Exploring new opportunities: can we replace or enhance (some) conventional web survey questions?

16th ACM Web Science Conference 2024

Workshop 2: Linking Surveys and Social Media Data: Advancing Public Opinion Research (LASER)

21 May 2024

Melanie Revilla | IBEI

Which new opportunities?

Different types of new data

- Data collected **actively**
  - Respondents need to actively provide these data
  - Visual data, voice data, etc.

- Data collected **passively**
  - Participants only need to accept to share such data and/or set up a tracking app
  - Mainly **digital traces data** = records of activity undertaken through an online information system, including digital footprints left behind by users as they interact with technology (Howison et al., 2011)

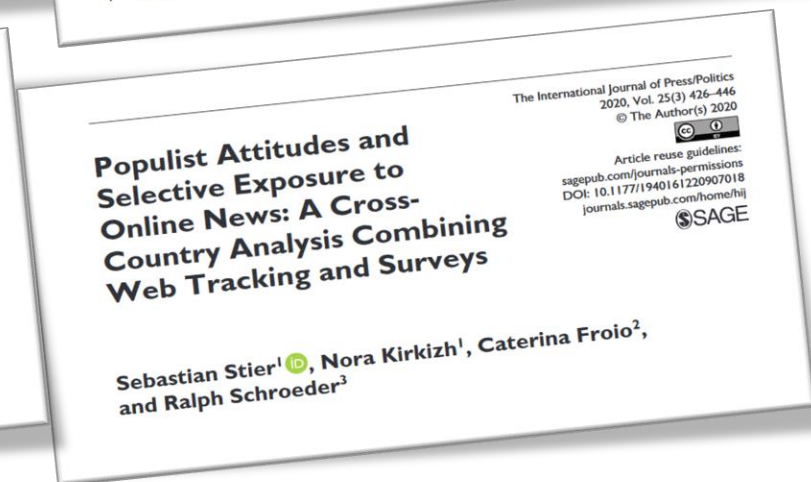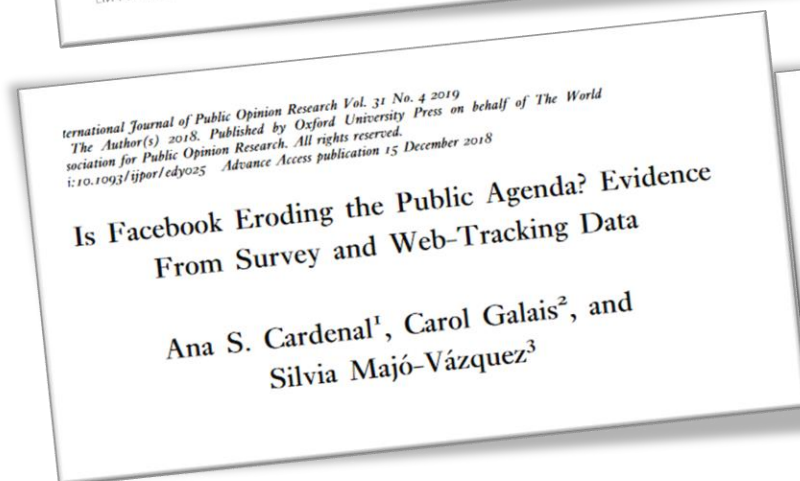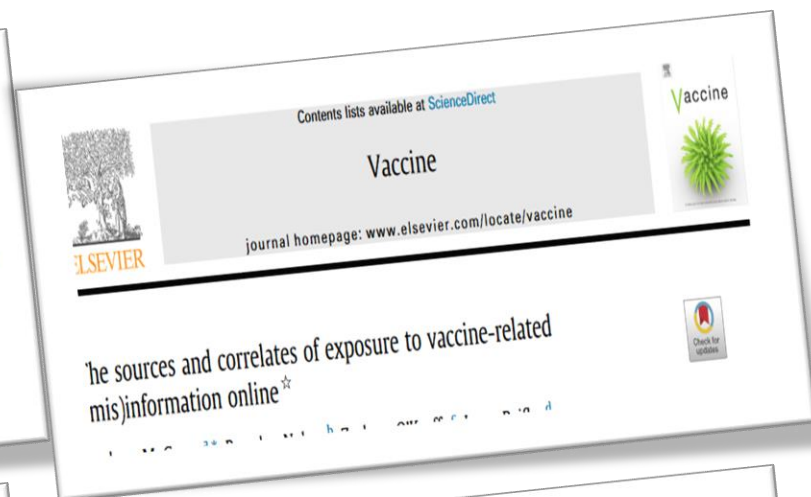Today I focus on 1 type of digital traces = **metered** data

