Critical Thinking

Toby Groves
Challenging our Assumptions

• Do our emotions cause us to be less logical or rational?

• Is lack of information the main culprit in poor decision making?

• Are moral decisions stable?

• Do you make decisions after weighing options, logically and consciously?
Situational Awareness
Attractors and Distractors

Not enough information?
• 9-11
• Financial meltdown
• Cancer screening
• TSA

...or too much?
• Problem is noise- there is always much more useless noise than useful information
  • The purpose of screening should be to help us recognize the problems from the non-problems or it does not serve its purpose
Situational Awareness
Attractors and Distractors

• Distinction between Puzzle...or Mystery?
  • Puzzles
    • Source dependent (data)
    • Clear conclusion
    • Every piece of new information makes answer clearer
  • Mysteries
    • Receiver dependent (interpretation skills)
    • Answer does not become clearer with additional piece of information
    • Making sense of the information we already have makes answer clearer
    • Making judgments about situations that are uncertain
Situational Awareness
Attractors and Distractors

• Screening for drug smugglers
  • Raymond Kelly- Head of U.S. Customs

  • Border Control Officers used 43 suspicious traits including behaviors and personal characteristics to ID and search suspected smugglers –most criteria were “unstable” indicators

  • Reduced to 6 stable criteria such as
    • Is there specific intelligence?
    • Was contraband found?

• Number of searches decreased 75% while successful seizures increased 25%

Malcom Gladwell-”What the Dog Saw“
Emotional Need for Certainty

• Search for level of certainty that doesn’t exist
• We subconsciously assign tremendous weight to our assumed outcomes and automatic character assessments
  • This assessment causes profound biases our perceptions
  • Colors our judgment
  • Results in automatic assumptions and predictions
  • Causes susceptibility to seek incorrect subliminal information

(Dan Ariely, Duke University)
What is Critical Thinking?

• Critical thinking skills allow us to:
  • Understand connections between ideas and concepts
  • Construct and evaluate arguments
  • See inconsistencies and gaps in reasoning
  • Assess the relevance of ideas
  • Examine the justification of your own beliefs

• Critical thinking should not be confused with:
  • Being critical or argumentative
    (Indeed, critical thinking plays an important role in cooperative reasoning)
Critical Thinking

• Scientific method
  • Ask a question
  • Do background research
  • Construct a hypothesis
  • Test your hypothesis with an experiment
  • Analyze your data and draw a conclusion
  • Communicate your results

• Randomly assign subjects
• Exactly the same treatment of subjects with no outside influences that bias the results (remove contextual differences)
What is Critical Thinking?

- Logic- Normative theory of how one should reason. Formal logic.
  - Mathematics/computer science
  - Hard answers- precisely defined operations
  - Not descriptive theory of how humans actually reason
  - Does not generally consider psychology
- Critical Thinking- Everyday, real life reasoning.
  - Using creativity
  - Deals with psychology. Beliefs and recognizing biases
  - Gray areas, complex, unclear and changing situations
  - Reflective and independent thinking

- Judgment- decisions made after interpretation, and conclusions reached that drive actions and behaviors
Critical Thinking - A meta-thinking skill that requires:

- **Attitude**
  - Openness
  - Willingness to be wrong
  - Exploring biases and assumptions
  - Accepting, even seeking criticism
  - Preferring to figure out problems on your own so you really understand them - not handed the answer
- Analyzing your errors in judgment
  - Instead of excuses, curiosity about what biases or other errors may have resulted in the incorrect judgment
A woman has just received a positive result from a mammogram and asks her doctor what the actual chances are that she has the disease.

- Consider the following to be true
  - The probability that a woman has breast cancer is 1%
  - If a woman has breast cancer, the probability that she tests positive is 90 percent
  - If a woman does not have breast cancer the probability that she nonetheless tests positive is 9 percent

A. The probability that she has breast cancer is about 81%
B. Out of 10 women with a positive mammogram, about 9 have breast cancer
C. Out of 10 women with a positive mammogram, about one has breast cancer
D. The probability that she has breast cancer is about 1%
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Best answer = C.
A woman has just received a positive result from a mammogram and asks her doctor what the actual chances are that she has the disease.

