# Contents

Preface to the Second Edition

### Preface

Audience Teaching strategy How to use this book Installing the rethinking R package Acknowledgments

## Chapter 1. The Golem of Prague

Statistical golems Statistical rethinking Tools for golem engineering

### Chapter 2. Small Worlds and Large Worlds

The garden of forking data Building a model Components of the model Making the model go

## Chapter 3. Sampling the Imaginary

Sampling from a grid-approximate posterior Sampling to summarize Sampling to simulate prediction

#### Chapter 4. Geocentric Models

Why normal distributions are normal A language for describing models Gaussian model of height Linear prediction Curves from lines

# **Chapter 5. The Many Variables & The Spurious Waffles** Spurious association

Masked relationship Categorical variables

### Chapter 6. The Haunted DAG & The Causal Terror

Multicollinearity Post-treatment bias Collider bias Confronting confounding

### Chapter 7. Ulysses' Compass

The problem with parameters Entropy and accuracy Golem Taming: Regularization Predicting predictive accuracy Model comparison

### **Chapter 8. Conditional Manatees**

Building an interaction Symmetry of interactions Continuous interactions

## Chapter 9. Markov Chain Monte Carlo

Good King Markov and His island kingdom Metropolis Algorithms Hamiltonian Monte Carlo Easy HMC: ulam Care and feeding of your Markov chain

## Chapter 10. Big Entropy and the Generalized Linear Model

Maximum entropy Generalized linear models Maximum entropy priors

## Chapter 11. God Spiked the Integers

Binomial regression Poisson regression Multinomial and categorical models

#### Chapter 12. Monsters and Mixtures

Over-dispersed counts

Zero-inflated outcomes Ordered categorical outcomes Ordered categorical predictors

### Chapter 13. Models With Memory

Example: Multilevel tadpoles Varying effects and the underfitting/overfitting trade-off More than one type of cluster Divergent transitions and non-centered priors Multilevel posterior predictions

### Chapter 14. Adventures in Covariance

Varying slopes by construction Advanced varying slopes Instruments and causal designs Social relations as correlated varying effects Continuous categories and the Gaussian process

### Chapter 15. Missing Data and Other Opportunities

Measurement error Missing data Categorical errors and discrete absences

#### **Chapter 16. Generalized Linear Madness**

Geometric people Hidden minds and observed behavior Ordinary differential nut cracking Population dynamics

#### Chapter 17. Horoscopes

Endnotes

Bibliography

Citation index

Topic Index