Data obtained through a tracking application ("meter") installed by the participants on their devices to register at least the **URLs** of the webpages visited. Usually collected in metered panels.

Can metered data replace survey data?

Metered data have been used to replace **some** survey questions

web data opp

More than **80 papers** published using metered data

AJPS AMERICAN JOURNAL of POLITICAL SCIENCE

ARTICLE

(Almost) Everything in Moderation: New Evidence on American Online Media Diets

Andrew M. Guess

First published: 10 February 2021

Contents lists available at ScienceDirect

Vaccine

journal homepage: www.elsevier.com/locate/vaccine

he sources and correlates of exposure to vaccine-related mis)information online

ternational Journal of Public Opinion Research Vol. 31 No. 4 2019
The Author(s) 2018. Published by Oxford University Press on behalf of The World sociation for Public Opinion Research. All rights reserved.
i:10.1093/ijpor/edy025 Advance Access publication 15 December 2018

Is Facebook Eroding the Public Agenda? Evidence From Survey and Web-Tracking Data

Ana S. Cardenal¹, Carol Galais², and Silvia Majó–Vázquez³

The International Journal of Press/Politics
2020, Vol. 25(3) 426–446
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Populist Attitudes and Selective Exposure to Online News: A Cross-Country Analysis Combining Web Tracking and Surveys

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Sebastian Stier¹, Nora Kirkizh¹, Caterina Froio², and Ralph Schroeder³

Usually consider that metered data has **no error**

But this is not true...

Many potential errors

JOURNAL ARTICLE

When Survey Science Met Web Tracking: Presenting an Error Framework for Metered Data 🔓

Oriol J. Bosch ✉, Melanie Revilla   Author Notes

Journal of the Royal Statistical Society Series A: Statistics in Society, Volume 185, Issue Supplement_2, December 2022, Pages S408–S436, https://doi.org/10.1111/rssa.12956

⬇

Total Error framework for digital traces collected with **Meters** (TEM)

⬇

Overview of possible errors & their causes

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

Meter not installed

Shared devices

Technology limitations

Important problem of undercoverage

UNCOVERING DIGITAL TRACE DATA BIASES: TRACKING UNDERCOVERAGE IN WEB TRACKING DATA

Oriol J. Bosch, Patrick Sturgis, Jouni Kuha, and Melanie Revilla

Abstract

In the digital age, understanding people's online behaviours is vital. Digital trace data has emerged as a popular alternative to surveys, many times hailed as the gold standard. This study critically assesses the use of web tracking data to study online media exposure. Specifically, we focus on a critical error source of this type of data, tracking undercoverage: researchers' failure to capture data from all the devices and browsers that individuals utilize to go online. Using data from Spain, Portugal, and Italy, we explore undercoverage in commercial online panels and simulate biases in online media exposure estimates. The paper shows that tracking undercoverage is highly prevalent when using commercial panels, with more than 70% of participants affected. In addition, the primary determinant of undercoverage is the type and number of devices employed for internet access, rather than individual characteristics and attitudes. Additionally, through a simulation study, it demonstrates that web tracking estimates, both univariate and multivariate, are often substantially biased due to tracking undercoverage. This represent the first empirical evidence demonstrating that web tracking data is, effectively, biased. Methodologically, the paper showcases how survey questions can be used as auxiliary information to identify and simulate web tracking errors.