Best answer = C, One out of Ten

Look at natural frequencies

Ten out of every 1,000 women has breast cancer
Of those ten women with breast cancer, nine will test positive
Of the 990 women without breast cancer, about 89 will nonetheless test positive

Thus, 98 women test positive, but only nine of those actually have the disease.
Relative vs. Absolute Risk

- U.K. sends out 190,000 letters to general practitioners warning that third-generation oral contraceptives increased likelihood of potentially life threatening blood clots by twofold (100%) relative risk
  - Great anxiety resulted in an estimated 13,000 additional abortions as well as and additional 13,000 births the following year in England and Whales (800 more conceptions among girls younger than 16).
    - Second generation risk=1 in 7,000 absolute risk
    - Third generation risk= 2 in 7,000 absolute risk
    - Increase in risk=1 in 7,000

Uncertainty and the Nature of Risk

Relative vs. Absolute Risk

• Hormone Replacement Therapy
  “has been proven to protect women from colorectal cancer (by up to more than 50 percent)” while breast cancer “may possibly increase by 0.6 percent (six in 1,000)”.

• Research showed the relative 50% benefit corresponded to an absolute number of less than 6 in 1,000-meaning that HRT causes more cancer than it prevents.

Study: Auditor Prioritization

Fundamental Attribution Error-
A cognitive bias of over emphasizing personality characteristics and under-emphasizing situational awareness.

## Sticky First Impressions

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Unlimited exposure times were highly correlated with briefest exposure times

Ekman & O’Sullivan (1991)
Neuroscience and Decision Making

- Instead of a conscious reasoning process to arrive at a judgment
  - Usually have immediate and sub-conscious intuition
    - Followed by conscious reasoning to support that intuition

- Logic versus emotion in decision making (J. Greene research)

Haidt (2001)
Stability of Moral Position

Study: “Large scale governmental surveillance of e-mail and internet traffic ought to be forbidden as a means to combat international crime and terrorism”

Hall, L. Lund University
Stability of Moral Position

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69% of people gave well constructed arguments for one of two altered statements after taking a moral position.

Hall, L. Lund University
Economic Theory
Decision Making

Theory of Expected Utility:
Assumes we will follow a logical process, weighing options, assigning values, and making a conscious choice.

Utilitarian—not emotional decision making
Biases

**Over-optimism** - A bias that causes a person to believe that they are less at risk of experiencing a negative event compared to others.

**Overconfidence** - An over-estimation of one’s abilities or exhibiting greater certainty than warranted by existing circumstances.

**Loss Aversion** - The motivation to avoid losing what you already have is even stronger than the motivation for additional gains.

**Framing errors** - (Exercises)
Framing
Imagine that the U.S. is preparing for the outbreak of an unusual Asian disease, which is expected to kill 600 people. Two alternative programs to combat the disease have been proposed. Assume that the exact scientific estimate of the consequences of the program are as follows:
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• If program A is adopted, 200 people will be saved.
• If program B is adopted, there is a 1/3rd probability that 600 people will be saved, and a 2/3rds probability that no people will be saved.

• If program C is adopted, 400 people will die.
• If program D is adopted, there is a 1/3rd probability that nobody will die, and a 2/3rds probability that 600 people will die.
Group Psychology

**Group Cohesiveness** - Forces that push members closer together

- More group related pride
- Engage in frequent and sometimes intense interactions
- Strong similarity features - similar backgrounds - homogenous

Breaking group norms is especially difficult in highly cohesive groups

**Conformity bias** - The power that pushes us to conform to our reference group.
Group Level Thinking

GroupThink-The tendency to seek concurrence among group members creating a dangerous bias in decision making like a social disease (Janis, 1984)—more likely in:

- Highly cohesive groups that reject deviant opinions and outgroup views (“US” verus “THEM”)
- Groups with strong leader that lacks procedures to review decisions
- Groups with similar backgrounds
- Stressful situations
  - Under stress/ambiguity, urgency overrides accuracy and the reassuring support of other group members becomes highly desirable
Group Level Thinking

Groupthink leads to Biased Sampling

• Tendency to spend more time discussing shared information-information already known by most of the group rather than information only known by a few
  • People tend to share knowledge most likely to be known/accepted
• Failing to consider important information that is not common knowledge
• Leads to decisions based on flawed or incomplete information

(Stasser, G., 1992; Stasser & Titus, 2003)
Group Psychology

The tangible the close and the near term- Vivid factors and people “now” have a larger impact on decision making than abstract and distant factors.

Diffusion of Responsibility-Deindividuation-In a group, we feel that responsibility is shared by all, lessening our role. Also, if something were wrong, someone else would say something.

Small Steps Phenomenon- Redefine normality-subconsciously lower the bar over time. German doctors during holocaust-IPO accounting fraud-Enron traders.

