Intuitive Statistics

1

Key Questions

- Do lay people think like a statistician when they predict and explain uncertain events?
- How does lay judgment differ from the statistical standard?

2

Key Concepts

- Normative theory = statistics
  - E.g., law of large numbers
- Descriptive phenomena
  - Coincidences
  - Gambler's fallacy
  - Hot hand effect
- Descriptive theory = law of small numbers

3

BELIEF IN THE LAW OF SMALL NUMBERS

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- People view 2 (small) samples drawn from a population to be more similar to one another and to the population than sampling theory (statistics) predicts
- Example: short sequence of coin tosses should have equal #s of H & T

4

Gambler's Fallacy

- Belief that random sequence is self-correcting
- Streak of one outcome means the alternative outcome is "due".
- E.g. far coin sequence:
- THTTHHHH
- Infer p(next = T) > 0.5

5

Hot Hand Effect

- Belief that a long streak indicates that sequence is not caused by a random process.
- Instead caused by a change in skill
  - e.g., basketball player with a 70% base rate of making baskets.
  - Sequence of 5 baskets in a row
  - Statistical explanation: each throw has p(success) = 0.70 and that will result in occasional streaks.
  - Psychological explanation: she's hot!
    - Right now, p(success) = 0.70

6

Neglecting Sample Size

7

T&K Hospital Problem

- A certain town is served by two hospitals. In the larger hospital about 45 babies are born each day, and in the smaller hospital about 15 babies are born each day. As you know, about 50% of all babies are boys. However, the exact percentage varies from day to day. Sometimes it may be higher than 50%, sometimes lower.
- For a period of 1 year, each hospital recorded the days on which more than 60% of the babies born were boys. Which hospital do you think recorded more such days?
  - The larger hospital
  - The smaller hospital
  - About the same (that is, within 5% of each other)

8

Attending to Sample Size

9

The Use of Statistical Heuristics in Everyday Inductive Reasoning

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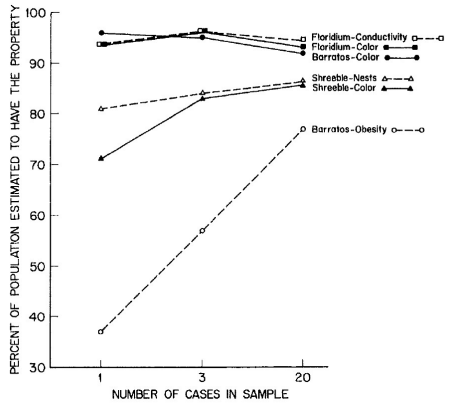
10



11

Homogeneity → sample size less important

- 1, 3, or 20 instances with same property
- Homogeneity
  - High: e.g., electrical conductivity
  - Low: e.g., colors of animals, human characteristics
- One sample of floridium burns green
  - What % of all samples of floridium burn green
- One Barratos member is obese
  - What % of all Barratos members are obese?

12

Conclusions

- Humans see patterns even when they aren't there statistically
  - Explained by LSN
- Humans neglect sample size (relative to statistics normative standard)
  - Also explained by LSN
- But still do pay some attention to sample size
  - Especially when the situation prompts us to

13