Data Visualization

A Practical Introduction

Nith Kosal

Future Forum

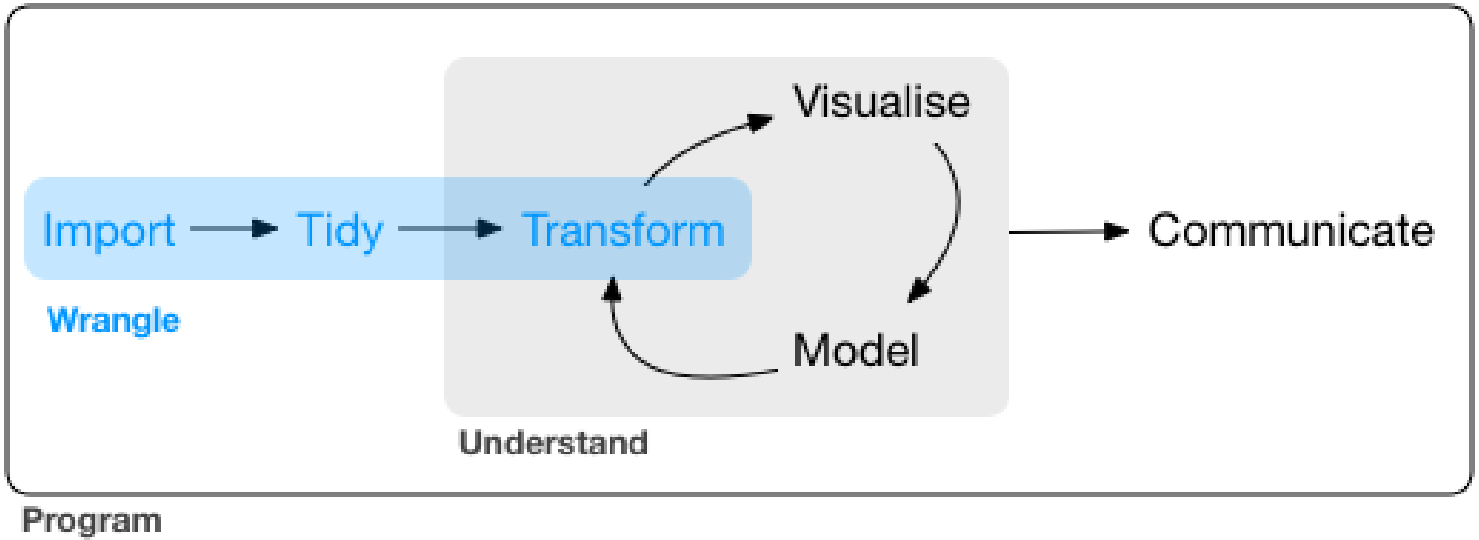
2021 YRP Seminar, May 13, 2021

Goal of Today's Seminar

- Know the types of graphs we should avoid
- Learn about RStudio IDE (integrated development environment)
- Data visualization in R
- Data import and transformation
- Data export
- Discussion about your questions or any concerns about R or datasets

Remember: It will not work in a flow and structure, because we practice in the real example as a researcher have a dataset and applied it for a specific research study.