TRI-POL data (Torcal et al., 2023)

Netquest panels in Spain, Portugal and Italy

N = 2,653

Only **26%** of participants are fully covered

Simulations suggest that some bias occurs due to this undercoverage

Potential problems in validity and reliability

web data opp

VALIDITY AND RELIABILITY OF DIGITAL TRACE DATA IN MEDIA EXPOSURE MEASURES: A MULTIVERSE OF MEASUREMENTS ANALYSIS

Oriol J. Bosch

Abstract

Understanding online media exposure is critical, especially in contemporary politics. Given the doubts about survey self-reports, research on media exposure has turned to web tracking data, sometimes considered the gold standard. However, studies revealed that web tracking data is also biased. To improve the understanding of the quality of web tracking measures of media exposure, this paper estimates their predictive validity and true-score reliability. It additionally identifies design choices that optimize their validity and reliability. Using data from a three-wave survey in Spain, Portugal, and Italy, combined with web tracking, this paper conducts a multiverse analysis to assess the validity and reliability of +2,500 web tracking measures of media exposure. Results show an overall high, but imperfect, reliability (0.86). However, in terms of predictive validity, the association between media exposure measures and political knowledge appears weak. This raises questions not only about the predictive validity of web tracking measures but also about the overemphasis on similar critiques regarding survey-based measures. Additionally, results suggest that the design decisions made by researchers can have a substantial impact on the quality of the web tracking data. Methodologically, the paper presents the multiverse of measurements approach, allowing researchers to embrace uncertainty, and improve the transparency of web tracking research.

+2,500 measures of media exposure

Predictive validity

Association between media exposure & political knowledge (TRI-POL)

⬇

Media exposure is a bad predictor of political knowledge

⬇

Low validity?

Reliability

Is the measure consistent across multiple observations?
(Quasi simplex model)

⬇

Average is **.86**, but large fluctuations

⬇

Quite similar to survey questions

Alternative to study validity and reliability: the MTMM approach

web data opp

Surveys or digital trace data, which one should we use?

Using MultiTrait-MultiMethod models to simultaneously estimate the measurement quality of surveys and digital trace data.

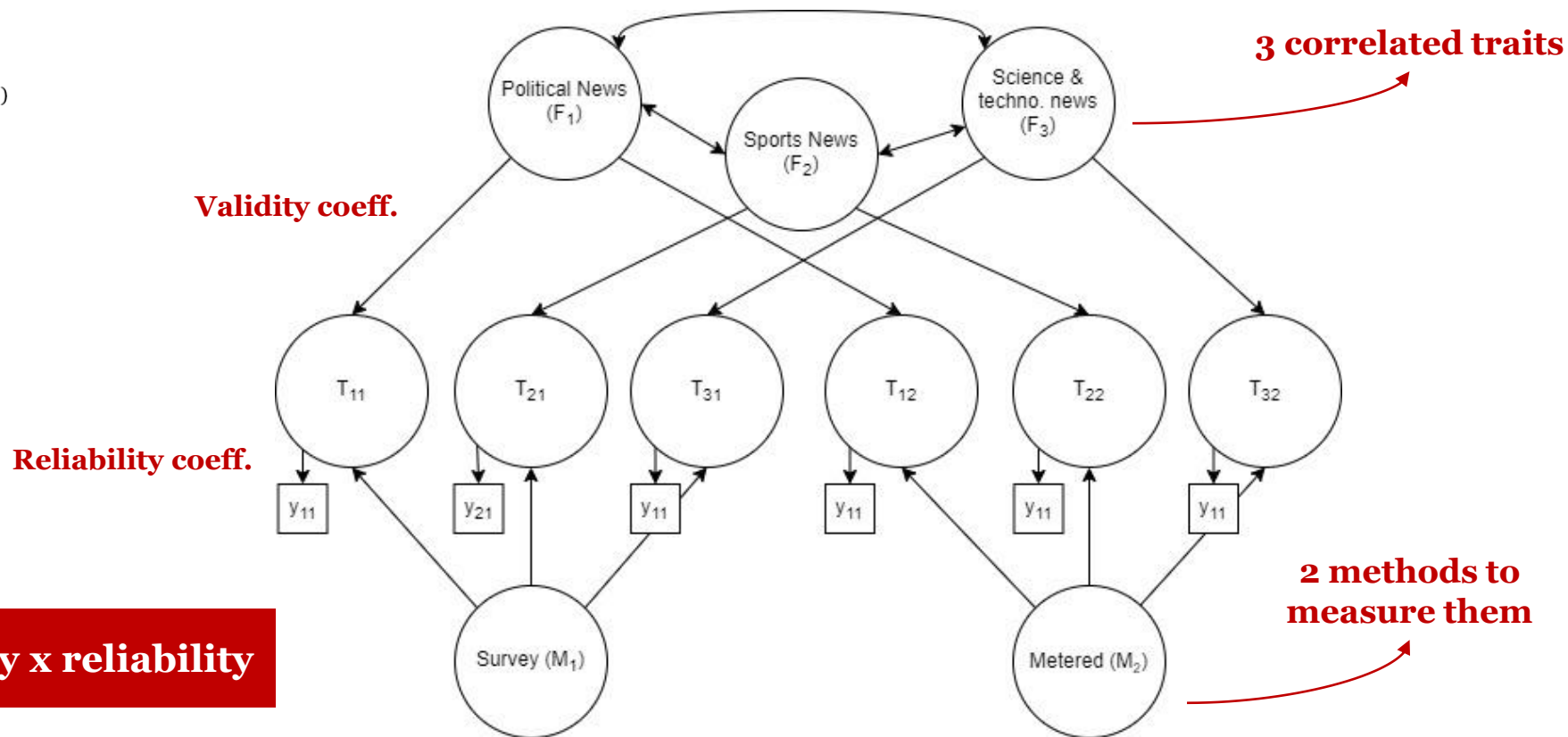**Oriol J. Bosch**| Department of Methodology, LSE & RECSM

