You can download the free shareware for
Multi-Attribute Utility Assessment
from the following website of Philippe Delquie

http://faculty.insead.edu/delquie/ASSESS.htm

AACREA

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Proyecto CLIMA

Behavioral Decision Theory:

How Judgments and Decisions are Made Under Uncertainty

Lesson 3

Judgment Heuristics/Shortcuts

Decision Making as Constrained Optimization

- **Role of Constraints in Optimization Problems**
- Operations Research
  - *Decision Making = Objective Function (to be optimized) + Constraints*
    - Material Constraints
    - Psychological Constraints
      - limited attention
      - limited memory

- Psychological Constraints may also affect objective function and psychological processes used
  - Satisficing vs. Maximizing
  - Use of Affect/Associations/Memory rather than Reasoning/Calculating

Herb Simon (1983):
Three visions of rational choice

- ## Olympian Model
  - heroic (wo)man making comprehensive choices in an integrated universe

- ## Behavioral Model
  - organisms with limited computational abilities making adaptive choices in a complex universe

- ## Intuitive Model
  - organisms using recognition processes that capitalize on stored experiences and using emotions to focus (limited) attention

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Satisficing

Definition:

Choosing the first alternative that is good enough (as opposed to choosing the BEST alternative).

- ❑ A sufficiency criterion rather than an optimality one.

Why Satisfice?

- ❑ Because the cost in time, effort, and demand on your analytical capabilities may be too high to do otherwise.

Examples:

- ■ Investment decisions
- ■ Consumer purchases

Two processing systems:
A recurrent theme

- Epstein (1994) and Sloman (1996)
  - rational analytic system *vs.* association- and emotion-driven experiential system
  - two systems use different processes and representations (and thus are differentially activated by different types of stimuli and information)
  - Corresponding two models of mental representation (Bruner, 1986)
    - propositional thought: logical, formal, abstract
    - narrative thought: imagistic, concrete, specific, emotional

Simple Judgment Tasks

- Simple judgments are often made using cognitive heuristics
  - Heuristic = rule of thumb; shortcut to correct judgment that uses less effort than the normative algorithm

- Three common heuristics
  - Availability
  - Representativeness
  - Anchoring and insufficient adjustment

Making Simple Judgments using Heuristics

- ❑ Advantages
  - reduces task complexity
  - functional and cost effective
  - usually provides correct answer

- ❑ Disadvantages
  - can lead to errors
  - usage is unconscious: we often don't realize we're using them
  - errors may persist even when we ARE aware (and even when the stakes are high)

Availability Heuristic

People assess the frequency of an event by the ease with which instances or occurrences can be brought to mind.

- Usually a good heuristic since frequent events ARE typically easier to recall then less frequent events.

Dangers of use of AVAILABILITY heuristic

- ease of recall often related to factors other than environmental frequency
  - recency
  - emotional content
  - imaginability
- selective exposure

Probability of dying in 1995 in USA from:

Lung cancer   (75,000)
Motor Vehicle Accident (55,000)
        actual ratio: 1.3 : 1

Emphysema   (21,000)
Homicide   (19,000)
        actual ratio: 1.15 : 1

Asthma   (1840)
Tornadoes   (88)
        actual ratio: 21 : 1

Representativeness Heuristic

- Probability of event A is evaluated by the degree to which A is "representative of" or resembles some category B. Probability judgments are essentially reduced to judgments of similarity

- Usually a good heuristic since similarity typically does predict group membership

Dangers of use of REPRESENTATIVE heuristic

- prior probabilities (base rates) ignored
  - lawyer-engineer problem
  - Linda problem

80 engineers and 20 lawyers were interviewed, and were described with thumbnail descriptions. The following descriptions have been drawn at random from the sample of 80 engineers and 20 lawyers.

John: John is 39 years old. He is married and has two children. He is active in local politics. The hobby that he enjoys the most is rare book collecting. He is competitive, argumentative and articulate.

Q: What is the probability that John is a lawyer?

Dick: Dick is 30 years old. He is married with no children. A man of high ability and high motivation, he promises to be quite successful in his field. He is well liked by his colleagues.

Q: What is the probability that Dick is a lawyer?

Linda is 31 years old, single, outspoken, and very bright. She majored in philosophy. As a student she was deeply concerned with issues of discrimination and social justice, and also participated in antinuclear demonstrations. Please check off the most likely alternative:
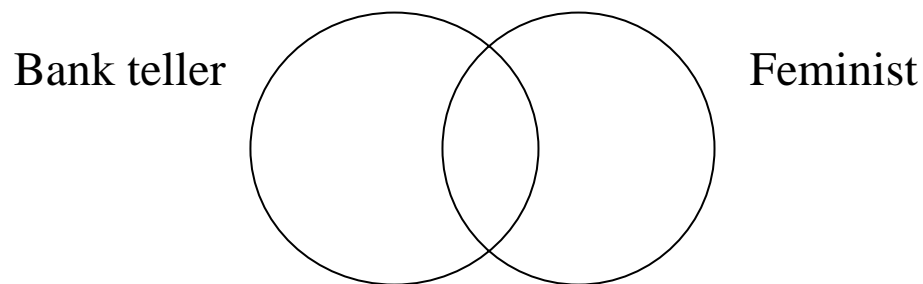
(a) Linda is a bank teller

(b) Linda is a bank teller and is active in the feminist movement

Which one of these is more probable?