The Thing to know when you work with data



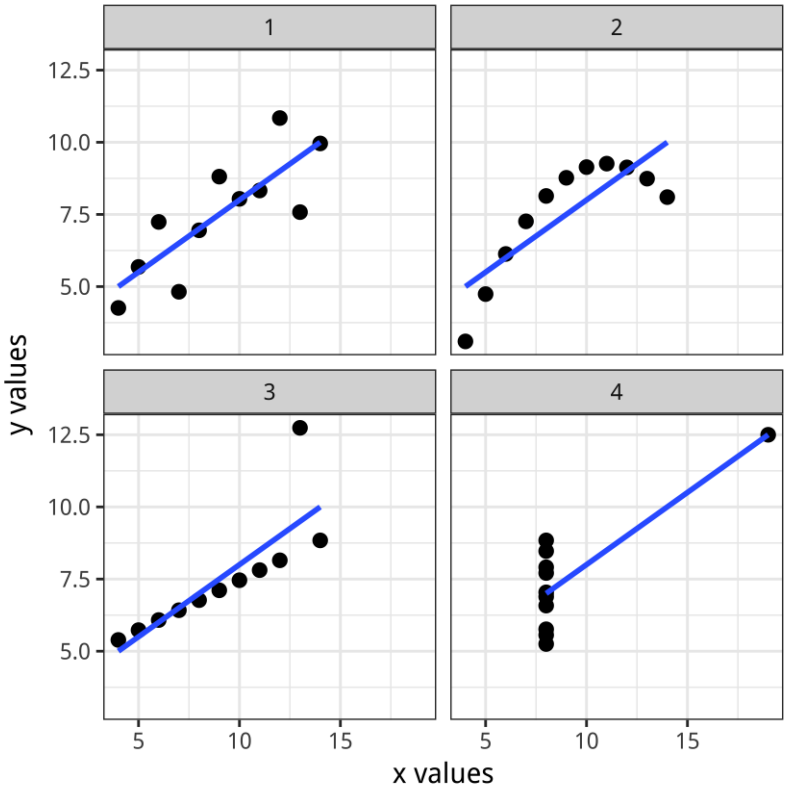
Source: Grolemund and Wickham (2016)

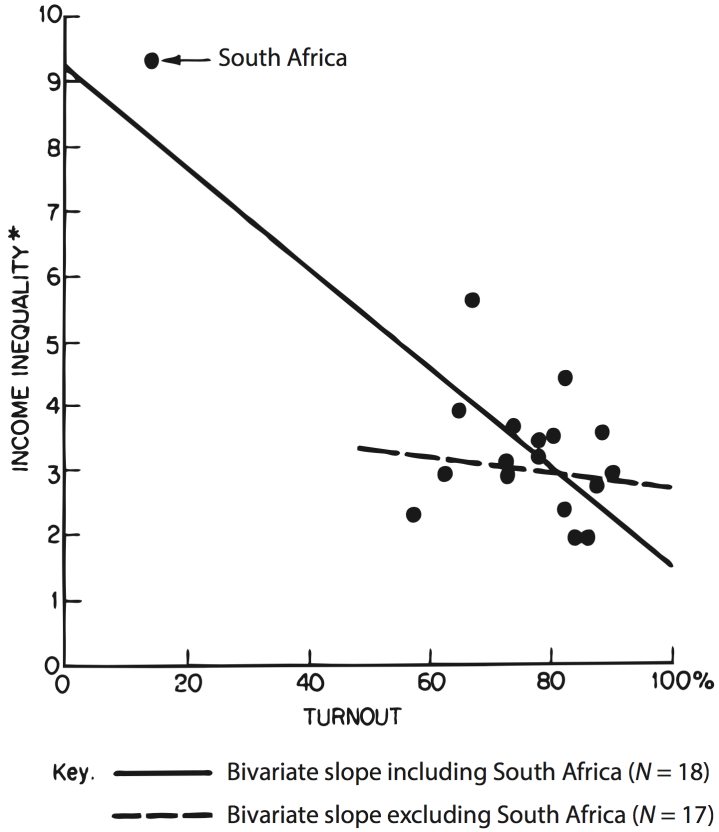
- Tidying your data means storing it in a consistent form that matches the semantics of the dataset with the way it is stored.
- Together, tidying and transforming, we called *wrangling*

What does data visualization mean?

- A reporting tool: the representation of information in the form of a chart, diagram, picture, etc.
- It is a part of *hypothesis generation* or *data exploration*.
  - A precise mathematical model to generate falsifiable predictions.
  - Only use an observation once to confirm a hypothesis.
- Modelling is an important part of the exploratory process.

