Decision-Making Biases & Their Implications for the Design of Support Systems

MBA 8473

Cognitive Objectives

C.O. 51. To explain the following biases and their antecedents/cognitive triggers:
  - 1 Framing effects/bias
  - 2 Availability bias (Recallability Bias)
  - 3 Overconfidence bias
  - 4 Illusion of control
  - 5 Regression Effect bias
  - 6 Sunk-cost bias
  - 7 Status-quo bias
  - 8 Confirming Evidence bias

C.O. 52. Explain the core challenge:
A. To identify the implications of these biases for designing and deploying DSS/GDSS for organizational decision making use?
B. How to help these implications by de-biasing these systems?
Framing Effects (1)
(will be included later in class)

Availability Biases (2)
*Also Called Recallability Trap*
List of Names

Instructions

- Read the list once.

- Margaret Thatcher
- James Eynon
- Barbara Walters
- Charles Stubbart
- Hillary Clinton
- Arlyn Melcher
- Indira Gandhi
- Jack Smith
- Madonna
- Greg White

Recall Test!

- Are there more men or women on the list?
- How many men are on the list?
- How many women are on the list?
- How confident are you of your answers? Provide a probability number ranging from 0 to 1 for each answer.
List of Names - Take 2

Instructions

- Read the list once.

- Bill Clinton
- Mary Culnan
- Michael Jordan
- Cynthia Ruppel
- Ted Kennedy
- Sharon Rose
- Mahatma Gandhi
- Ellen Novar
- Nelson Mandela
- Sara Eynon

Recall Test!

- Are there more men or women on the list?
- How many men are on the list?
- How many women are on the list?
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Definition of Availability Bias

- Situations in which people assess the frequency of a class or the probability of an event by the ease with which instances or occurrences can be brought to mind.

- People inadvertently assume that readily-available instances, examples or images represent unbiased estimates of statistical probabilities.

Experience Antecedent of Availability Bias

- A successful executive who attended Yale is likely to remember fellow alums he encounters in his business circle and his social life. But his success places him in a narrow professional and social stratum. Because of his special, circumscribed range of experiences he is likely to overestimate the relative proportion of successful Yale graduates (because he meets them all) and to underestimate the proportion of unsuccessful Yale graduates (because he never meets them).

- Range of experience can trigger the availability bias
Salience Antecedent of Availability Bias

- Unemployed executives are likely to overestimate unemployment among executives, whereas employed executives are likely to underestimate unemployment among executives. For each executive, employment estimates are biased by the **vivid salience** of their own personal situation.

- Vivid salience can trigger the availability bias.

Categorization Antecedent of Availability Bias

- It is easier to find books about "history" in the library than it is to find books about "strategic failures" because history is part of the library cataloguing system whereas "strategic failures" is not. In other words, *any kind of categorization scheme* favors some kinds of searches over others. What's true for the public library also holds for personal memory - the retrieval structure can bias estimates.

- Categorization scheme can trigger the availability bias.
Problem A

• In four pages of a novel (about 2,000 words), how many words would you expect to find that have the form __ __ __ __ ing (seven-letter words that end with ing)?

Indicate your best estimate by circling one of the values below:

0  1-2  3-4  5-7  8-10  11-15  16+

Problem B

• In four pages of a novel (about 2,000 words), how many words would you expect to find that have the form __ __ __ __ __ n __ (seven-letter words that end with n_)? Indicate your best estimate by circling one of the values below:

0  1-2  3-4  5-7  8-10  11-15  16+
Retrievability Antecedent of Availability Bias

- Most people respond to a higher number for Problem A
- All words with seven letters that end in ing also have n as their sixth letter
- Ing words are more retrievable from memory because of the commonality of the ing suffix

Consequences of Availability Bias

- Creates sizeable errors in decision maker's estimates about the probability of cases, examples, rates or categories of many kinds of phenomena, such as behavior, events or data structures.

- Biases estimates of relationships, such as causal relationships, correlation, and trends.
Summarize:
Antecedents of the Availability Bias

- Special, circumscribed range of experience
- Vivid salience, Recent occurrences
- Categorization scheme/Retrievability

Overconfidence Biases (3)
Overconfidence Bias (3)

- "People generally ascribe more credibility to data than is warranted and hence overestimate the probability of success merely due to the presence of an abundance of data" (Sage, 1981, p. 648).
- Predictive accuracy reaches a ceiling at an early point in an information gathering process
- Confidence in decisions continues to climb as more and more information is obtained
- This bias is most extreme in tasks of great difficulty

Problem

Instructions
- Do not look up any information on these items.
- For each, write down your best estimate of the quantity.
- Next, put a lower and upper bound around your estimate, such that you are 98 percent confident that your range surrounds the actual quantity

- Lockheed’s 1991 sales
- General Motors’ 1991 profit
- General Motor’s assets in 1991
- Number of deaths due to pneumonia and influenza in the United States in 1990
- The world population in 1990
Problem

Instructions
- Do not look up any information on these items.
- For each, write down your best estimate of the quantity.
- Next, put a lower and upper bound around your estimate, such that you are 98 percent confident that your range surrounds the actual quantity.