Melanie Revilla |Institut Estudis Barcelona Internacional (IBEI)

Patrick Sturgis| Department of Methodology, LSE

Jouni Kuha| Department of Methodology, LSE

ESRA 2023 Conference, Milan

3 correlated traits

Validity coeff.

Reliability coeff.

2 methods to measure them

Measurement quality = validity x reliability

REPLACING SURVEY DATA WITH METERED DATA?
Alternative to study validity and reliability: the MTMM approach

web
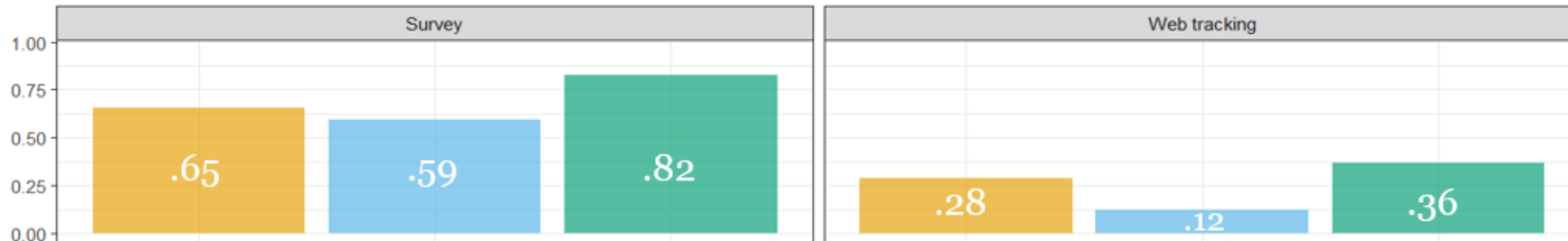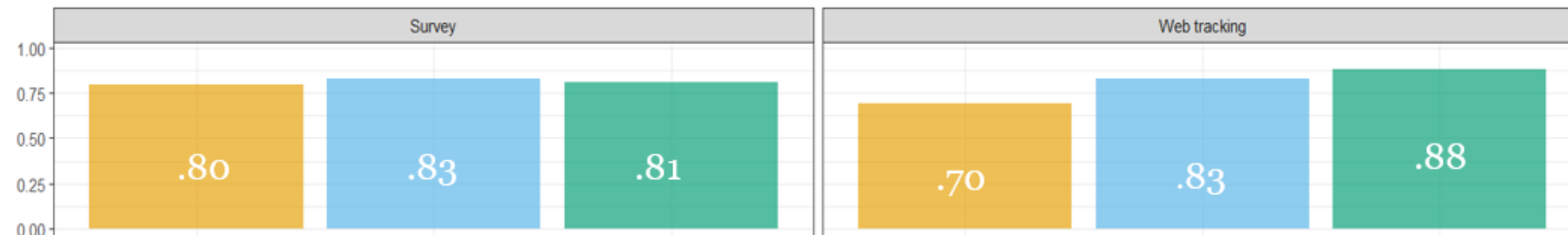data
opp

