The basic model

Building a Statistical Model

Data generating hypothesis

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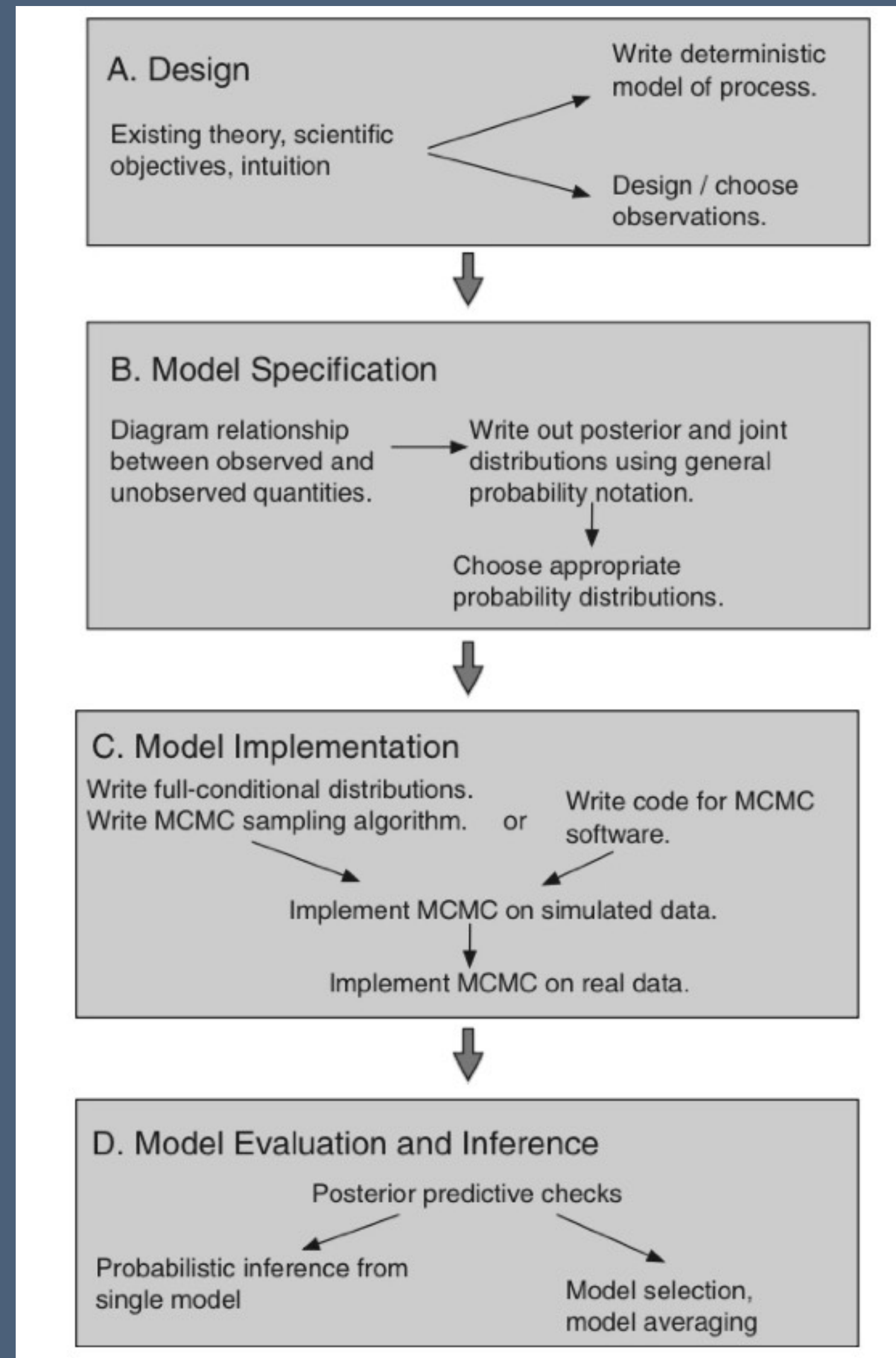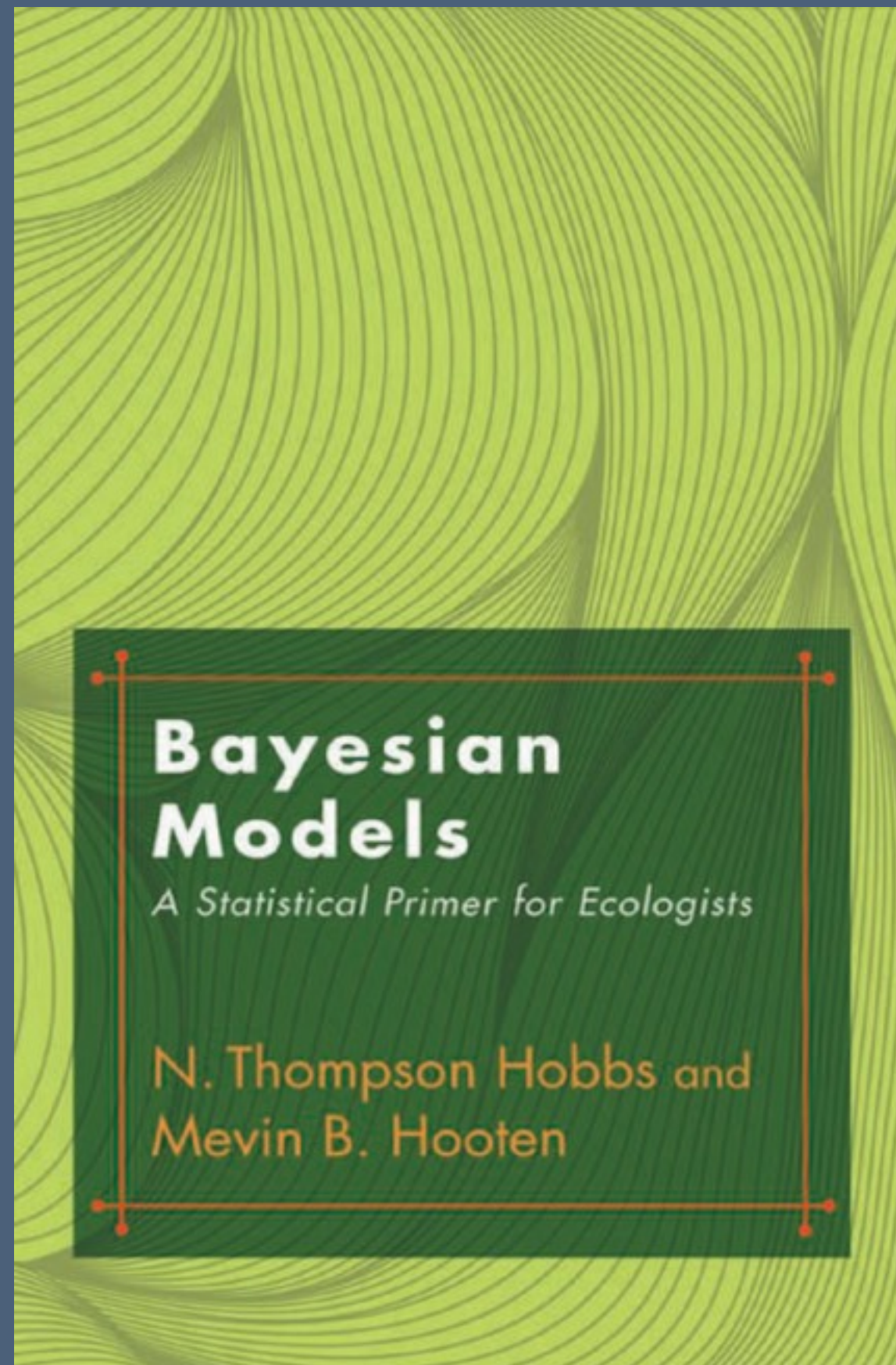Statistical model

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Estimate parameters

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Check model fit

Step by step of the modeling process

A. Design

Existing theory, scientific objectives, intuition → Write deterministic model of process.

→ Design / choose observations.

B. Model Specification

Diagram relationship between observed and unobserved quantities. → Write out posterior and joint distributions using general probability notation.

Choose appropriate probability distributions.

C. Model Implementation

Write full-conditional distributions. Write MCMC sampling algorithm. or Write code for MCMC software.

Implement MCMC on simulated data.

Implement MCMC on real data.

D. Model Evaluation and Inference

Posterior predictive checks

Probabilistic inference from single model

Model selection, model averaging

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Model selection

Causal thinking

Mixed and hierarchical models