UNIVERSITÄTSMEDIZIN GÖTTINGEN UMG

THE USE OF EXTERNAL DATA FOR DECISION MAKING

BBS Spring Seminar

Panel discussion

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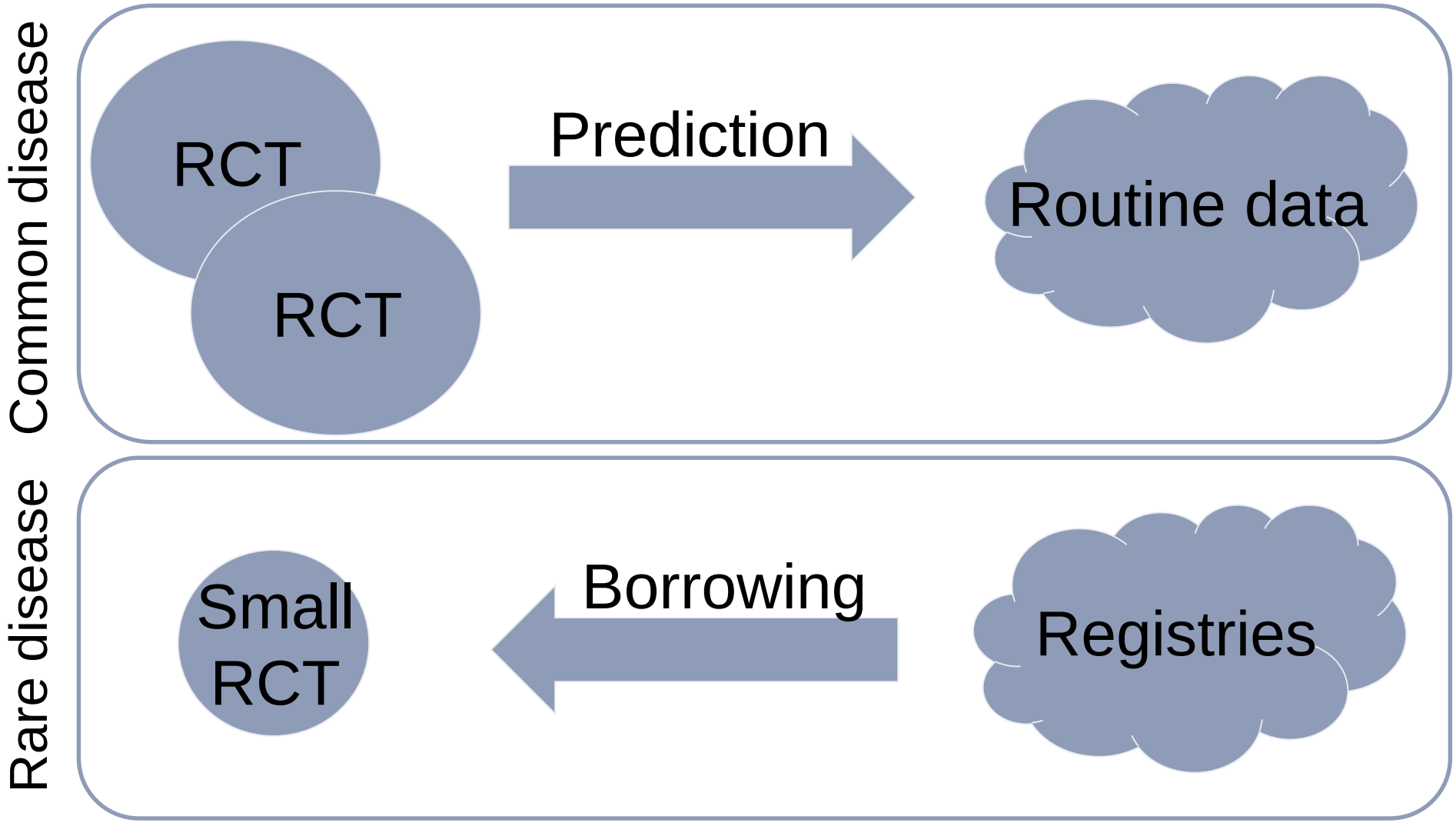
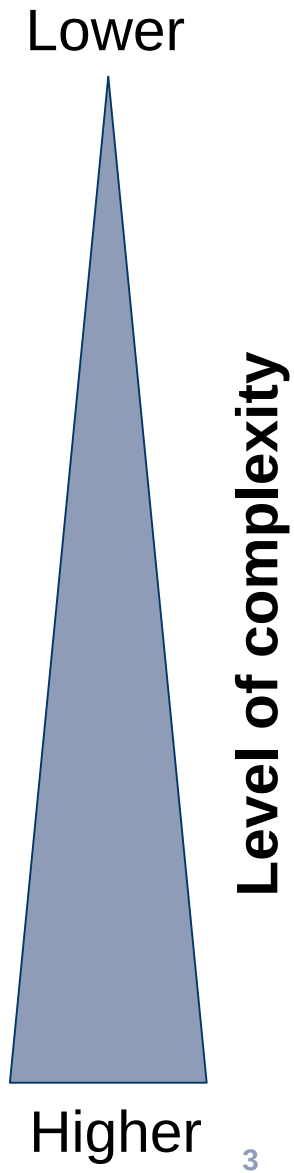
EXTRAPOLATION



