A very brief introduction to quantitative social science

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What this presentation is not about

- Stats
- Maths
- Programming language
- Nerdy stuff

...although in quantitative research you may find all such things in different combinations.

Goals:

- Provide you a general understanding of what quantitative research is.
- Discuss about issues, concerns and possible ideas.
- Perhaps arouse your curiosity.

Topics to be covered:

1. A quick overview on the differences between quantitative and qualitative research.

2. Quantitative research design.

3….

1. Quanti vs. Quali

“The paradigm war”

Comparing paradigms

Interpretivism

- Only through the subjective interpretation reality can be fully understood.
- Phenomena should be studied in their natural environment.

Positivism

- Reality is stable and can be observed and described from an objective viewpoint.
- Phenomena should be isolated and observations should be repeatable.

(Davison 1998)

This ends up in two different research routines:

Qualitative	Quantitative
The aim is a complete, detailed description.	The aim is to construct statistical models in an attempt to explain what is observed.
Researcher may only know roughly in advance what he/she is looking for.	Researcher knows clearly in advance what he/she is looking for.
The design emerges as the study unfolds.	All aspects of the study are carefully designed before data is collected.
Researcher is the data gathering instrument.	Researcher uses tools to collect numerical data.
Data is in the form of words, pictures or objects.	Data is in the form of numbers and statistics.
Individuals' interpretation of events is important ,e.g. participant observation, in-depth interviews etc.	Seek precise measurement & analysis of target concepts, e.g. surveys, questionnaires etc.
Qualitative data is more 'rich', time consuming, and less able to be generalized.	Quantitative data is more efficient, able to test hypotheses, but may miss contextual detail.
Researcher tends to become subjectively immersed in the subject matter.	Researcher tends to remain objectively separated from the subject matter.

Sum up:

Qualitative	Quantitative
• Subjective. • Inductive. • Not generalizable results. • Data are words, pictures, objects.	• Objective. • Deductive. • Generalizable results. • Data are in numerical form.

In practice...

- Qualitative research can follow the same logic of inference as quantitative research (KKV 1994).
- Quantitative results are not always so generalizable.
- Quantitative research can be fairly inductive ("*play around with the data*").
- (Social) research can follow a mixed-methods strategy.

2. The quantitative research design

A few words on the deductive approach

- Conceptualization
- Operationalization
- Hypotheses
- Test
  - ➔ Measurement
  - ➔ Data analysis

Conceptualization

- What are you talking about?
- The quality of concepts affects both the quality of the theory and the empirical scope (measurement).
- Crucial for valid descriptive and causal inference.

By the way, this is a very important part also in qualitative research!

Operationalization

- To turn a phenomenon into a measurable quantity.
- From concepts to variables.

  Q: What is a variable??

  A: A characteristic of our unit of analysis. E.g. people's vote choice, countries' annual GDP growth, parties' policy position, governments' law production, etc.
- There are several types of variables. Not all of them are strictly quantitative (see nominal and ordinal variables).

Hypothesis

- Loose definition: a statement about the nature of the (social) world.
- Usually: a statement about the relationship between our variables.
  - ➔ It comes from the theory (remember, deductivism).
  - ➔ To be confirmed, it has to be tested.
- Example: the larger the number of electoral choice options, the higher the turnout (Wessels & Schmitt 2008)

Testing the hypotheses 1

- Do we have the data?
- Quantitative methods it's not only about statistical models, but also measurement.
  - Validity: are we actually measuring what we think we are measuring?
  - Reliability: if we repeat the measurement, will we get the same data?
- The quality of data is very important for quantitative research.

Testing the hypotheses 2

- Data analysis: we need some information, we ask the data.
- It's often a long process, rather than a simple task.
  - Data cleaning.
  - Data transformation.
  - Data modeling.
- That's the point where the stats comes in.

Data cleaning

- Our data may contain a lot of information that we don't need:
  - Survey non-responses: I don't know, no answer.
  - Missing values.
  - Useless variables (for our purposes).
- We need to clean the data in order to keep only the information that we want.

Data transformation

- Sometimes we need to perform some transformation to our data in order to make them fit for our model.
- The transformation has to preserve the information that we need.
- It may mean just to recode a variable (e.g. from the numeric age to categories).
- It may involve some mathematical operations (e.g. logarithm)

