PART THREE--COGNITIVE BIASES

Chapter 12

Biases in Estimating Probabilities

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Biases in Estimating Probabilities

- Simplified Rules: **Availability Rule**, **Anchoring**
  - Depended upon in making rough probability judgments, greatly ease the burden of decision
- **Expression of Uncertainty**
  - A common source of ambiguity
- **Probability of a Scenario**
  - Often miscalculated
- **Base-Rate Fallacy**
  - Data on "prior probabilities“ are commonly ignored unless they illuminate causal relationships

Availability Rule

- Used to make judgments about likelihood or frequency
  - “Availability" refers to imaginability or retrievability from memory
- Two cues people use unconsciously in judging the probability of an event
  - The ease with which they can imagine relevant instances of the event
  - The number or frequency of such events that they can easily remember
- Example:
  - ➢ We estimate our chances for promotion by recalling instances of promotion among our colleagues in similar positions and with similar experience.

Availability Bias

- Factors that influence judgment can be unrelated to the true probability of an event
  - How recently the event occurred
  - Whether we were personally involved
  - Whether there were vivid and memorable details in the event
  - How important it seemed at the time
  - The act of analysis itself
- Example:
  - ➢ There are two CIA officers, one of whom knew Aldrich Ames and the other who did not personally know anyone who had ever turned out to be a traitor.

    Question: Which one is likely to perceive the greatest risk of insider betrayal?

Availability Bias Influence

- Likely to be Influenced by the availability bias
  - Analysts make quick judgments without really analyzing the situation (e.g. policymakers and journalists)
- Less influenced by the availability bias
  - Intelligence analysts are evaluating all available information, not making quick and easy inferences
- Intelligence analysts need to
  - Be aware when they are taking shortcuts
  - Know the strengths and weaknesses of these procedures
  - Be able to identify when they are most likely to be led astray

Anchoring

- A natural starting point serves as an anchor
  - From a previous analysis of the same subject or from some partial calculation
  - Used as a first approximation to the desired judgment
  - Adjusted, based on the results of additional information or analysis
- Problem
  - The starting point reduces the amount of adjustment
  - The final estimate remains closer to the starting point than it ought to be

Anchoring Bias

- Example:
  - Asking a group of students to estimate the percentage of member countries in the United Nations that are located in Africa.
  - Give half the students a low-percentage number and half a high-percentage number as an estimated answer. Then they adjust this number until they get as close as possible to what they believe is the correct answer.
  - Experiment results:

Anchor (Starting point)	Averaged Estimate
10 percent	25 percent
65 percent	45 percent

  - Problem: Starting points acted as anchors, causing drag or inertia that inhibited full adjustment of estimates

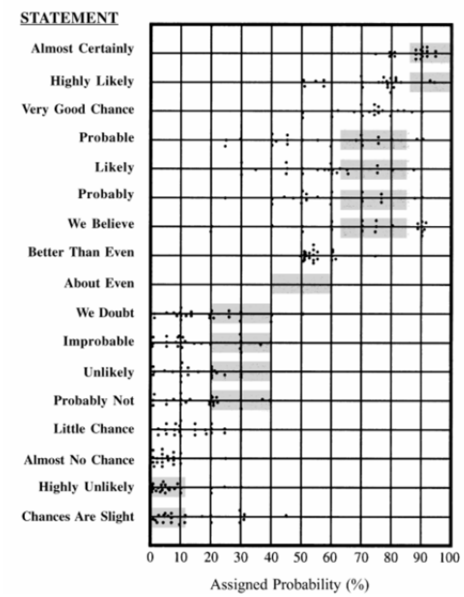
Avoid Anchoring Bias

- Reasons for the anchoring phenomenon are not well understood
- If the estimated range is based on relatively hard information concerning the upper and lower limits, the estimate is likely to be accurate
- Techniques for avoiding the anchoring bias
  - Ignore one's own or others' earlier judgments and rethink a problem from scratch
  - Employ formal statistical procedures

Expression of Uncertainty

- Probabilities may be expressed in two ways
  - Statistical probabilities are based on empirical evidence
  - Make a "subjective probability" or "personal probability" judgment
- Verbal expressions of uncertainty
  - "possible," "probable," "unlikely," "may," and "could“
  - Sources of ambiguity and misunderstanding
  - Make it easier for a reader to interpret a report as consistent with the reader's own preconceptions
- Analysts must learn to routinely communicate uncertainty using the language of **numerical probability or odds ratios**

Figure 18: Measuring Perceptions of Uncertainty



Assessing Probability of a Scenario

- Intelligence analysts sometimes present judgments in the form of a scenario
  - a series of events leading to an anticipated outcome
- The probability of a scenario should be the multiplication of the probabilities of each individual event
- Approaches used to simplify the estimate lead problem
  - To assume one or more probable events have occurred
  - Averaging strategy: to base judgment on a rough average of the probabilities of each event
    - This violates the principle that a chain cannot be stronger than its weakest link
    - The least probable event in a scenario sets the upper limit on the probability of the scenario as a whole

Base-Rate Fallacy

- In assessing a situation, an analyst sometimes has two kinds of evidence available
  - Specific evidence about the individual case at hand
  - Numerical data that summarize information about many similar cases
    - This type of numerical information is called a **base rate** or **prior probability**
- The base-rate fallacy is that the numerical data are commonly ignored unless they illuminate a causal relationship

Base-Rate Fallacy

- Example:
  - A fighter plane made a strafing attack on a US aerial mission at twilight. Both Cambodian and Vietnamese jets operate in the area. You know the following facts:

    (a) **Specific case information**: The US pilot identified the fighter as Cambodian. The pilot's aircraft recognition capabilities: the pilot made correct identifications 80% of the time and erred 20% of the time.

    (b) **Base rate data**: 85% of the jet fighters in that area are Vietnamese; 15% are Cambodian.
  - Question: What is the probability that the fighter was Cambodian rather than Vietnamese?
  - Answer:

    (15% x 80%) / (15% x 80% + 85% x 20%) = 12/29 = 41%