# Heuristics and Biases in Judgments

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# Heuristics & Biases

- What is a heuristic?
  - A cognitive ‘short cut’ that allows us to respond *quickly* to complex problems
  - Benefits: Low effort mental processing
  - Costs: Errors in judgments and decisions
- What is a bias?
  - A systematic pattern of responding that shows predictable errors
  - Many biases are thought to be a byproduct of automatic processing or otherwise useful heuristics

KAHNEMAN, SLOVIC, & TVERSKY, 1982

# Representativeness Heuristic

- Make probability judgments based on the degree to which an event is similar in essential characteristics to its parent population
- What is the probability that patient X has disease Y?
- Probabilities are assessed by the degree to which patient X resembles disease Y
  - E.g., Nurses attributed physical symptoms to a less serious cause when context cues were provided
- Biases: 1) Conjunction fallacy; 2) Base rate neglect

TVERSKY & KAHNEMAN 1974; BRANNON & CARSON, 2003

# Availability Heuristic

- Make probability judgments by considering the number of examples that come to mind when considering a particular exemplar
  - Which is a more likely cause of death in the United States—being killed by falling airplane parts or shark attack?
- How likely is it that my patient has disease Y?
- Probability is assessed by the ease with which examples come to mind
  - E.g., Physicians' judgements of the probability their patients had bacteremia were higher if they recently had other patients with bacteremia

KAHNEMAN & TVERSKY, 1974; POSES & ANTHONY,1991

# Anchoring & Adjustment Heuristic

- How common is prostate cancer?
  - I don’t know, but I know the prevalence rate of breast cancer is ~12%
  - Do I think prostate cancer is more or less common?
  - How much more or how much less?
- Make probability estimates by starting from an initial value (anchor) and adjusting up or down •
- When making probability judgments, we rely too heavily on initial information (‘the anchor’) and fail to adjust away from the anchor sufficiently

TVERSKY & KAHNEMAN, 1974; STRACK & MUSSWEILER, 1997

# Other Relevant Biases

**Illusory Correlations**— tendency to see to events as causally related when no true relationship exists

- E.g., more vaccination causes autism
- Can develop and be maintain in the face of strong contradictory evidence

**Hindsight Bias**— tendency to exaggerate the extent to which a past event could have been predicted beforehand

- Impedes learning and generates unwarranted overconfidence in judgment

**Confirmation Bias**— tendency to seek out information that confirms a hypothesis

- put extra example here

CHAPMAN & CHAPMAN, 1967; KLEIN, 2005; FISCHHOFF, 1975; ARKES, 2013

# Learning from Experience

- Documented a lack of ability in clinical judgment, decision making, and probability estimation by expert and non-experts
- Experience ≠ more accurate judgment
- Experience = greater confidence in judgments
- Why doesn’t experience teach us to doubt our abilities?

EINHORN & HOGARTH, 1978

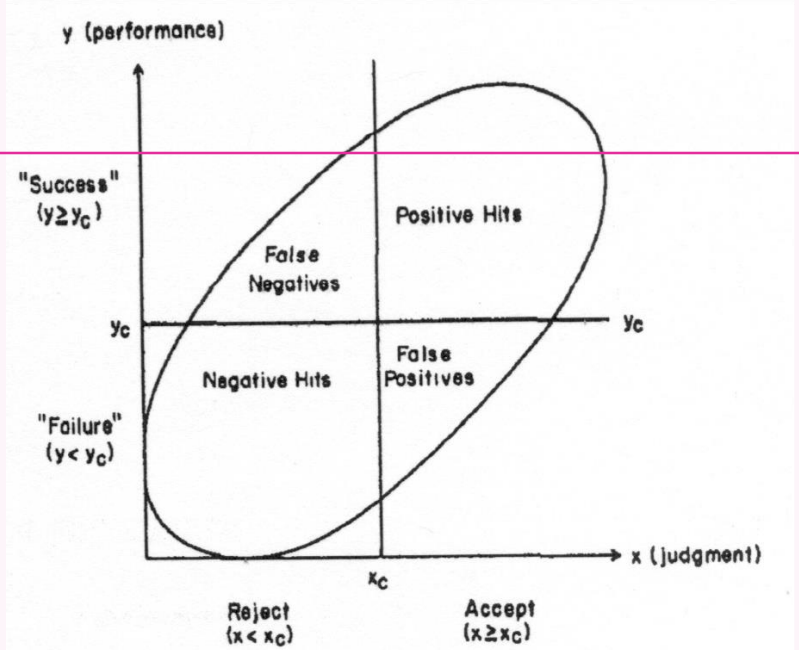



*Figure 1.* Action–outcome combinations that result from using judgment to make an accept or reject decision.