Obedience to authority- The “draw” of following orders (diminishes self-responsibility)-Milgram experiments-60% continued to 450 volts-High status increases obedience.
Escalation Effects

- **Escalation of commitment**
  - Commitment to a failing course of action is increased to justify investments already made (Haslam et al., 2006; Keil et al., 2007; Staw, 1997)
  - Groups are more likely than individuals to escalate commitment to a failing project and to do so in more extreme ways.
  - Numerous groups, businesses, governments have incurred huge costs on projects that should have terminated long before they did (Ross & Staw, 1986)
Escalation Effects

• **Cases of Escalation of commitment**
  • Nick Leeson-Barings Bank
  • Concorde Fallacy-French-British consortium
    • “Too much invested to quit”
  • Boston’s “Big Dig”-High speed underground tunnel
    • Started in 1983 to be completed by 1995 at budget of $2.6B
    • Finished in 2008 for $22B
  • Numerous labor strikes, lawsuits that continued beyond all economic viability for either side
A K 8 5
Recognizing Biases

**Confirmation Bias** - The tendency of people to favor information that confirms their beliefs or hypotheses. Studies show we tend to seek information that confirms rather than properly tests the validity of what we are told.

**Selective Perception** - A cognitive bias wherein individuals are subconsciously attracted to stimuli that falls in their range of reasonable expectation and are oblivious to other stimuli.

**Belief Perseverance** - Our tendency to seek information that is consistent with our pre-existing beliefs.

**Biased Processing of Disconfirming Information** - The subconscious bias towards being more critical of evidence that disconfirms our initial beliefs than evidence that confirms it.
Situational Awareness
Attractors and Distractors

• We must be able to filter relevant information from a sea of irrelevant stimuli
  • Requires balancing task and stimulus related factors
    • Balance is governed by working memory and selective attention

• Research shows that the more extraneous contextual stimuli that exists, the harder our brains work to tune that stimulus out and focus on the original subject (U.S.)
  • Sometimes that extraneous stimuli has significant implications on the context of the subject
Pattern Seeking and Professional Skepticism

Two types of errors in pattern seeking
- Type I-False Positive- Finding a pattern that doesn’t exist
- Type II-False Negative- Failing to detect a pattern that exists

Signal to noise ratio (Attractors)
- Too low- Miss obvious patterns
- Too high- See false patterns everywhere

What causes pattern detection errors?
Negotiation Research in Auditing

- The more ambiguous the accounting issue, auditor likely to accept clients preferred treatment.
- The more important/increased pressure surrounding the accounting issue, auditor more likely to concede.
- The greater number of possible alternative treatments, the less likely the auditor was to insist on their judgment.
- Clients perceive they are more likely to persuade auditors if firm has short tenure.
- Auditors are much more likely to waive smaller adjustments that aggregate to a material amount than those that are individually material (Small Steps Phenomenon).

Brown & Wright (2008)
Choice Complexity and Professional Judgment

Study on bias in professional decision-making using Doctors

• Decision to send patient-a 67 year old farmer for hip replacement surgery
  • First group of doctors told they forgot to try one drug-Ibuprofen. Would they call patient back from surgery to try the drug? 50% said pull then back
  • Second group of doctors told they forgot two drugs-Ibuprofen & Piroxicam. Would they call patient back from surgery? 72% let patient go on to surgery

Why? Choice complexity increases chance of going with default option

Redelmeier & Shafir (1995)
Critical Thinking

“Rules based thinking” type
- Spurs automatic responses to “recognized” patterns
- Narrows our thinking to specific and narrowly applicable rules and patterns
- Entails simple recognition of the situation and retrieving a typical response

Does not address:
- How situational assessment is accomplished in new or changing circumstances
- How to deal with conflicting or unreliable data
- How to change your mind

In unusual circumstances, our recognitional process needs to be supplemented by using “Attentional Control”

We do this by shifting our attention from simply reading the cues in a situation to recognizing our automatic assumptions about the conclusion...
- Use “As-If” reasoning by developing hypothetical or counter-factual ideas
- Imagine that the possibility is true and pose queries about what would happen
Critical Thinking

“Real Time” Critical Thinking

CURIOSITY is KING! - Situational Awareness

• Question underlying assumptions
  • Reveal new connections in data
  • Lead to new questions
• Think critically about the results (our assumptions) of recognition on an ongoing basis
  • Pose questions about those results
• Look at information from different perspectives
Critical Thinking

More about the story and research:
Hear the story on National Public Radio at NPR.ORG (search Toby Groves)
Read the research article in the CPA Journal (Google CPA Journal Toby Groves)
Links and further information available through tgroves.com

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