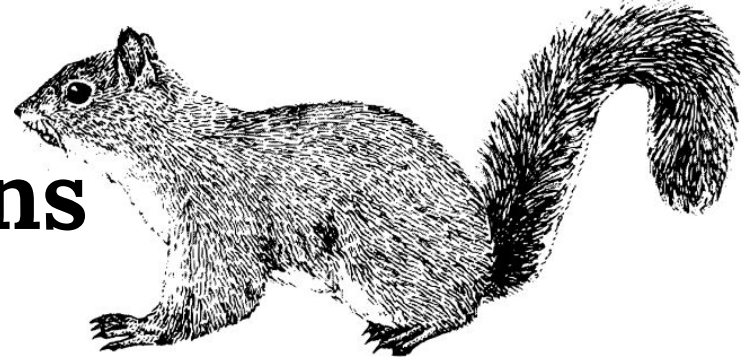


Social sciences
in invasion **biology**:
an **alien** among aliens





Hello!

*I am **Jacopo Cerri***

I will be brief because my voice will vanish in **20 minutes**

You can find me at j.cerri@santannapisa.it

1

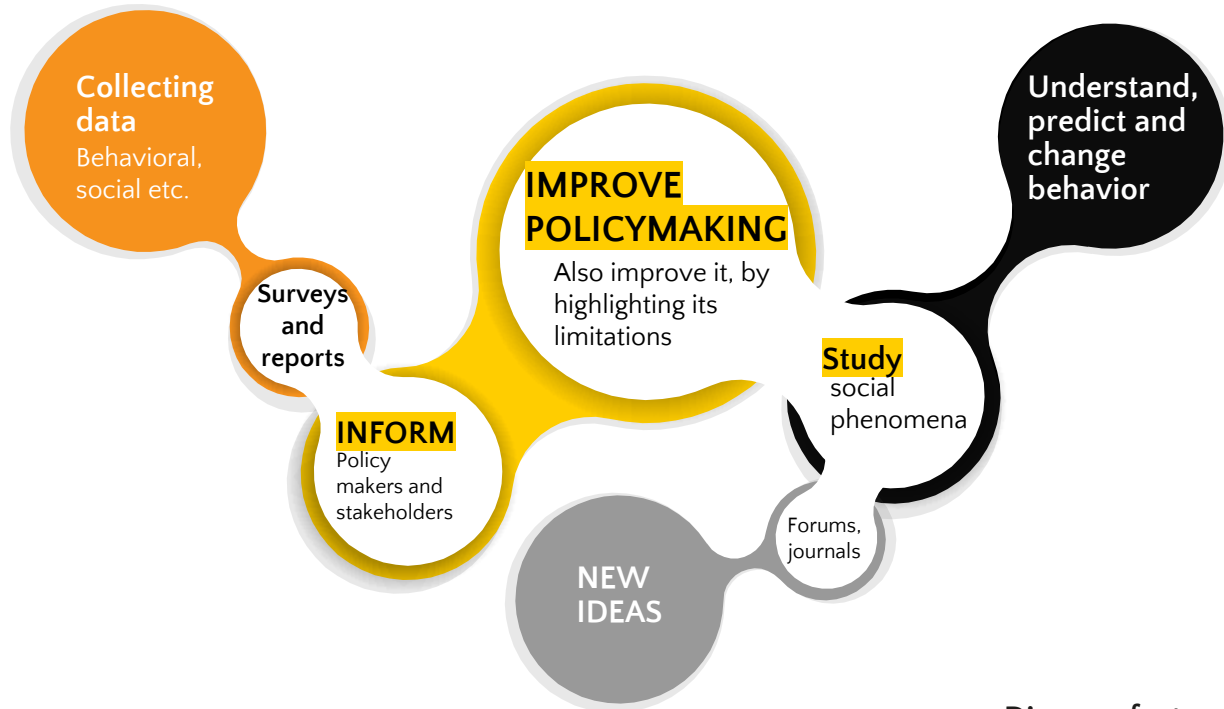
Why?

Which **role** could social sciences **play**?