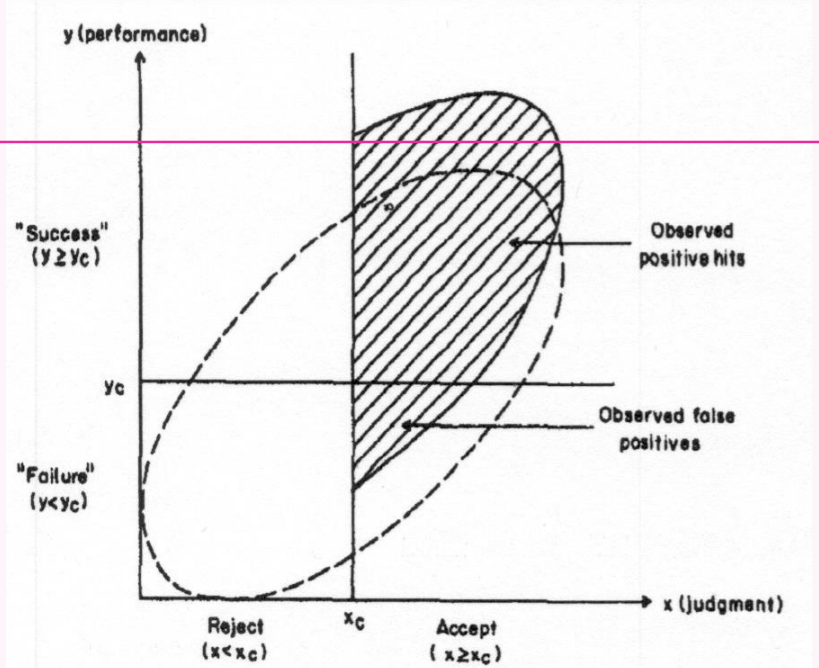



*Figure 2.* Effects of treatment on the observed positive hit rate.