Now, We Look at Some Data Visualizations

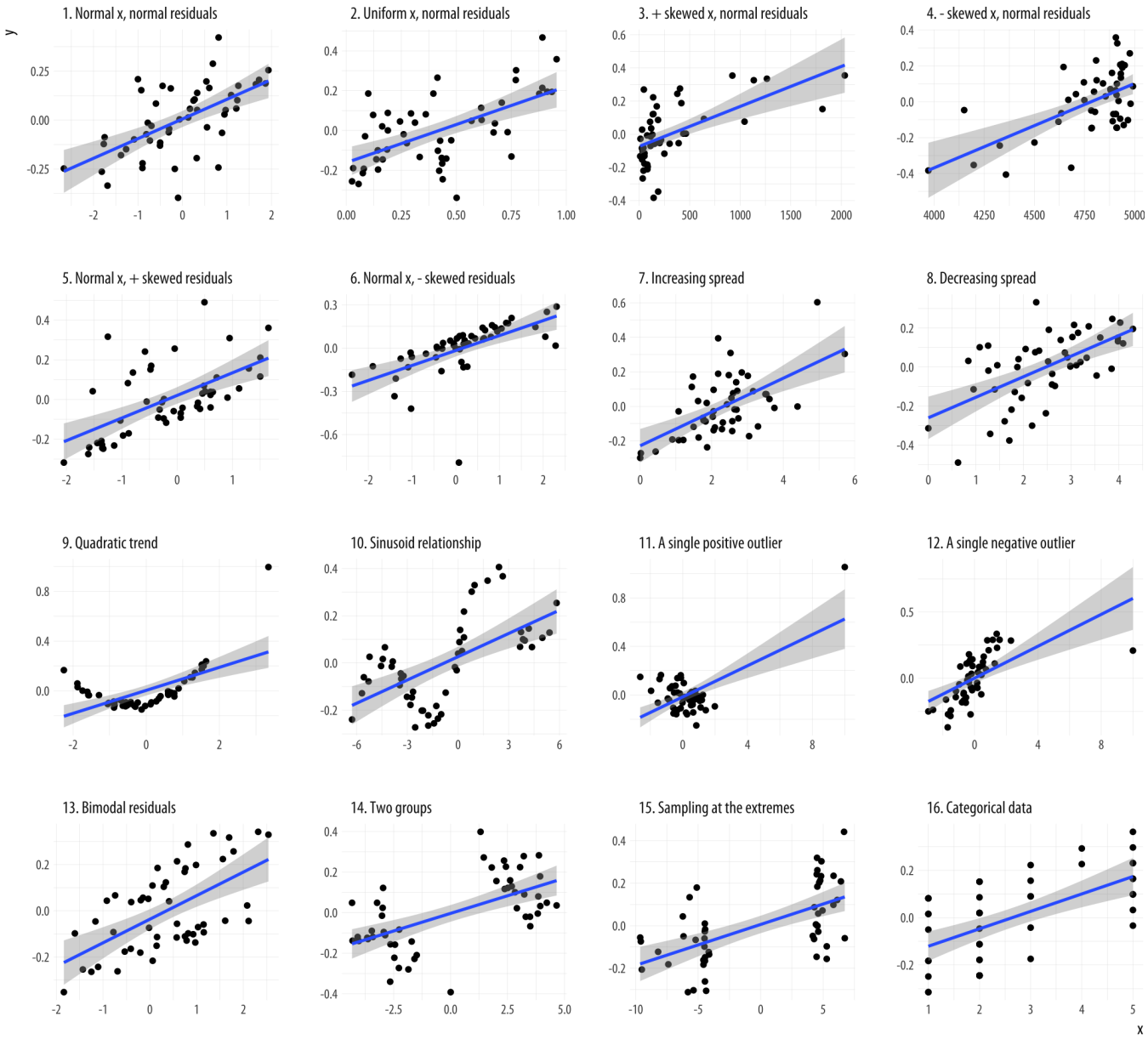




Source: Chatterjee and Firat (2007), Jackman (1980)

- Scatterplots are the workhorse of data visualization in social science.
- A scatterplot shows the relationship between two quantities, such as height and weight, age and income, or time and unemployment.