(a) Linda is bank teller

(b)   Linda is a bank teller and active in the feminist   movement

Bank teller   Feminist

Stephen J. Gould (1992, p. 469)

I am particularly found of [the Linda] example, because I know that the [conjunction] is least probable, yet a little homunculus in my head continues to jump up and down, shouting at me -- 'but she can't just be a bank teller; read the description'... Why do we constantly make this simple logical error? Tversky and Kahneman argue, correctly I think, that our minds are not built (for whatever reason) to work by the rules of probability.

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Anchoring and Adjustment

In estimating an unknown quality, we start with some convenient initial value and adjust it upward or downward

<u>Anchoring & Adjustment Dangers</u>:

- Insufficient adjustment (anchors weighted too heavily)
- Underestimating disjunctive events ("or")
    - e.g., nuclear power plant failure.

A piece of paper is folded in half. It is folded in half again, and again and again….After 100 folds, how thick will it be?

My best guess is that the paper will be __ inches thick.

I am 90% sure that the correct answer lies between ___ and ____ inches.

A piece of paper is folded in half. It is folded in half again, and again and again....After 100 folds, how thick will it be?

My best guess is that the paper will be **19.9** inches thick.

I am 90% sure that the correct answer lies between **12.5** and **37** inches.

True thickness: 2.5×10^{27} inches (VERY!!! thick)

6 folds → ¼ inch; 24 folds → 1 mile; 42 folds → distance to Moon; 50 folds → distance to Mars

Judgments of Confidence

"Everything that can be invented has been invented."
Charles H. Duell, Director of U.S. Patent Office, 1899

"Who the hell wants to hear actors talk?"
Harry M Warner, President of Warner Brothers Pictures, 1927

"There is no likelihood man can ever tap the power of the atom."
Robert Milikan, Nobel Prize in Physics, 1923

"Heavier than air flying machines are impossible."
Lord Kelvin, President of Royal Science Society, 1895

Overconfidence in judgments or decisions

- Confidence intervals
  - general knowledge questions
    - Gestation period of Asian elephants? Length of Nile river?
  - engineering discount/safety factors

- Confidence ratings
  - Poor calibration found in most cases: proportion of time a prediction of answer is correct ought to equal the confidence assigned to that estimate
  - calibration curve
    - Only weather forecasters, bookies, and expert bridge players are calibrated → availability of quick and frequent corrective feedback

Question

- Absinthe is:
  - A liqueur
  - A precious stone

- What is the probability that your answer is correct?

  .50   .55   .60   .65   .70   .75   .80   .85   .90   .95   1.00

Question

- Absinthe is:

  69 A liqueur

  38 A precious stone

- What is the probability that your answer is correct?

.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	1.00
33	0	8	1	6	5	1	2	3	11	37

Correlation between accuracy and confidence = .37

6-footer: "the make or break putt"

A sample of 20 golf pros were asked to predict their success in making the six-foot put:

□ "Most of the players on the PGA tour guessed that at least 70% of their six-footers would drop. Tour rookie Billy Mayfair, a former U.S. Amateur champion and a very good putter, thought the success average was about 80% and his own average 'around 91%-92%.'"

□ "Veteran Dave Barr, who was more typical, said: 'If you aren't making at least 85% of your six-footers, you aren't making any money.' Told the actual average was 54.8%, Barr said, "I don't believe that."

(Sports Illustrated, March 1989)

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PGA Tour: Probability of making putts from different lengths.

Length	% made		Length	% made
2'	93.3		11'	31.6
3'	83.1		12'	25.7
4'	74.1		13'	24.0
5'	58.9		14'	31.0
6'	54.8		15'	16.8
7'	53.1		16'	13.4
8'	46.3		17'	15.9
9'	31.8		18'	17.3
10'	33.5		>19'	14.6

*(Sports Illustrated, March 1989)*

Reasons for Overconfidence

- □ **Attentional**
  - ■ Selective information search: difficult to detect missing features
  - ■ Selective information encoding: excuses/rationalizations
  - ■ Selective memory search: confirmation bias