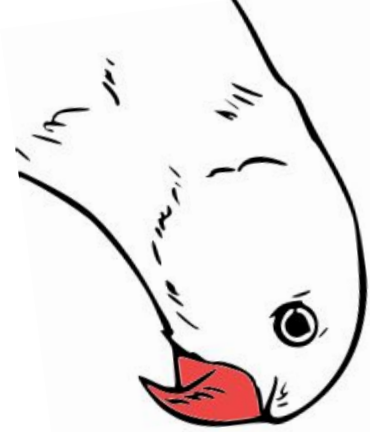
Why social sciences in human dimensions of invasions?



7, 6 blns

Are you still convinced you can ignore people in invasion biology?





2

About surveys

(and questionnaires)

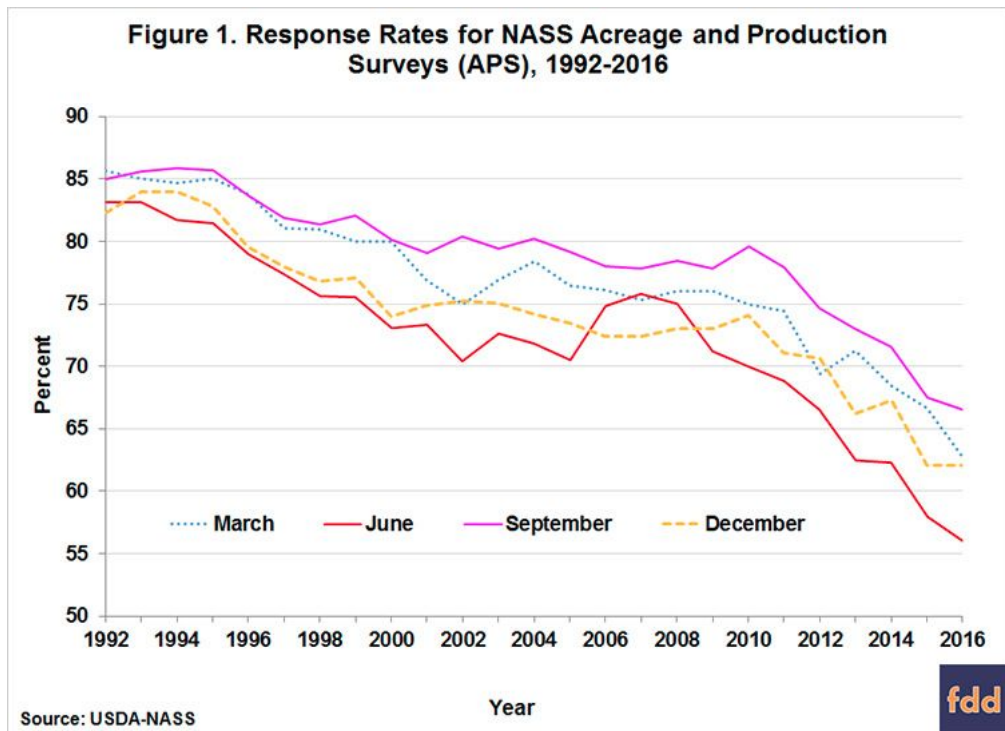
Surveys are *the dominant approach* in social sciences, despite big data might change their importance in next few decades



“



Changes in surveys...





What do survey measure?

BEHAVIOR

Surveys ask respondents to report their past, present or future behavior, usually through questionnaires.

Self-reports might be affected by memory recall bias.

Reported behavior might be triangulated with other methodologies (e.g. behavioral observations, modeling, big data)

PSYCHOLOGICAL TRAITS

Questionnaires can ask respondents to evaluate a few items, in order to measure constructs from social psychology.

These constructs could be antecedents of human behavior, like attitudes, values or social norms.

Measuring these constructs require good elements of survey design.

Good reads:

Vaske, J. J. (2008). *Survey research and analysis: Applications in parks, recreation and human dimensions*. Venture Publ..



Surveys: what do they do?

Large,
representative
samples

Self-reported
information
(attitudes,
behavior,
norms)

Reasonable
price



What do survey measure?

Attitudes

Latent tendency to approve or disapprove a certain object (e.g. the presence of invasive squirrels in a urban park)

Social norms

Informal institutions governing human behavior through informal sanctions and social influence.

Value orientations

Beliefs (e.g. about wildlife) that mediate the role of general values (e.g. freedom) over some wildlife-specific issues (e.g. lethal control).

3

About attitudes

(they are **not everything**)





Attitudes are not everything

- ◉ Easy to measure and cognitive
- ◉ People always have them
- ◉ Sometimes conflicting
- ◉ Attitude sometimes explain behavior, but sometimes they do not.