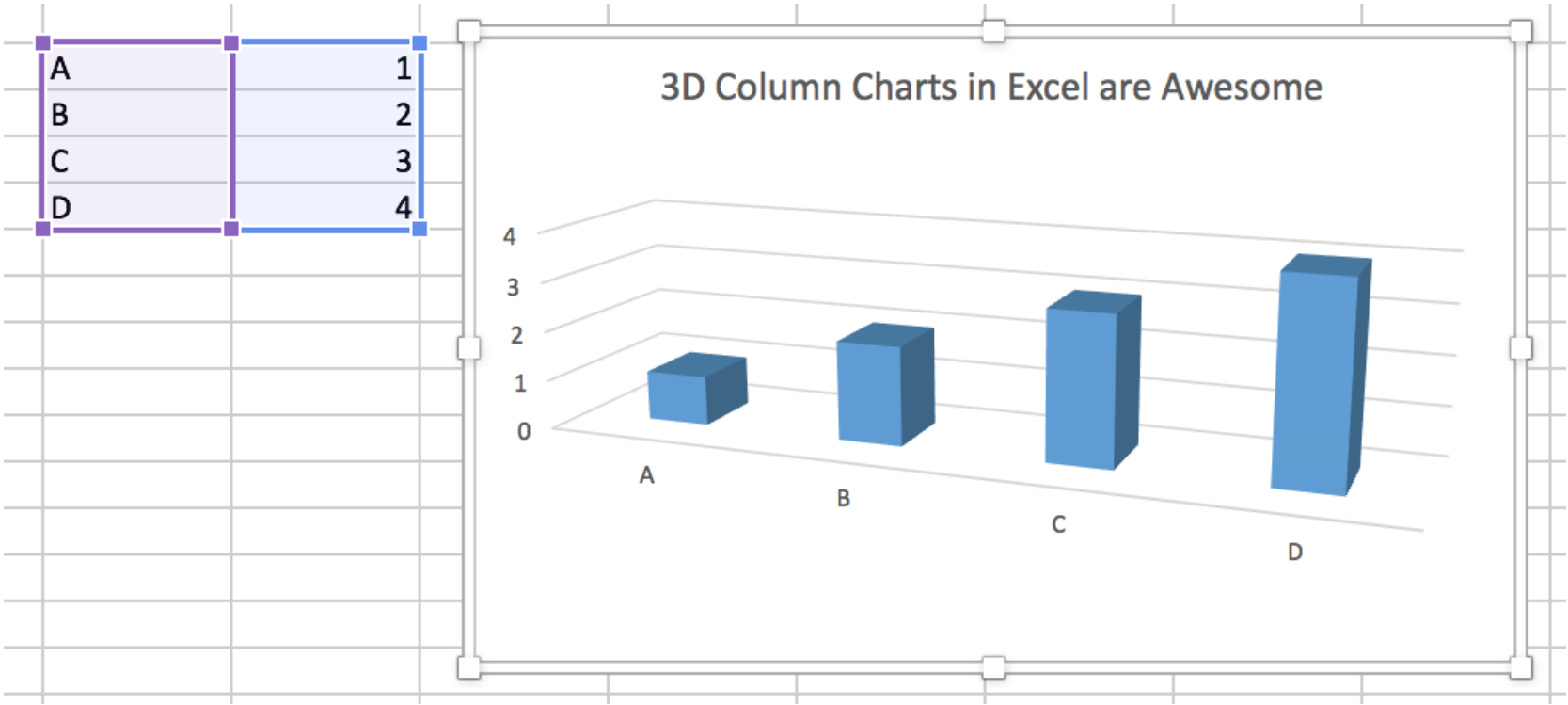
Within each panel, the correlation between the `x` and `y` variables is set to be `0.6`, a pretty good degree of association. But the actual distribution of points is created by a different process in each case.



