Natural Experiments

Chapter 2 – Correlation vs. Causality

Proof of causal relationships with the help of natural experiments?

Natural experiments draw on data, which has not been collected for scientific purposes, but is already available for other reasons. In this case, the experimental conditions cannot be controlled before data collection, rather they must be identified thereafter.

This is not easy. The data situation often proves to be complex. Which test subjects do belong to a treatment group and which to a control group? In other words: When is there a causal relationship and when merely a correlation?

A causal relationship describes a cause and a clearly defined effect. A correlation is a coincidental connection. It is unclear what the actual cause is; possibly several factors may be influential.

For example: Obesity and life expectancy correlate. Overweight people die sooner. But is obesity necessarily the cause of early death?

Joshua D. Angrist and Guido Imbens investigate the issue of whether and how it is possible to draw precise conclusions of cause and effect from natural experiments. Together with David Card, they were awarded the Sveriges Riksbank Prize in Economic Sciences in memory of Alfred Nobel 2021 for their methodological contributions to the analysis of causal relationships.

Angrist and Imbens analyse data on compulsory schooling in two US states to determine whether education influences the level of future income. Joshua D. Angrist explains his research using a Nobel poster as follows:

"My corner here is here. That's about a work that I did many years ago with Alan Krueger, using the fact that children born in different quarters of the year are constrained to get more or less schooling by compulsory attendance laws. So, your birthday is the serendipitous force that manipulates the intervention of interest in this case education. And it's the stork here that delivers babies experimentally, or I should say quasi experimentally."

Chance therefore determines whether a child is born shortly before or right after a month's end. If born before, it may leave school before graduation in the USA. If some of the pupils in a class are allowed to leave school earlier, i.e. theoretically receive less education than the others, can a causal link be inferred with the level of future income? After all, many factors can be decisive for dropping out of school. The randomly differing birth dates can be used to study correlations between education and career success.

Using this example, scientists were able to show that natural experiments can in fact provide insights into cause and effect.