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Introduction to Bayesian statistics

In this lecture we will introduce the basic concepts of Bayesian statistics through a simple example: Inference on a binomial rate parameter. The important ingredients will be discussed: Likelihood, prior, posterior, Bayes' theorem, and simulation-based inference. Next, the versatility of the approach is illustrated by considering how a hierarchical model can be used to take into account individual differences. It will also be shown how the hierarchical model effectively performs shrinkage and how this may increase the generalizability of one's findings.

The data and the model multiverses in empirical research

The step from the raw data from a study to statistical conclusions relies on a lot of decisions. These decisions relate, for example, to the transformation of the data, the exclusion of data points and the statistical method. In many cases, for each decision, there are several reasonable options available. As such, there is never a single unique statistical conclusion, but rather a multitude of conclusions exist (each depending on a specific set of justifiable decisions). Charting this multitude of conclusions is called a multiverse analysis. In this lecture, we will explain the basic ideas of a multiverse analysis and discuss how conclusions can be drawn from it.