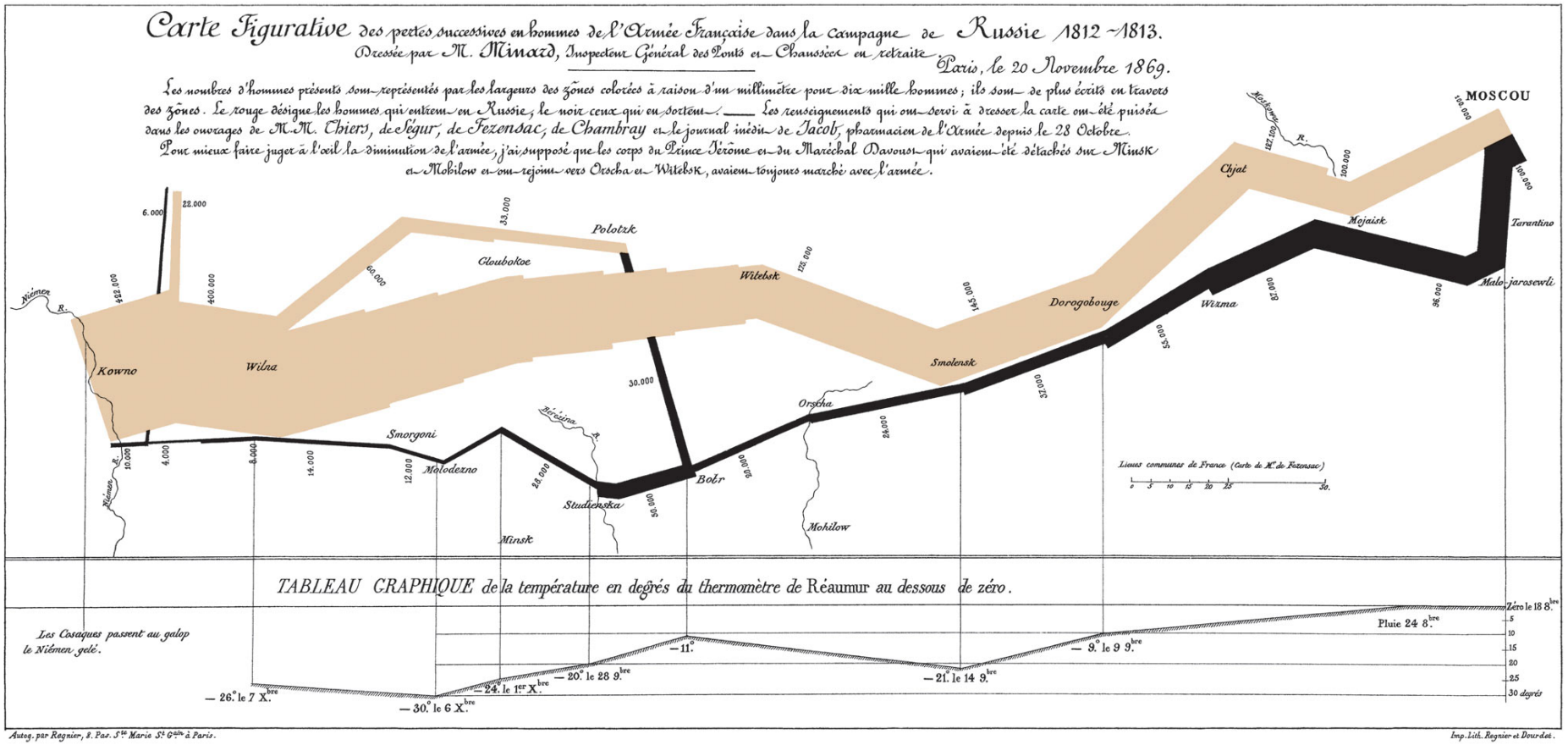
Source: Jan Vanhove (2016)

Source: Kieran Healy (2018)

The bars are hard to read and compare.



- Scatterplots are the workhorse of data visualization in social science.
- A scatterplot shows the relationship between two quantities, such as height and weight, age and income, or time and unemployment.

