“Life is a matter of making choices.”
- Larry Summers

“… how thoughtfully you make those choices will critically affect how good those choices will be and how effective you will be.”
- Robert Rubin

“Hey, how about just flipping a coin?”
- Daniel Goroff

Expectations

Content
- ~1/2 course on decision making techniques
- ~1/6 course on games and game theory
- ~1/3 course on negotiation strategy

Advice
- Keep up
- Keep in touch
- Keep your wits about you

Decisions, Games, and Negotiation

Today: 1. Why Study This?
2. Kinds of Approaches
3. Kinds of Decisions
4. Kinds of Techniques
5. In Class Activity Results

Have you ever played tennis?

Have you ever had instruction?
Do you ever play music?

Have you ever had instruction?

Do You Ever Make Decisions?

Have you ever had instruction about making better decisions?

What Kinds of Decisions?

- Personal
- Job-Related
- Public Policy
- Other examples…
Personal Decisions
• Should I take this course?
• Choice of a job
• Choice of a house
• Choice of a college
• Choice of a vacation

Job-Related Decisions
• Business examples:
  - product introduction and pricing
• Medical examples:
  - diagnosis and treatment
• Design examples:
  - safety and what will appeal

Public Policy Decisions
• The Cuban Missile Crisis
• What next in Iraq? In Iran?
• Bringing peace to the Middle East
• And what about Liberia, Korea, global warming?

Decision Making Perspectives
Types of Decisions
- Individual Decision
- Group Decision

Group Decisions
• Games
  - Competitive pricing, advertising, promotion
  - Auctions and bids
• Negotiations
  - Mergers and joint ventures
  - Trade agreements
  - Peace treaties
Fuzzy Boundaries

- Negotiate or have competitive bid
- Decision to negotiate.
- Decision to suggest a mediator.

Three Approaches

Descriptive
How decisions are made (by ordinary folk)

Normative
How decisions should be made (by super-rational people)

Prescriptive
How decisions could be made better (by you, perhaps with coaching)

Descriptive Decision Making
How it is done!
- How do people think and act?
- How do they learn and adapt their behavior?
- What are their hang-ups, biases, anomalies?
- Do they structure and decompose problems?
- Culture and gender differences.
- Role of tradition, imitation, superstition.
- Wanted: Good Understanding and Prediction

Normative Decision Making
How it should be done!
- How idealized, rational, super-intelligent people should make decisions.
- Analyses abstract away cognitive concerns such as anxieties, regrets, envy, altruism, …
- Superstructure of logical results built up from a set of basic axioms of idealized behavior.
- Hallmarks of good analysis: coherence and rationality. Most economic theory is normative.

Prescriptive Decision Making
How it could be done better!
- How might YOU learn to make better decisions by
  - being more reflective;
  - being more analytical and decomposing a complex problem into thinkable parts;
  - psycho-analyzing yourself to learn what you really want;
  - using some decision aids.

Hallmarks of Good Prescriptive Analysis:
- Is it helpful? Can I learn to do it?
- Is it operational and practical?
- Will I make better decisions?
Three approaches to transitivity

- Donna prefers alternative x to y;
- she also prefers y to z.
Therefore, she should prefer x to z

Is this a normative statement?

Normative argument: The Money Pump

- z over x: Pay to go from x to z
- y over z: Pay to go from z to y
- x over y: Pay to go from y to x
- Start with x. Now What?

\[ x \rightarrow z \rightarrow y \rightarrow x \rightarrow z \rightarrow y \ldots \]

Pay to go to z; pay to go to y; pay to go to x;...

Descriptive approach

Reasonable people may sometimes violate the normative transitivity principle by simultaneously preferring
- x to y
- y to z and
- z to x.
Such individuals are said to register cyclic preferences
Why might this happen?

Condorcet cycles

The Decision Maker considers three objectives (cost, quality, and time) to rate the alternatives x, y, z. His ratings are as follows:

<table>
<thead>
<tr>
<th></th>
<th>Cost</th>
<th>Quality</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>x</td>
<td>y</td>
<td>z</td>
<td></td>
</tr>
<tr>
<td>y</td>
<td>z</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>z</td>
<td>x</td>
<td>y</td>
<td></td>
</tr>
</tbody>
</table>
He adopts a Majority Rule Principle: On each of two objectives, he gets x over y over z over x.

Prescriptive approach

Problem: You are having difficulty comparing alternatives x and y.
You find an alternative y and you feel that
- x is better than y
- y is better than z.
Therefore you conclude that x is better than z.

Prescriptive approach

Problem: You are having difficulty comparing alternatives x and y.
You find alternatives x’ and y’ such that:
- You are indifferent between x and x’
- You are indifferent between y and y’.
- You prefer x’ over y’.
Hence you conclude that perhaps you really prefer x to y.
Some Themes

Probability is powerful.
We will study certainty first to understand uncertainty.
Spreadsheets are powerful.
Study what is the same to understand what is best.

Techniques

• Linear Optimization using Excel
• Decision Trees and Utility Theory
• Equilibrium Analysis of Matrix Games
• Bidding and Auction Theory

Consider the car market, for example…

Linear Programming with Excel

Reliability and decision trees

Car accidents and game theory

Driver B

Optimal bids at a car auction

Expected payoff = Area of rectangle
 BEV = Buyer’s Expected Value
It’s time for us to hear from you. Let’s see how you would answer some simple questions before we take up the normative and prescriptive approaches to decision making. These are the kinds of questions often asked by researchers studying the descriptive approach to decision making theory. Please do not look up the answers. They will not be graded. Just give your honest reactions. You can find the appropriate questionnaire files on the website together with instructions for how to submit your responses.

Framing

Imagine that the United States is preparing for an epidemic (e.g., a smallpox attack). Experts expect 6,000 to die from the disease. As a leader, you are presented with two plans to combat the epidemic, but because of limited resources only one plan can be implemented.

| Program A (Tried and True): | 4,000 people will be saved. |
| Program B (Experimental): | There is an 80% chance that 6,000 people will be saved and a 20% chance that no one will be saved. |
| Program X (Tried and True): | 2,000 people will die. |
| Program Y (Experimental): | There is a 20% chance that 6,000 people will die and an 80% chance that no one will die. |

Anchoring

Is the population of Turkey greater __ or smaller __ than 30 million?

Is the population of Turkey greater __ or smaller __ than 90 million?

ANSWER: 67 million
Familiarity

a. Being killed by a falling airplane parts (30x more likely)
   Being killed by a shark

b. Being killed by a tornado (40 deaths in 2000)
   Being killed by lightning (51 deaths in 2000)

c. Homicides (16,765 deaths in 2000)
   Suicides (29,350 deaths in 2000)

d. The letter K is the first letter of a word
   The letter K is the third letter in a word (2x more likely)