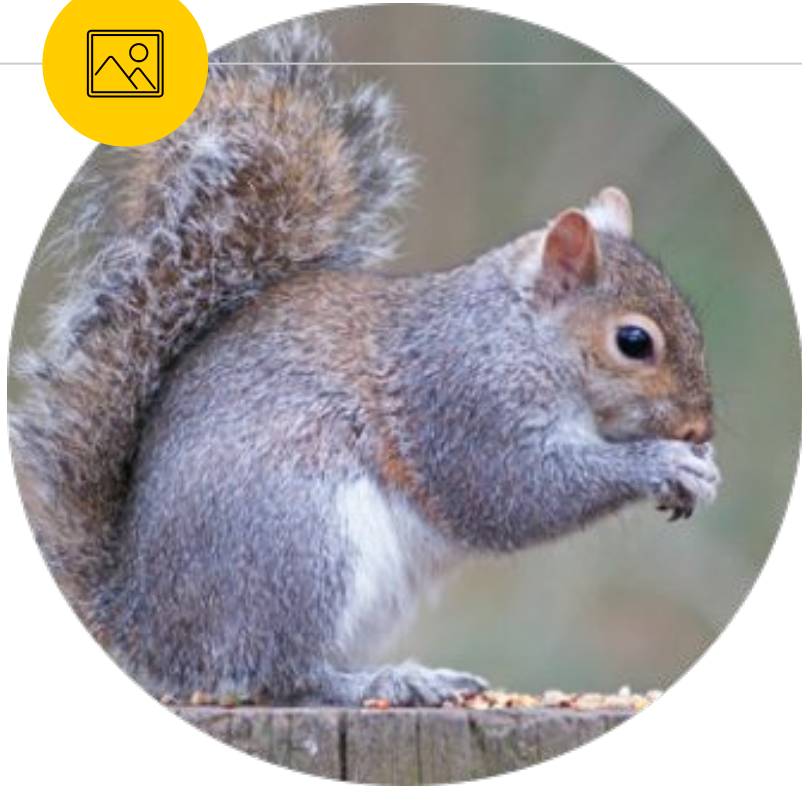
Weak attitudes do not lead anywhere.



3 principles of attitudes

- ◉ Consistency
- ◉ Direct experience
- ◉ Ties to our identity

Attitudes predict behavior only if they refer to the same action (e.g. lethal control), about the same target (e.g. coyus) at the same time and context (now, in Northern Italy).



Attitudes: the **Theory of Reasoned Action** (Ajzen and Fishbein, 2011)

Attitudes can be obtained through the *be* scoring, by considering a series of consequences of the target action, then:

- Expectancy (likely/unlikely)
- Valence (good/bad)



The presence of gray squirrels in an urban park ...

- ... would improve its environmental quality
- ... would improve its aesthetics
- ... would make visitors more prone to visit it again
- ... would make visiting the park a more rewarding experience
- ... might increase the risk of disease transmission to visitors
- ... might increase the risk of disease transmission to visitors' dogs
- ... would damage the vegetation
- ... would cause nest depredation
- ... could create problems with garbage.

Respondents indicate how they perceive each consequence as likely/unlikely on a 7 points bipolar scale. In a second section they indicate if each item is good/bad on a 7 points bipolar scale. Then for each impact the two items are multiplied and the products are summed. Validity and reliability are obtained with Confirmatory Factor Analysis.



Surveys: limitations

Questionnaire design

Questionnaires are **measurement tools**: if they are poorly designed they **do not measure** what they are aimed at;

In nature conservations questionnaires are poorly designed: constructs do not have a **theoretical basis**, **piloting** is modest, questions are **ambiguous** and **latent variable analysis** for constructs is unknown.