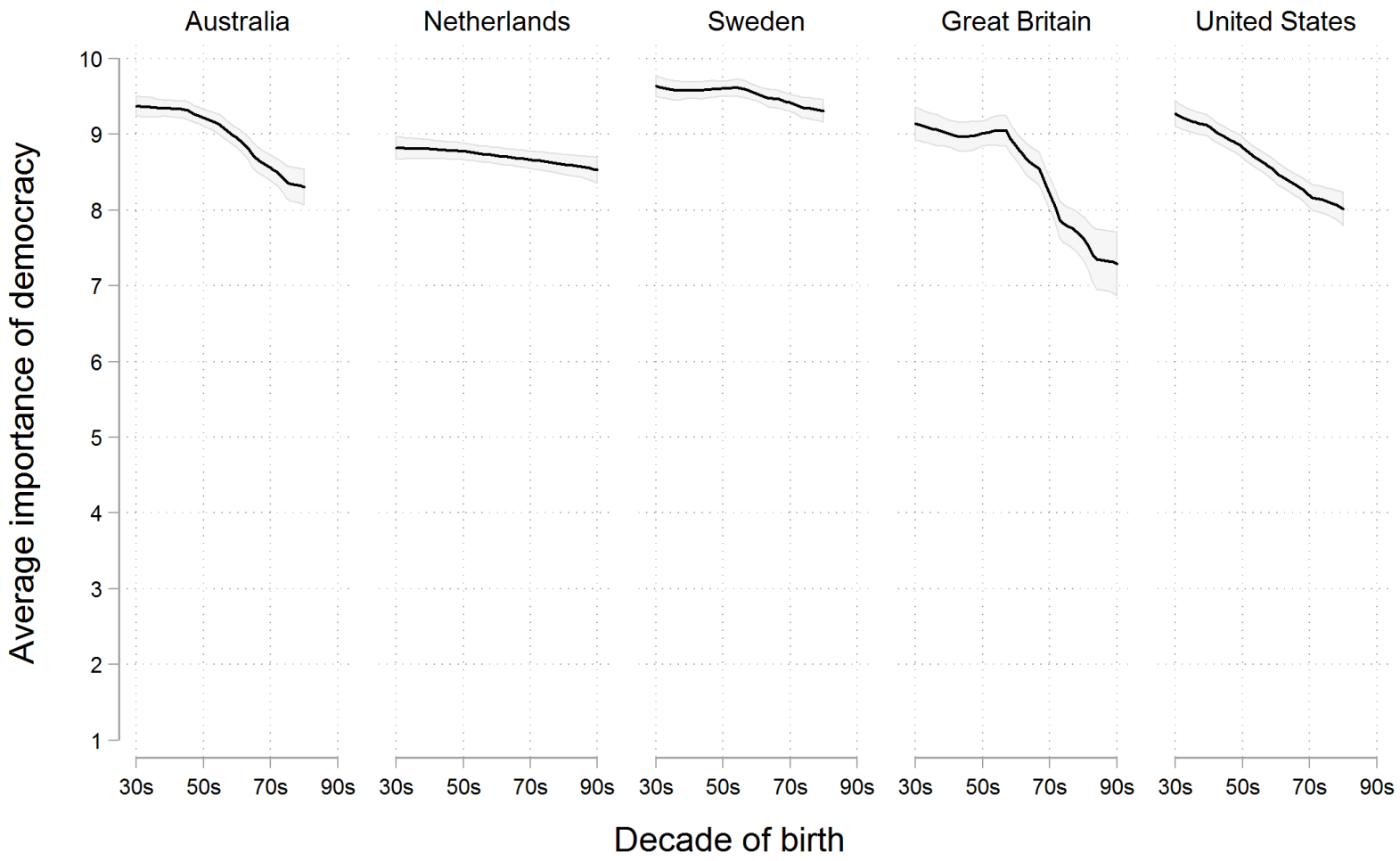


Source: Charles Joseph Minard — Minard's visualization of Napoleon's retreat from Moscow.