Netquest metered
panel in Spain

N = 1,200

May/June 2023

Tracking mobile
and PCs

**Measurement
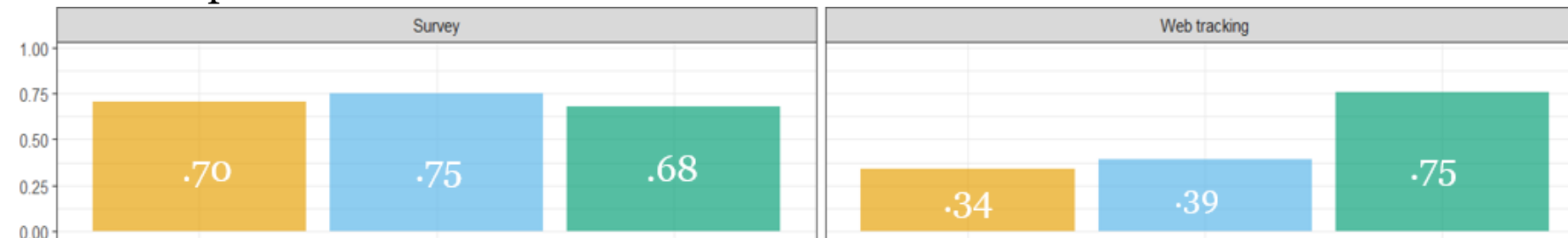quality of metered
data often (much)
lower than the one
of survey**

First experiment: News

Survey: .65 .59 .82
Web tracking: .28 .12 .36

Second experiment: Communication

Survey: .80 .83 .81
Web tracking: .70 .83 .88

Third experiment: Entertainment

Survey: .70 .75 .68
Web tracking: .34 .39 .75

Alternative to study validity and reliability: the MTMM approach

web
data
opp

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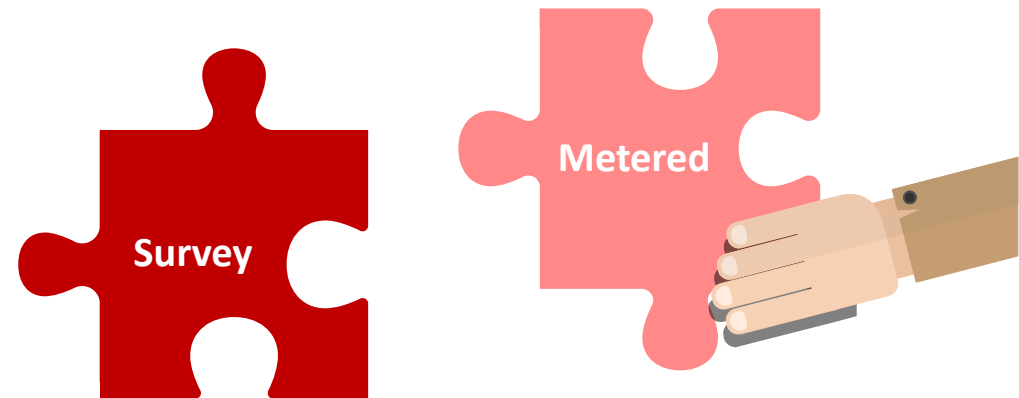
Survey — Web tracking
.73 .68   .34 .39 .75

REPLACING SURVEY DATA WITH METERED DATA?

At this day, it seems quite dangerous to replace....

You don't want to throw away your old screwdriver
even if you have a new power drill...