A poor questionnaire is **a waste of paper** (just interview people, then)

Common errors

The most common errors are:

- Demographics at the beginning;
- Scales are made in 5 minutes on a desk;
- Open-ended questions;
- Topics people never thought about;
- Measures of knowledge;
- Horrible layout;
- Boring formats (if the quantitative survey is properly implemented)

Good read: Vaske, J. J. (2008). *Survey research and analysis: Applications in parks, recreation and human dimensions*. Venture Publ.. [Chapter 7 - Writing and constructing surveys](#) (Freely available as a PDF)

3

About sensitive questions

(and specialized techniques)



Sensitive questions

Respondent bias their answers if:

- Taboos
- Risk of sanctions
- Social desirability (informal sanctions)

Conventional questionnaires are unsuitable, even if you guarantee anonymity;



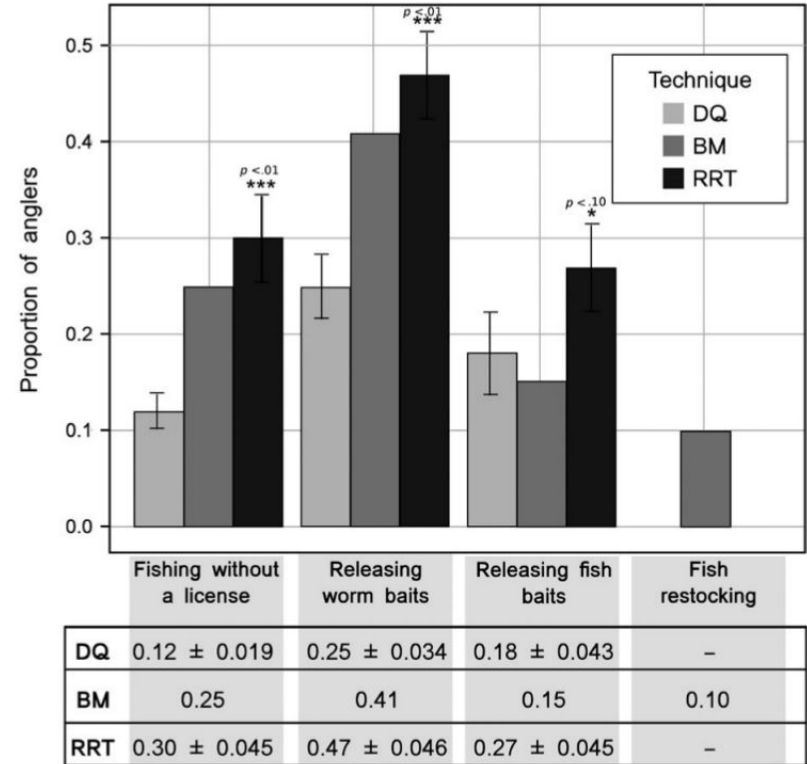
Specialized questioning techniques

Randomized Response Technique (RRT)

The RRT measures univariate binary constructs (yes/no);

It protects privacy by introducing noise in the data by means of a randomizing device (e.g. a 6- faces die);

Respondents are asked to “play” a game, by rolling the die before answering: if the outcome is 6 they answer “Yes”, if it is 1 they answer “No”, if it is between 2 and 5, they answer honestly.



Good read:

Cerri, J., Ciappelli, A., Lenuzza, A., Nocita, A., & Zaccaroni, M. (2017). The randomised response technique: A valuable approach to monitor pathways of aquatic biological invasions. *Fisheries Management and Ecology*, 24(6), 504-511.



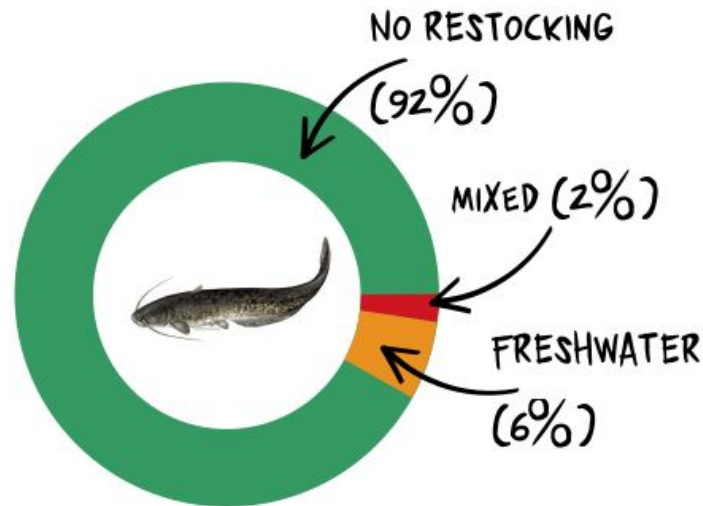
Specialized questioning techniques

Multidimensional Randomized Response Technique (mRRT)

More complex version for non-binary outcomes

Statistically efficient and it tests for noncompliance with instructions

We used it for measuring illegal restocking of the European catfish (*Silurus glanis*) among specialized recreational anglers at a fishing fair in Italy



Good read:

Nuno, A., & John, F. A. S. (2015). How to ask sensitive questions in conservation: A review of specialized questioning techniques. *Biological Conservation*, 189, 5-15.

