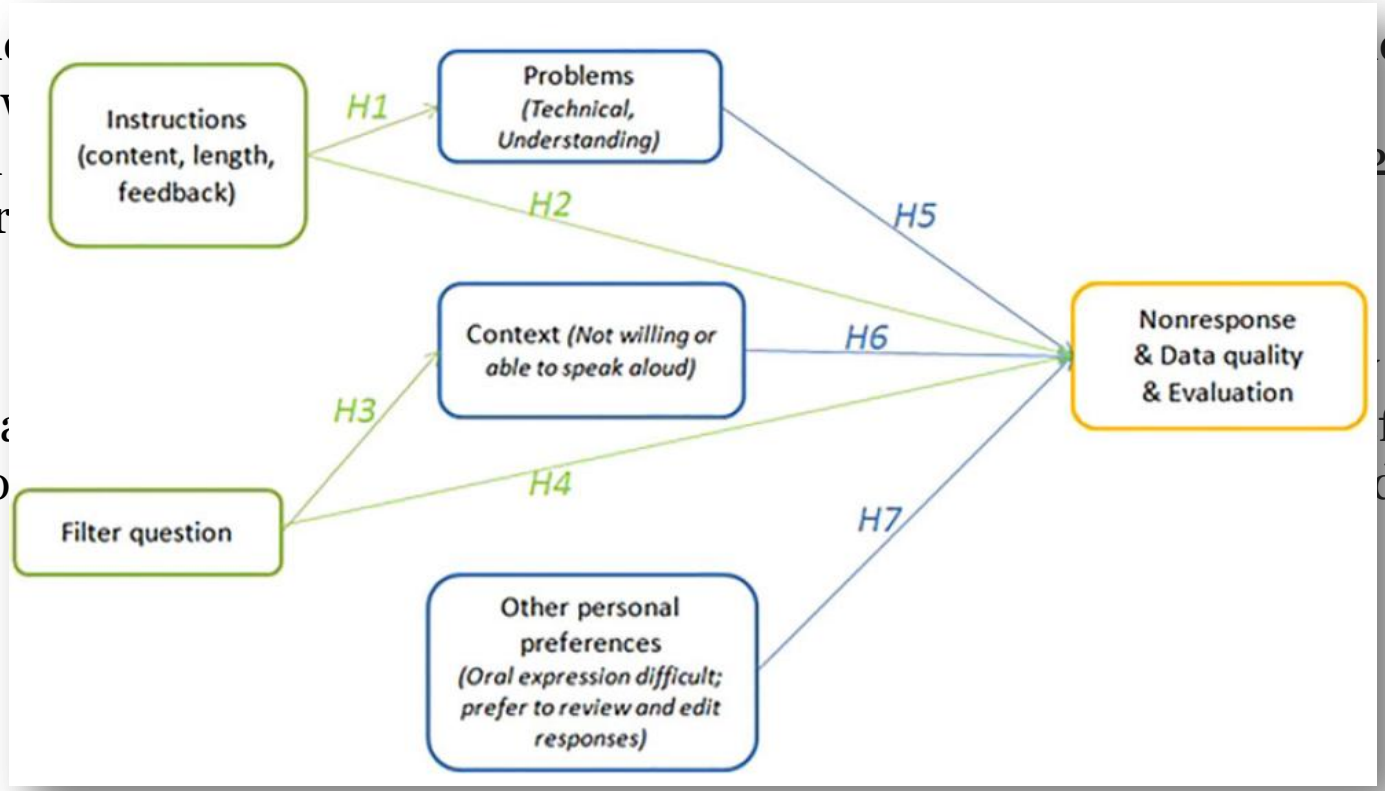
Not clear to understand the mecha ffect of instructio ding problems.



Summing up

- We have been working in different directions but still a lot to do!

- I cannot explain it all now

  - If you want to know more, contact me!
  - **If you think your research could use some of the new data types, also contact me**!

What next?

WHAT IS STILL NEEDED

Learn more about the errors of those data

web data opp

- Types of errors, **their size** and how they affect the results
  - In different contexts
- Need also to develop ways to reduce/correct for these errors
- Differences and similarities across data types

WHAT IS STILL NEEDED

Better understand when to use such data

web data opp

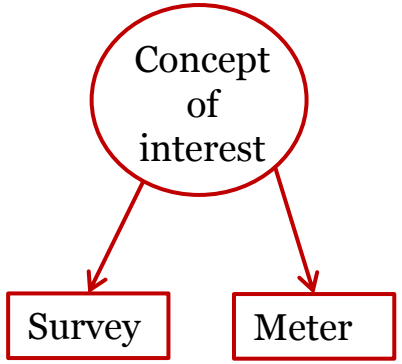
- When does it make sense to consider these new opportunities?
  - Clearly not something that can be used to measure any concept
- Need to identify when benefits > disadvantages
  - Balancing those for researchers and participants
- Need to understand better the mechanisms

WHAT IS STILL NEEDED

Better understand how to use such data

- To replace conventional survey questions?

- To combine them with conventional survey questions?
  - How?
  - Examples for metered data and surveys
    - Use metered data as triggering event to survey respondents at a specific moment ("in-the-moment surveys")
    - Use metered data to check respondents behaviors during the survey (e.g. if they look for information when asked knowledge questions)
    - Compare more subjective and more objective measures
    - Use both measures as indicators for a latent variable



Conclusions

CONCLUSIONS

Need more research

- Still **a lot to be done!**
  - More methodological research needed
  - Also more applications to key practical issues
- Potentially **broad applications**
  - Across different disciplines
- And potentially **new insights**!
- But there will always be errors…

Do not conclude too much…

- Not realistic to aim to perfect measures
  - Try to minimize errors / correct for them → but still there will be errors

- So… what we can do?
  - Be aware of the errors, **acknowledge them** and think about **their consequences**
  - Look from different perspectives to get **different but complementary information**

Look from different perspectives

THE BLIND MEN AND THE ELEPHANT

"And so these men of research
Disputed loud and long,
Each in his own opinion
Exceeding stiff and strong,
Though each was partly in the right,
And all were in the wrong!"

John Godfrey Saxe (1816-1887)

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Thanks!

Questions?

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