Combining survey & metered data

Different ways of combining

Meter	Survey	
Measure concepts that are usually measured through surveys	**Different concepts**	→ Shorten surveys by replacing some questions → Use survey to identify errors in metered data
Measure new concepts	Same concepts	
Measure other aspects that are not directly the concepts of interest	Different concepts	
	Different concepts	

Different ways of combining

Meter

Survey

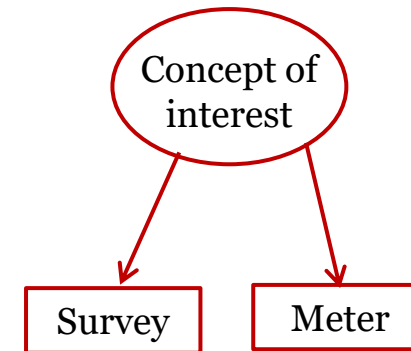| Measure concepts that are usually measured through surveys	Different concepts
	Same concepts
Measure new concepts	Different concepts
Measure other aspects that are not directly the concepts of interest	Different concepts

➡ Assess biases in survey answers & in metered data

➡ Use multiple measurements of same concept

Concept of interest → Survey, Meter

➡ Complement surveys in data scarce scenarios (e.g., study evolution in between survey waves)

Different ways of combining

Meter	Survey

Meter column:
- Measure concepts that are usually measured through surveys
- **Measure new concepts**
- Measure other aspects that are not directly the concepts of interest

Survey column:
- Different concepts
- Same concepts
- **Different concepts**
- Different concepts

→ Extend knowledge to concepts not measured before (e.g., study exact content seen)

→ Measure the process (e.g., consumer journey)

Different ways of combining

Meter	Survey
Measure concepts that are usually measured through surveys	Different concepts
	Same concepts
Measure new concepts	Different concepts
Measure other aspects that are not directly the concepts of interest	Different concepts

→ Select who to invite (Revilla & Ochoa, 2018)

→ Detect triggering event for sending in-the-moment surveys (Ochoa, 2023)

→ Study behaviours during the survey (e.g., detect cheating in knowledge questions; Bosch & Revilla, 2024)

Conclusions

Still a lot to be done

- Not enough knowledge at this day
  - Need to **learn more** about new types of data, especially about their errors
  - Necessary to make informed decisions about their use

- But it is clear that metered data are **not free of errors**
  - True for other kinds of data: should not use them without considering errors

- Replacing seems dangerous in most cases…

- Might change when we will know better these data

My main recommendation at this day

Combine *several* **types of data**!

FOUR!

NO THREE!
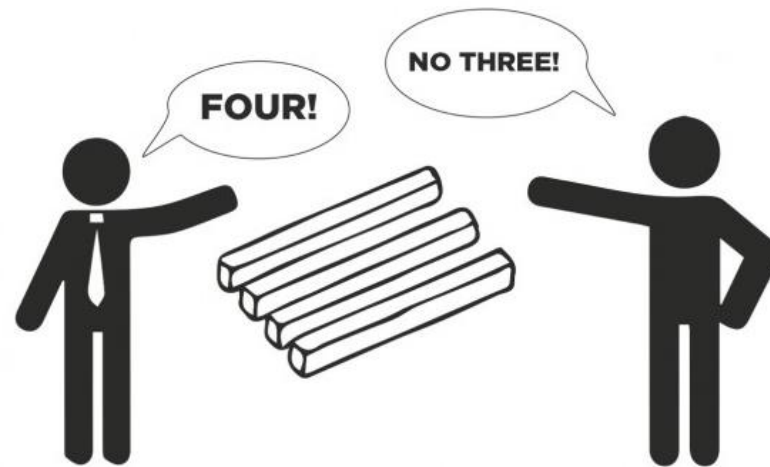
Different ways of doing this

Also think about the "**how**"

Different types of data provide **different but complementary information**

Thanks!

Questions?

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https://www.upf.edu/web/webdataopp

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data
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Appendix: traits in the MTMM

1. News exposure traits

- Exposure to news about politics
- Exposure to news about sports
- Exposure to news about science and technology

2. Communication traits:

- Use of social media
- Use of instant messaging
- Use of e-mails

3. Entertainment traits:

- Use of video platforms (YouTube, Vimeo, Twitch)
- Use of audio streaming (Spotify, Audible, Apple podcast)
- Use of TV/Movie streaming (Netflix, BBC online)