EVIDENCE SYNTHESIS

- **Pairwise meta-analysis**
  - comparing two treatments
- **Meta-regression**
  - including study-level covariates
- **Network meta-analysis**
  - comparing multiple treatments indirectly
- **RCT with historical controls**
  - integrating control group data from previous trials
- **Generalized (or cross design) synthesis**
  - combining data from different types of studies

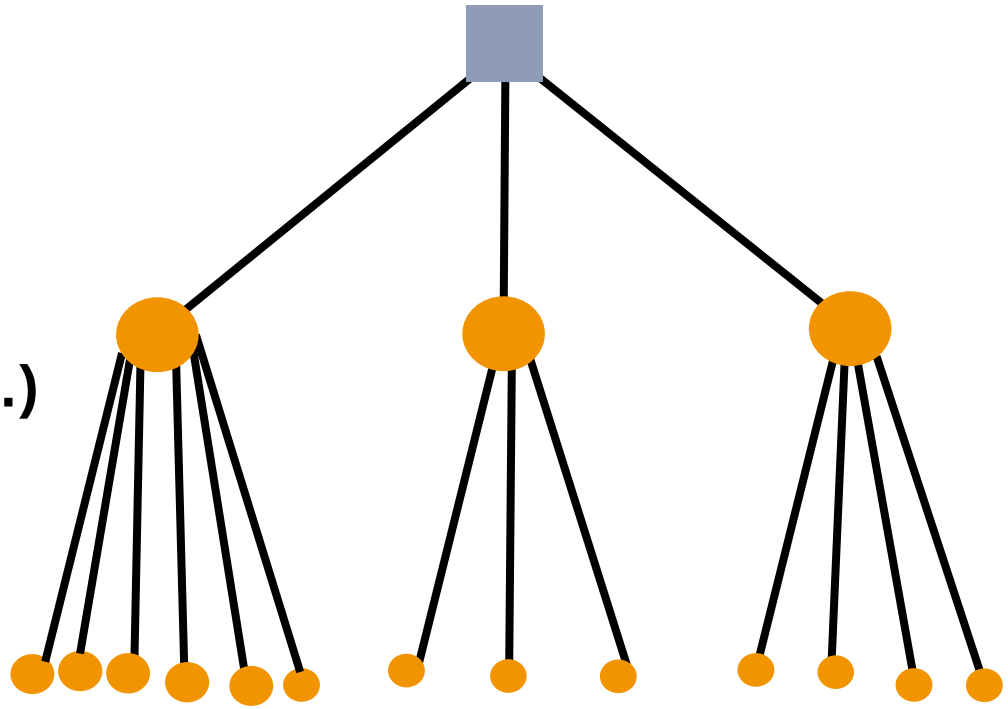


HIERARCHICAL MODELS

Meta-analysis

Studies (RCT, registry, …)

Patients



Example: **Normal-normal hierarchical model (NNHM)** for random-effects meta-analysis

$$y_i|\theta_i \sim \text{Normal}(\theta_i, s_i^2) \qquad \theta_i|\Theta, \tau \sim \text{Normal}(\Theta, \tau^2)$$

QUANTITIES OF INTEREST

Different **quantities of interest** in hierarchical models

- average effect (μ) across studies
  - standard (pairwise) meta-analysis
- effect (θ_{k+1}) of a future study
  - prediction / extrapolation: adult to children; bridging
- effect (θ_i) of an individual study in the light of the other studies (shrinkage estimator)
  - small RCT with borrowing from registry

Inference of effects must account for between-study **heterogeneity** and potential **biases**.