4

About sampling

(and what you **pay** for it)





Surveys: what do they do?

Large,
representative
samples

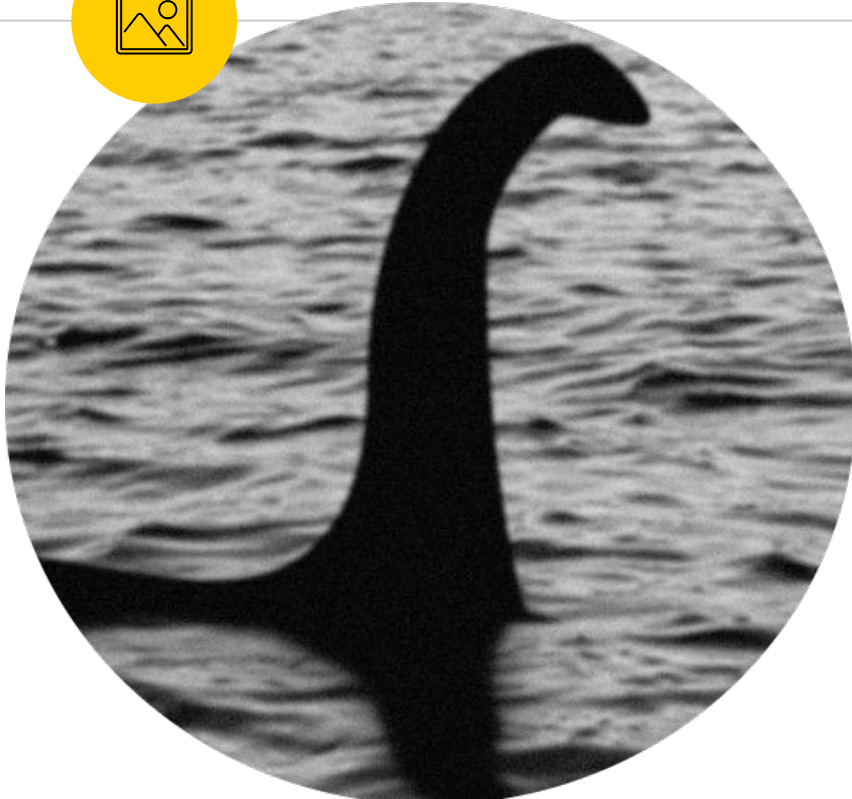
Self-reported
information
(attitudes,
behavior,
norms)

Reasonable
price

Surveys aim to provide a picture
or some social phenomena.
Sampling is all about the quality
of that picture.



“



Representative sampling

It requires the definition of a proper sampling scheme (random, random stratified, quota sampling), then the existence of registers from which respondents could be obtained:

- Telephone books
- Address
- Panels of participants (paid)



Surveys: what do they do?

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price



Issues with representativeness

Price

Good panels of respondents are very expensive (20.000–300.000 €);

Long questionnaires take time and multiple waves are needed;

Companies are not necessarily interested in providing you with complete information about the drawbacks of administration modes (e.g. internet surveys);

Hard-to-reach

Some segments of the general populations might be very hard to reach, as they are not included on existing registers:

- Homeless people;
- Poachers;
- Recreational anglers (30% no license);
- Young people, immigrants

Respondent Driven Sampling and Capture-Mark-Recapture methods might be helpful.

Good read:

Vaske, J. J., Jacobs, M. H., Sijtsma, M. T., & Beaman, J. (2011). Can weighting compensate for sampling issues in internet surveys?. *Human Dimensions of Wildlife*, 16(3), 200-215.