# Illusion of Validity

EINHORN & HOGARTH, 1978

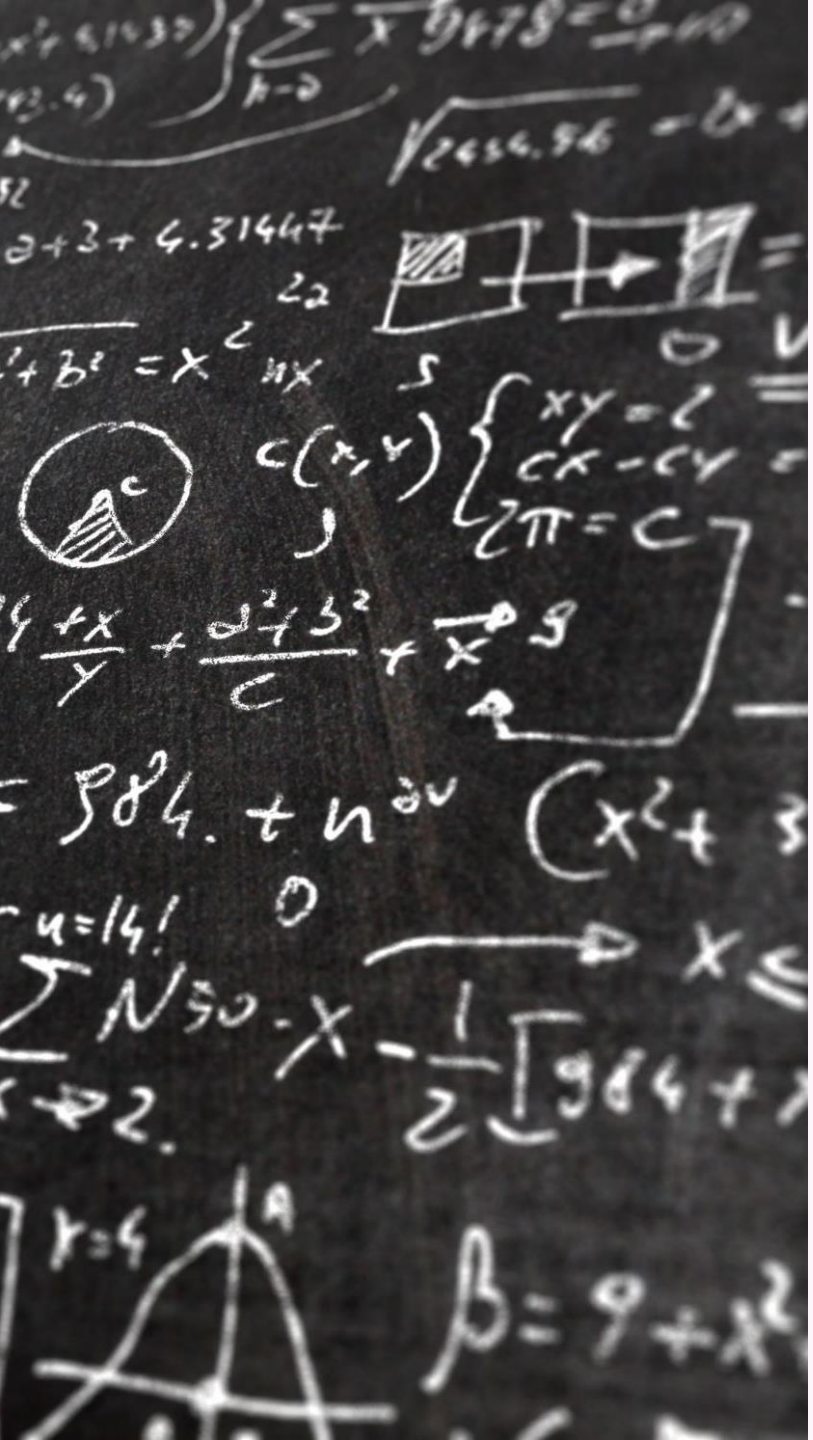
# Illusion of Validity

- Factors affecting the positive hit rate:
- judgmental ability
- selection ratio
- base rate of success

# Learning from Experience

BREHMER, 1980

- Use of the confirmation bias limits our ability to learn
- Learning is difficult because variables are probabilistic not deterministic
- Do not have cognitive schemata needed for understanding probabilistic tasks
- “A more adequate understanding of the nature of experience leads to a more pessimistic view of what its effects may be. This, in turn, leads to less surprise about the results of studies on judgment and decision making. It seems that these results are exactly what they should be, and if we do not learn from experience, this is largely because experience often gives us very little information to learn from”



# Strategies for Debiasing Judgments

- Many biases are unrelated to reasoning ability
- Biases are caused by two types of errors:
- Association-based errors—i.e., “mental contamination”
- Strategy-based errors—failure to apply correct strategy or  mental operation
- Implications for debiasing

ARKES, 1981; STANOVITCH & WEST, 2008; WILSON & BREKKE, 1994

# Strategies for Debiasing Judgments

- If error is association-based:
  - Be aware about how the bias is impacting your judgment (both direction and magnitude)
  - Have the time and motivation to correct
- If error is strategy-based:
  - Recognize that the heuristic or intuitive response is wrong
  - Have time and motivation to correct
  - Possess and apply skills necessary to solve the problem (e.g., numerical computations)
- Incentives and accountability are NOT useful if the errors are association-based but are useful with strategy-based errors

# Strategies for Debiasing Judgments

- **Consider the Opposite**: “What are some of the reasons why my initial judgment might be wrong?”
- Failure to acknowledge information that is inconsistent with your judgment is a common source of judgmental error
- The Consider the Opposite strategy has been shown to debias: Hindsight bias, Overconfidence, Availability heuristic, Representativeness heuristic, Anchoring & Adjustment, and the Confirmation bias
- This strategy can backfire if:
  - Listing too many cons is a difficult task (Schwartz, 2011)
  - There is a poor match between articulated pros/cons and factors that determine the outcome (Wilson & Schooler, 1991)

# "Feral" Debiasing Strategies

| *Cognitive repair* | *Benefits of the repair* |
|---|---|
| Wall Street brokers tell each other "Not to confuse brains with a bull market." | This proverb helps deflate self-serving biases in decision-making ability. |
| Toyota and other companies encourage their employees to analyze problems by asking the question "Why?" five times. | The Five Whys helps decision makers to arrive at a deeper – rather than a merely accessible – answer for why problems have occurred. |

HEATH ET AL., 1998

# Summary

- Intelligence often doesn’t help
- “Thinking carefully” often doesn’t help
- People can be biased even when they believe they are not
- What may help:
  - Consider the opposite
  - Statistical models
  - Ad hoc “feral” strategies
  - Incentives for strategy-based erorrs

# Poll Question 2

In which contexts do you anticipate structured expert elicitation would encounter biases?

- HTA (National policy level)
- HTA (local/regional level)
- Global health settings
- Rare diseases
- Priority setting/planning
- Trial design
- Other