- Total number of people serving in the U.S. armed forces in World War I
- Number of votes for George Bush in Cook County, Illinois in the 1988 presidential election
- Number of U.S. homes with cable television in May 1991
- Total advertising expenditures by Procter & Gamble in 1989
- Rice exported (in metric tons) by Thailand in 1989

Solution

- Lockheed’s 1991 sales
- General Motors’ 1991 profit
- General Motor’s assets in 1991
- Number of deaths due to pneumonia and influenza in the United States in 1990
- The world population in 1990

- $9,809,000,000
- -$4,452,800,000
- $168,259,000,000
- 78,640
- 5,333,000,000
Solution

• Total number of people serving in the U.S. armed forces in World War I
• Number of votes for George Bush in Cook County, Illinois in the 1988 presidential election
• Number of U.S. homes with cable television in May 1991
• Total advertising expenditures by Procter & Gamble in 1989
• Rice exported (in metric tons) by Thailand in 1989

• 4,743,826
• 878,582
• 56,072,270
• 1,779,300,000
• 3,927,000

Confidence in Estimation Ability

• How may of your ranges surrounded the actual quantities?
• How many of your ranges should have surrounded the actual ranges, given the fact that you established 98% confidence limits?
• How well is your confidence level aligned with the quality of estimation abilities?
Antecedents of Overconfidence Bias

- Information overload can lead toward overconfidence
- Repetitious and redundant information adds to overconfidence
- Reliability and validity of information ignored
- Misplaced emphasis on "quantity" of data

Consequences of Overconfidence Bias

- Overconfident managers stop gathering and processing information about an issue sooner.
- Selectively seeking out information that supports a position, while disregarding contradictory information. Preempts the collection of disconfirming evidence.
- Reduces analysis of data.
- Discourages the examination of alternative ideas and solutions.
Illusion of Control Bias

- Closely related to the overconfidence bias
- Lack of distinction between skill and luck!
- Distinction between a game of skill and a game of chance often not made
- Is the outcome controllable by my skill set? Implies that my behavior leads to desirable outcome.
Illusion of Control

- Antecedents:
  - People behave as though chance events are subject to control.
  - Inducing a skill orientation in the case of chance events leads to an illusion of control
    - Many dice players clearly behave as though they control the outcome of the toss
    - They behave as though effort and concentration pay off!
- What makes it worse:
  - Skill and chance are very closely associated in people’s experience
  - Element of chance in almost every skill situation and an element of skill in almost every chance situation.
- Consequence:
  - An expectancy of a personal success probability inappropriately higher than the objective probability warrants.
  - Successive success or successive failures can cause sizeable error in decision maker’s mind regarding the decision making process or his/her (inter)actions in place.

Regression Effect Biases (5)
Antecedents of Regression Effects

- Human tendency to place too much emphasis on exceptions (outliers)
- Belief that an outlier score represents a drastic change and that it is a clear precursor to future outliers occurring in the same direction
- Decision makers' lack of appreciation for the inherent randomness of the environment. People do not recognize a probabilistic process, random fluctuations, or the presence of variations

Examples of Regression Effects

- Policy makers often get overly-excited about minor changes in unemployment rates or GNP growth
- Overestimation of the effectiveness of punishments and underestimate the effectiveness of rewards when chance alone causes changes in employee performance
Consequences of Regression Effects

- Overreaction to misleading cues from the environment
- False attributions about efficiency
- Misperception of the true causes of events
- Naive estimates
- Inappropriate planning

Other Biases (6, 7, 8) (C.O. 51 finishes here)

6. The Sunk-Cost Trap
7. The Status-Quo Trap
8. The Confirming-Evidence Trap

Class exercise

• If present, identify one or more instances of
  – Framing bias
  – Availability bias
  – Overconfidence bias
  – Illusion of control bias
  – Regression bias
  
in the movie, “12 Angry Men.”

• What are the possible antecedents for each of these bias instances that you detected?

• What design properties of support systems can reduce the escalation of the availability bias?

Summary and Review Questions

• What are some important decision making biases? What causes such biases and what can be done to de-bias them?

• What can we do to build a DSS that systematically de-bias common human biases?

• Identify the same biases from the movie 12 Angry Men and what was done to de-bias them?