Edward Tufte's comment: "*Graphical excellence is the well-designed presentation of interesting data—a matter of substance, of statistics, and of design, it consists of complex ideas communicated with clarity, precision, and efficiency.*"

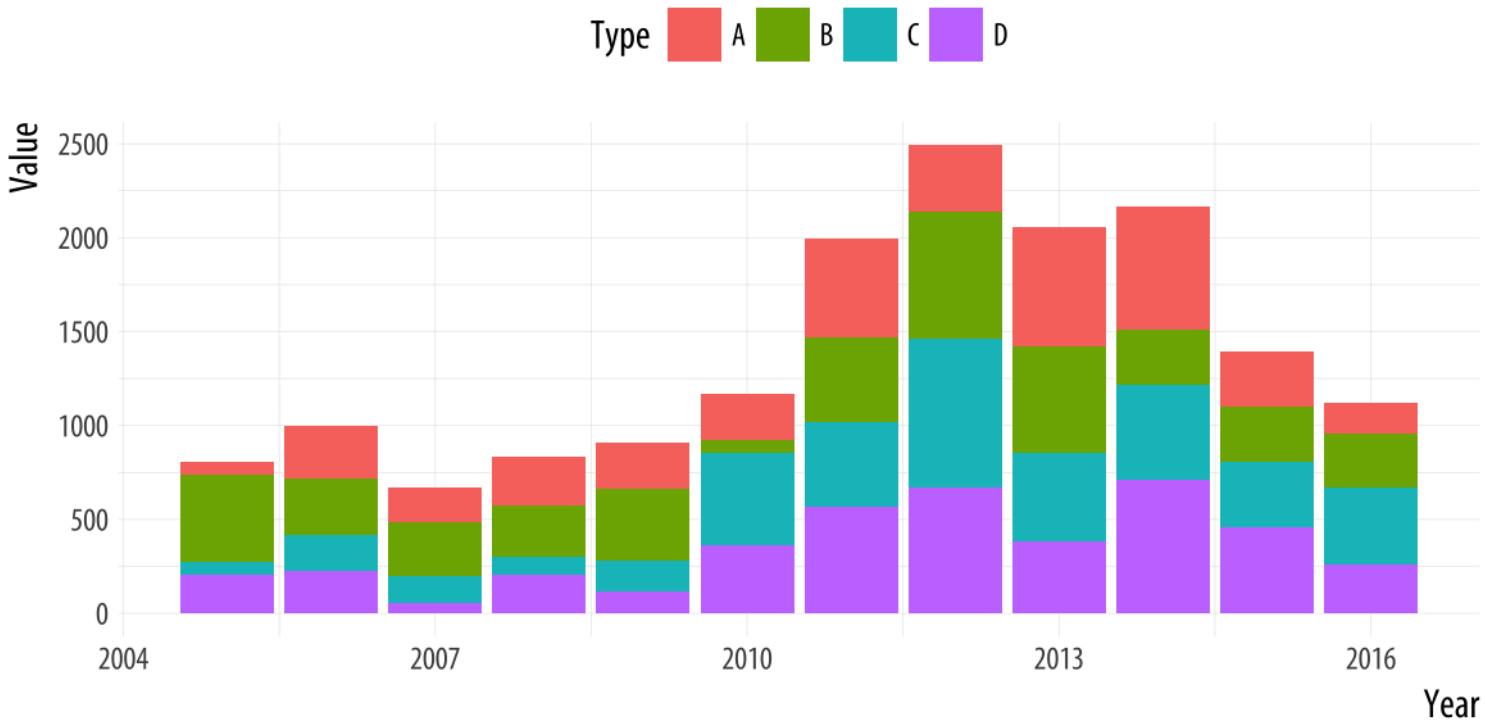
Source: 'Monstrous Costs' by Nigel Holmes

- Scatterplots are the workhorse of data visualization in social science.
- A scatterplot shows the relationship between two quantities, such as height and weight, age and income, or time and unemployment.



