

Evidence-based Decision Making: Session 6

Rui Mata, FS 2022

Session information

Sessions take place Tuesdays, 16.15–17.45. Currently, the course is planned to be held in person but a change to an online format is possible depending on the current epidemiological situation.

| # | Date | Topic | Slides |
|----|------------|---------------------------------|------------|
| 1 | 22.02.2022 | <u>The Scientific Method(s)</u> | <u>pdf</u> |
| 2 | 01.03.2022 | <u>Algorithms</u> | <u>pdf</u> |
| 3 | 22.03.2022 | <u>Algorithms</u> | <u>pdf</u> |
| 4 | 29.03.2022 | <u>Consensus</u> | <u>pdf</u> |
| 5 | 05.04.2022 | <u>Consensus</u> | <u>pdf</u> |
| 6 | 12.04.2022 | <u>Counterfactuals</u> | <u>pdf</u> |
| 7 | 19.04.2022 | <u>Counterfactuals</u> | <u>pdf</u> |
| 8 | 26.04.2022 | <u>Synthesis</u> | <u>pdf</u> |
| 9 | 03.05.2022 | <u>Synthesis</u> | <u>pdf</u> |
| 10 | 10.05.2022 | <u>Interventions</u> | <u>pdf</u> |
| 11 | 17.05.2022 | <u>Interventions</u> | <u>pdf</u> |
| 12 | 24.05.2022 | <u>Exam</u> | |

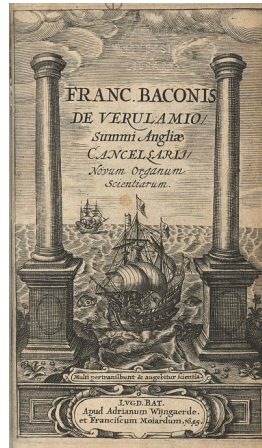
Goals

- Understand the nature of causal inference as the comparison of treatment to some counterfactual
- Understand that RCTs/experiments have desirable properties for causal inference – but also have limitations...

Evidence-based decision making



Francis Bacon
(1561-1626)



1620

Bacon suggests that one can draw up a list of all things in which the phenomenon to explain occurs, as well as a list of things in which it does not occur. Then one can rank the lists according to the degree in which the phenomenon occurs in each one. Then one should be able to deduce what factors match the occurrence of the phenomenon in one list and do not occur in the other list, and also what factors change in accordance with the way the data had been ranked.

Varian, H. R. (2016). Causal inference in economics and marketing. Proceedings of the National Academy of Sciences of the United States of America, 113(27), 7310–7315. <http://doi.org/10.1073/pnas.1510479113>

“The critical step in any causal analysis is estimating the counterfactual—a prediction of what would have happened in the absence of the treatment”

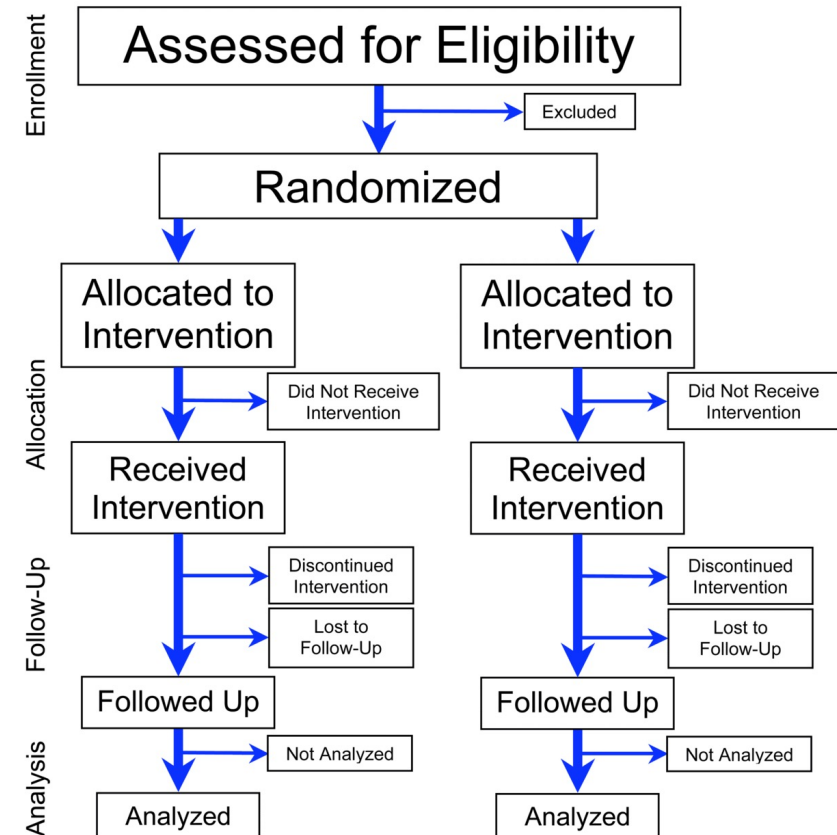


The gold standard...

Experiments/Randomised control trials (RCT)

A type of scientific experiment, where the people being studied are randomly allocated one or other of the different treatments under study. RCTs are considered the gold standard for a clinical trial. RCTs are often used to test the efficacy or effectiveness of various types of medical intervention and may provide information about adverse effects, such as drug reactions. Random assignment of intervention is done after subjects have been assessed for eligibility and recruited, but before the intervention to be studied begins.

$$Y = B_0 + B_1\text{group}$$



Shorter, E. (2011). A brief history of placebos and clinical trials in psychiatry. *Canadian Journal of Psychiatry*, 56(4), 193–197.

The gold standard...

Experiments/Randomised control trials (RCT)



<http://www.consort-statement.org>

The gold standard is not always gold...

Experiments/Randomised control trials (RCT)

- **Efficacy vs. effectiveness:** Trials may not be widely applicable in real-world conditions....
- **Generalizability:** Results may not always generalize to other samples (e.g. inclusion /exclusion criteria)
- **Ethical limitations:** randomisation requires experimental equipoise: one cannot ethically randomise participants to some treatments (no-schooling condition)

Summary

“The critical step in any causal analysis is estimating the counterfactual—a prediction of what would have happened in the absence of the treatment”

RCTs are great **but** do not guarantee effectiveness, generalizability, or ethical treatment of participants...