- □ **Motivational**
  - ■ Need to appear competent and confident to others and oneself
  - ■ Confidence and optimism help to get the job done
    - □ They even have physiological effects: e.g., influence wound healing rates
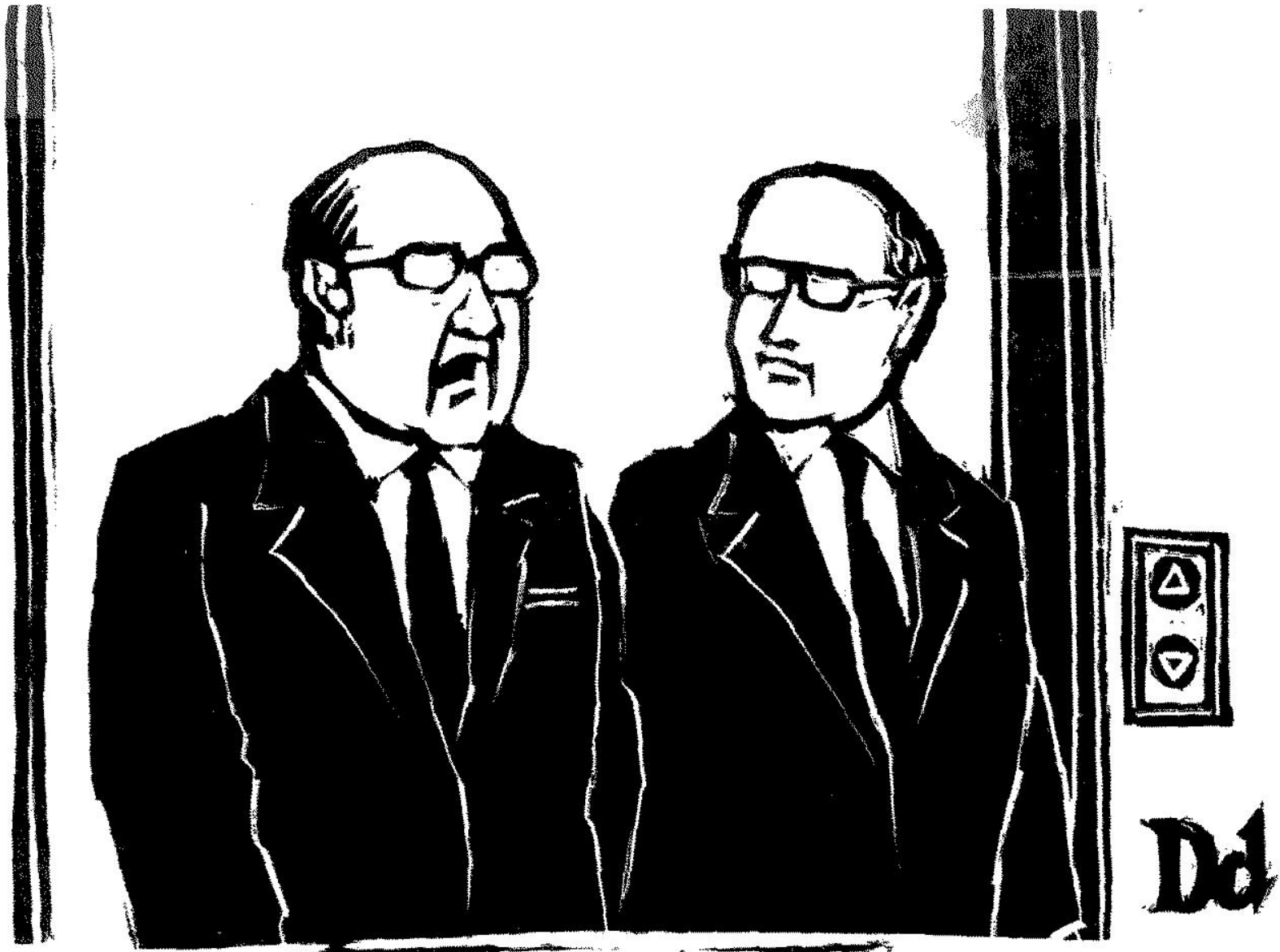
"In a few months, I should be arrogant enough to start another company."

LESSON 12

"Perpetual optimism is a force multiplier."

The ripple effect of a leader's enthusiasm and optimism is awesome. So is the impact of cynicism and pessimism. Leaders who whine and blame engender those same behaviors among their colleagues. I am not talking about stoically accepting organizational stupidity and performance incompetence with a "what, me worry?" smile. I am talking about a gung-ho attitude that says "we can change things here, we can achieve awesome goals, we can be the best." Spare me the grim litany of the "realist," give me the unrealistic aspirations of the optimist any day.

☐ **Ways of avoiding overconfidence**

- Be aware of it (and make adjustments)
- Keep objective records
- Ask disconfirming questions
  - Why could my answer be wrong?
  - Why could other answers be right?
  - Why could other answers be wrong?

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