Good tips for sampling

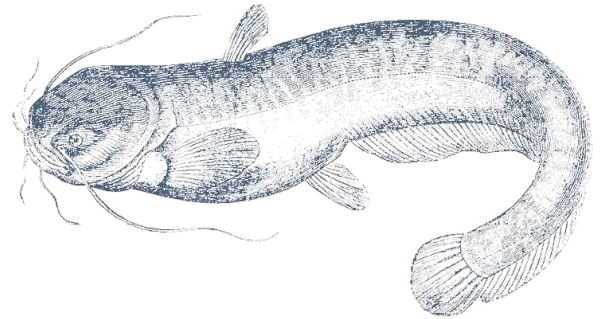
- Representative panels are expensive
- Field, purposive, sampling is nice but be careful with generalization
- Hard-to-reach populations

The amount of money you pay equals the level of generalizability of your findings

4

Beyond surveys

(qualitative methods and vignettes)





Questionnaires are not useful if ...

- ... you need rich, unstructured, data;
- ... you aim to elicit preferences;
- ... you want to explore interactions.

These needs will make you look for alternative research methods from social sciences.



Qualitative methods

Type of information

Qualitative methods allow to collect very rich, unstructured information, which is subsequently interpreted;

They usually pave the ground in questionnaire development, to elicit beliefs;

They can also enable you to collect data from a group of people, letting information emerge from their interaction and discussion (e.g. Delphi methods, focus groups)

Good for social media and deliverables

Squirrels and beliefs

Semi-structured interviews are adopted to elicit beliefs connected with social norms governing wildlife feeding at the Valentino urban park, in Torino (Italy)

- Reference network;
- Normative beliefs;
- Reasons for and against feeding
- Expectations

Participants are recruited onsite and they interact with interviewers, who record them

Good read:

Sutherland, W. J., Dicks, L. V., Everard, M., & Geneletti, D. (2018). Qualitative methods for ecologists and conservation scientists. *Methods in Ecology and Evolution*, 9(1), 7-9.



Many approaches exist...

Interviews

Individual participants, very rich data, advantages of avoiding interactions, flexible protocols.

Focus groups

4-5 people together discussing over an issue with a moderator. Useful for emergence of knowledge. Risk of domination.

Delphi technique

2-stages focus groups. Useful to avoid domination dynamics. Quite time-consuming.

Nominal group technique

Aims to reach consensus. Participants provide information silently, to a moderator, then contributions are put together, discussed and rated.

Q-method

Good for understanding diversity of ideas, which are listed then synthesized with data reduction techniques.

Others ...

Multi criteria decision making, Bayesian belief networks, content analysis etc...



Vignettes ...

... whenever respondents are asked to evaluate hypothetical situations (good/bad; doing/not doing). Good to measure attitudes:

- Conjoint evaluation (effort, desirability)
- Flexible
- High internal and external validity



Factorial! survey experiments

FSE

Each scenario is characterized by a series of characteristics (n=5-7), each one with a number of levels (n=2-7);

The number of potential scenarios is the factorial combination of the number of levels;

Scenarios can be sampled randomly or with a D-efficient approaches;

Scenarios are assigned to respondents randomly. But each respondent evaluate a fixed number of scenarios (n=5-10).

Management of cottontails

Hunters' preferences towards control program for invasive cottontails in Tuscany:

- Goal (eradication, strong reduction, mild reduction);
- Scale;
- Frequency of operations;
- Method (trapping vs shooting);
- Duration of the plan;
- Impact of cottontails.

Hunters told whether they would have participated to the plan.

Good read:

Cerri, J., Batisti, G., Ferretti, M. et al. (2018) Hunters' preferences for engaging in control programs of introduced Eastern cottontails in Italy: a factorial survey approach. *Eur J Wildl Res* (2018) 64: 21. <https://doi.org/10.1007/s10344-018-1181-2>

“A control plan aimed at limiting the population of Eastern cottontail in the province of Pistoia is approved. The plan has the following attributes: At the end of the plan, the species has been mildly reduced in its numbers. Control operations are carried out every two weeks. The species transmits diseases to humans. The control plan contemplates the suppression of animals through shooting. The plan lasts three years. Control operations are carried out at a single hotspot

Would you participate to such of a plan?(Yes/No)



“



What, then?

Surveys

- Good for structured information and social pictures.
- Expensive !
- Require time for piloting and design
- Not good for qualitative data

Vignettes

- Good for measuring preferences and judgements
- Robust
- Flexible but complex to design

Qualitative methods

- Extremely rich data
- Good for social media
- Capture social interactions and deliberation
- Tiresome



Thanks!

Any **questions** ?

You can find me at

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- jacopocerri@gmail.com



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