

THINKING PROBABILITY

Coordinator: Donald Ray

The facts and rules of probability don't always agree with our common picture of the world, whose very uncertainty is hard for us to accept. This study group traces that split through the philosophy and psychology of probability, and the various meanings of "randomness." Examples come from several surprising logic puzzles, as well as health advisories, evidence in trials, weather reporting and other areas where our chances are assessed. Readings and discussion often involve basic algebra and, especially, logic. Many doubts and questions are anticipated.

Readings and other Required Materials:

A coursepack will consist of examples, explanations and issues from introductory books. (about 200 pages, approx. \$20.00)

Don Ray has coordinated three study groups (on German Romanticism, Ibsen, and evolution). This study group comes out of Don's fascination with probability as the intersection of numbers/logic with philosophy, psychology and survival.

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Week 1 Definitions and Paradoxes

David Hand, *The Improbability Principal*, "What is Chance?" pp.41-61

David Leonhardt, NY Times, Oct. 15, 2014 "What are the Odds?"

Ian Hacking, *Intro to Probability and Inductive Logic*, "What do you mean?" pp.128-33

Week 2 Counter-intuitive cases

Peter Olofsson, *Probabilities*, "Surprising Probabilities" pp.53-56

Losing your marbles: 3 quick puzzles

Week 3 Rules of probability

Olofsson, "Computing Probabilities" pp.1-14

Puzzle: Getting the newspaper

Week 4 Combinations, teams, line-ups

Independent events

Michael Woolfson, *Everyday Probability*, "Making Choices...", pp.35-42

Olofsson, pp.15-20

- Puzzle: License plate lottery
- Week 5 Coin tosses and random walks
Olofsson, "Even Steven..." pp. 181-91
Ekeland, *The Broken Die*, pp. 160-69
Puzzle: A roulette strategy
- Week 6 This, given that; and that, given this
Brian Everitt, *Chance Rules*, "All Probabilities Are Conditional," pp.118-19
Olofsson, "Conditional Probabilities" pp. 20-24
Nate Silver, *The Signal and the Noise*, "Climate"
Puzzle: Which car was it?
- Week 7 Bayes and medical predictions
Gerd Gigerenzer, *Calculated Risk*, "Breast Cancer Screening," pp.81-86
"Physicians, Certainty and Responsibility," pp. 16-21
"Informed Consent," pp. 91-101
- Week 8 Distribution of frequencies: the bell curve
YouTube: Search "Normal curve probability" (Common Core)
Woolfson, "Variation...", pp. 95-113
Hacking, "Statistical Stability," pp. 190-95
Question: 2 non-normal data distributions?
- Week 9 Real decisions under uncertainty
Woolfson, "The Mathematics of War," pp. 200-4
YouTube: "How to Create a Differential Diagnosis" Part 2 (Strong Medicine)
Kahneman, *Thinking Fast and Slow*, pp. 156-65
- Week 10 What is "random"? The unknown - the undetermined
Weather and chaos
- Week 11 Persistent patterns
Bruce, *Conned Again*, pp. 239-43
Olofsson, "Number One is Number One," pp. 294-96
Puzzle: Throwing darts
- Week 12 Making it random
J. Marques de Sa, *Chance*, pp. 125-27
Olofsson, "Is Random Really Random?" pp. 297-302