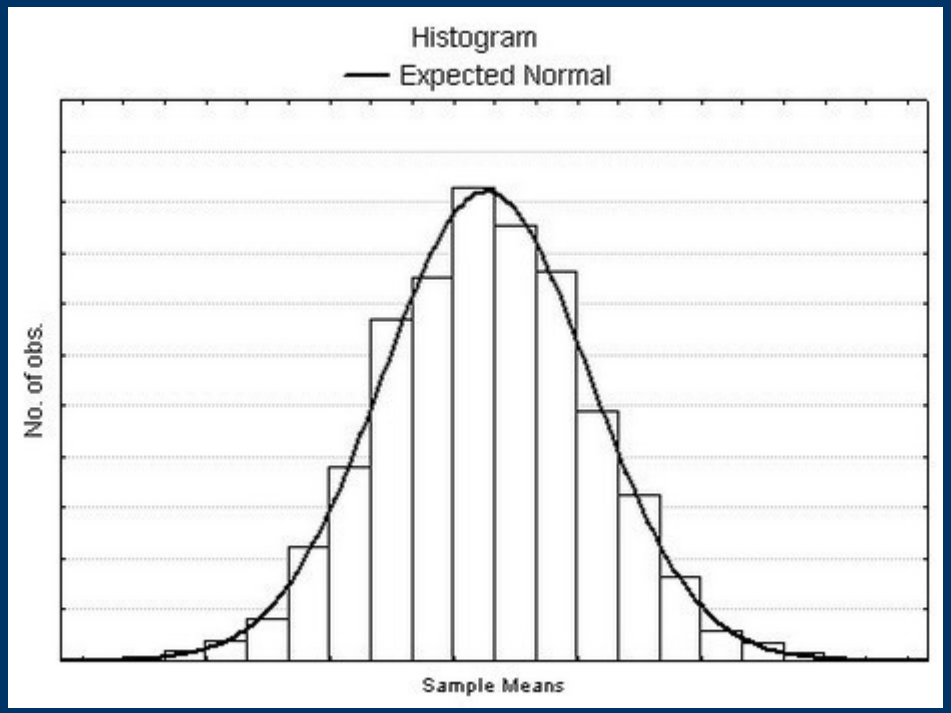
Data analysis

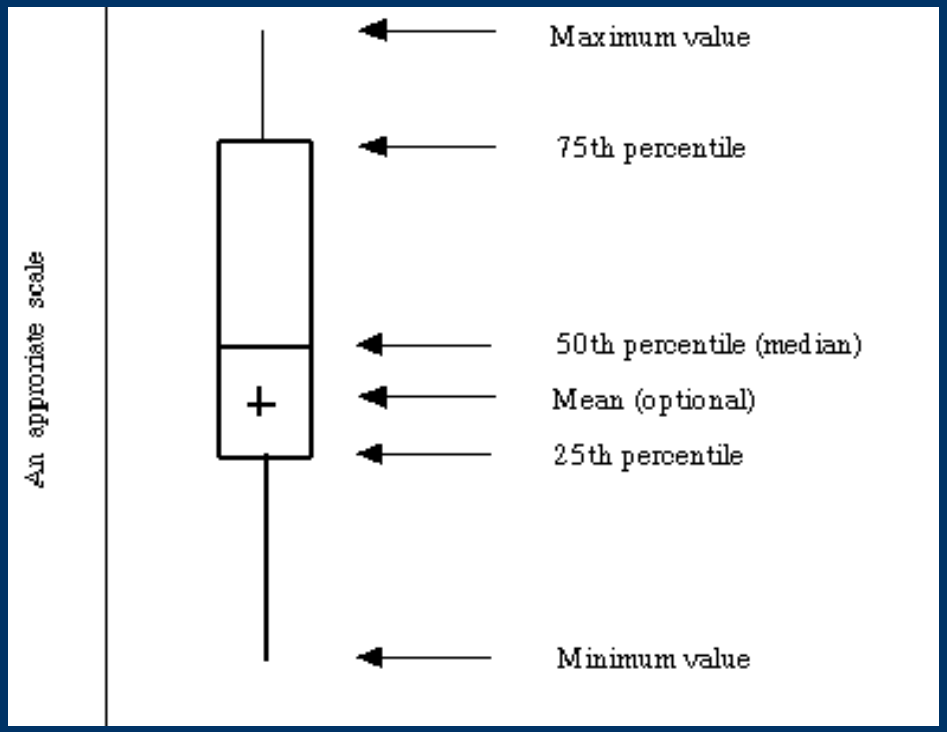
- We want to:
  - Describe the data.
  - Observe relations between variables.
  - Have a measure of the uncertainty of our findings.
- For many, this is the fun part...

Describing data

- Central tendency: mean, median, mode.
- Variability: variance, standard deviation.
- Visualization: histograms, boxplots.

How do our data look like?





Statistical model

- A formalization of the relationships between variables in the form of mathematical equations.
- What's the *effect* of X on Y?
  - ➔ e.g. positive effect: as X increases of 1 unit, Y will increase of a quantity = β.
- Parameter: a quantity that expresses the relation between variables.
- We believe this quantity is a property of the real world.
- We just want to estimate it.

Uncertainty...

- How correct is our estimation?
- Remember, we (almost) always work on data about a *sample* of the population.
- May our results be given by the quality of our sample? i.e. is it possible that what we see is given by chance?
- To make a valid inference, we should provide a measure of the uncertainty that we have about our findings.

However

- Fancy statistical models are nice, but sometimes the reality is way more simple than the way how we model it.
- We are still talking about people...
- Research requires both a theoretical and an empirical part.

Questions?