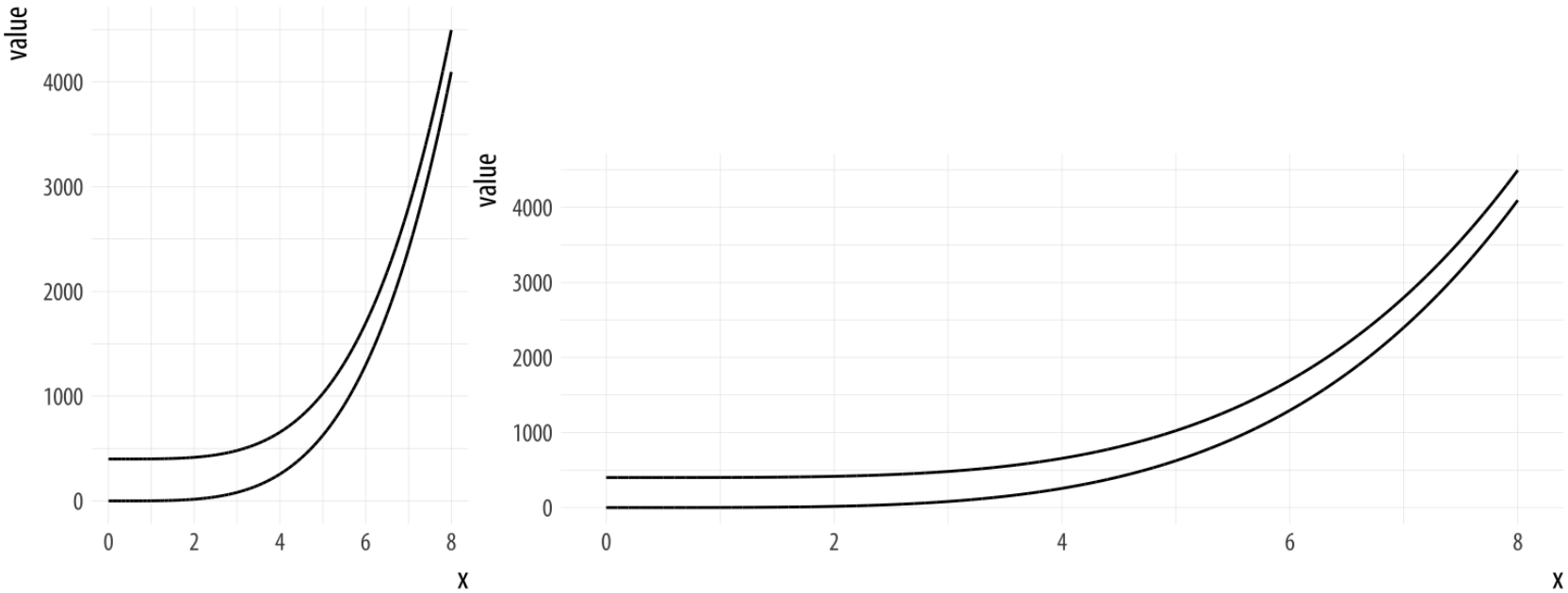
Graph by Erik Voeten, based on WVS 5

- Scatterplots are the workhorse of data visualization in social science.
- A scatterplot shows the relationship between two quantities, such as height and weight, age and income, or time and unemployment.



Source: 'Monstrous Costs' by Nigel Holmes

- Scatterplots are the workhorse of data visualization in social science.
- A scatterplot shows the relationship between two quantities, such as height and weight, age and income, or time and unemployment.



Source: 'Monstrous Costs' by Nigel Holmes

- Scatterplots are the workhorse of data visualization in social science.
- A scatterplot shows the relationship between two quantities, such as height and weight, age and income, or time and unemployment.

Variable Types in the Statistical Software

1. `int` stands for intergers
2. `dbl` stands for doubles, or we call real numbers
3. `chr` stands for character vectors, and strings
4. `dttm` stands for date-times (a date + a time)

At the same time, there are three other common types of variables

1. `lgl` stands for logical, vectors that contain only `TRUE` or `FALSE`
2. `fctr` stands for factors, which R uses to represent categorical variables with fixed possible values.
3. `date` stands for dates.