Cognitive Processes in Choices
and in Individual Evaluations

Psychology 466: Judgment & Decision Making
Instructor: John Miyamoto
11/27/2017: Lecture 10-1

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Outline

• Effects of comparisons in choice
  ♦ Judgments and choices involve different processes

• Decoy effects

• Preference reversal phenomenon

• Evaluability: Joint evaluation & separate evaluation

• How evaluability explains the preference reversal phenomenon

• Is deliberative choice always better than non-deliberative choice?

Lecture probably ends here
Comment on Peak-End Model for Experienced Utility

Possible Factors in Judging the Overall Pleasure or Pain of an Experience

- the peak of the experience
- the end of the experience
- the average pleasure or pain
- the total pleasure or pain
- the duration of pleasure or pain

• Remember results from studies of linear judgment models:
  People simplify a complex judgment task.
  They substitute simpler judgments even if they aren't aware of it.

• Peak-end model makes a similar claim:
  Judging the overall pleasure or pain of an experience is complex.
  People simplify this judgment.
How Do You Choose Between A and B?

A simple, but often false, idea of how a choice is made between A and B:

- Decide how much you like A. Call this the evaluation of the utility of A.
- Decide how much you like B. Call this the evaluation of the utility of B.
- Choose A if Utility of A > Utility of B.
  Choose B if Utility of B > Utility of A.

- How could this idea be false?
  - What if the Utility of A is influenced by the fact that you are comparing it to B.
  - What if the Utility of B is influenced by the fact that you are comparing it to A.
Independence from Irrelevant Alternatives (IIA):

The proportion of subjects choosing \( A_1 \) from a set \{ \( A_1, A_2 \) \} should be equal or smaller than the proportion of subjects choosing \( A_1 \) from the set \{\( A_1, A_2, A_3 \)\}.

- I.e., increasing the set of options from which to choose should never increase the proportion choosing a specific option.
- IIA is regarded as a rational principle.
  IIA is implied by any theory that assigns separate values to A and B.

• Example:
  - Waitress asks, "Which do you want, apple pie or cherry pie?"
  - Reply: "I'll have cherry pie."
  - Waitress returns to the table: "I just found out that we also have pumpkin pie. Would you like that?"
  - Reply: "In that case, I'll have apple pie."
Example of Decoy Effect

Condition 1:
Choose between:

- ≈ 50%
- ≈ 50%

Condition 2:
Choose between:

- 70%
- 0%
- 30%

Condition 3:
Choose between:

- 30%
- 0%
- 70%
Example of Decoy Effect

Condition 1:
Choose between:

\[ \approx 50\% \quad \approx 50\% \]

Condition 2:
Choose between:

\[ 70\% \quad 0\% \quad 30\% \]

Condition 3:
Choose between:

\[ 30\% \quad 0\% \quad 70\% \]
Decoy Effects

- Decoy effects violate the principle of Independence from Irrelevant Alternatives (IIA)

  Adding an inferior option to the set of options should not change the preferred option (but it does).

Why do decoy effects occur?

- Comparisons enhance the importance of shared dimensions.

- Notice: The judged utility of an object depends on what else it is being compared to.
Use of Decoy Effects in Marketing

Strategy 1: I offer you a choice between cell phones, A and B
  
  Cell phone B: Has basic features; $150
  
  Cell phone A: Has basic features + additional useful features; $300

Strategy 2: I offer you a choice between cell phones, A, B and C

  Cell phone B: Has basic features; $150
  
  Cell phone A: Has basic features + additional useful features; $300
  
  Cell phone C: Has basic features + additional useful features + extra fancy features; $500

• If my main goal is to sell cell phone A, then Strategy 2 is a better strategy than Strategy 1.
Preference Reversals – What Are They?

• (X, p, Y) means: Win X with probability p; Win Y with probability 1-p

MSP = "minimum selling price" (a.k.a. cash equivalent)
MSP(G) = the minimum selling price of the gamble G.

G1 pref G2 means G1 is preferred to G2 in a choice

Suppose we ask people to choose between G1 and G2:

G1 = ($97, .08, $3) ← "$ gamble" EV = $10.52
G2 = ($11, .9, $6) ← "p-gamble" EV = $10.50

$ gamble: Big $ amount, small probability to win
p-gamble: Small $ amount, bigger probability to win

Empirical finding: G2 pref G1 but MSP(G2) < MSP(G1)

This is a preference reversal.
General “Recipe” for Producing Preference Reversals

• Construct a $ gamble (low probability, large amount to win)
• Construct a p-gamble (high probability of a small amount to win)
• Adjust the amounts to win and lose so that the two gambles have approximately equal expected values.

• Typical result:
  People set the higher selling price for the $ gamble, but they prefer the p-gamble in a paired comparison choice, i.e.,

  \[
  \text{MSP($-Gamble) > MSP(p-Gamble)}
  \]

  but

  p-Gamble pref to $-Gamble
Procedure Invariance

- **Procedure invariance** – the hypothesis that preferences should be the same when measured by any logically equivalent method of determining preference.
  - EU theory implies that procedure invariance should always hold.
    EU theory implies that
    \[
    \text{MSP($\text{-}\text{-gamble}$)} > \text{MSP(p-gamble)}
    \]
    if and only if
    \[
    \text{$\text{-}\text{-gamble pref to p-gamble$}
    \]
  - Preference reversals violate procedure invariance.
Preference Reversals – Why Are They Important?

• Preference is a basic aspect of decisions. Lack of clarity about what we mean by "preference" is a serious challenge to any theory of decision making. Preference reversals violate EU theory.

• Preference reversals are a symptom of a basic fact of JDM:
  - Different ways of expressing preference (choices or selling prices) produce different, non-equivalent evaluations of the options.
  - Preference reversals are analogous to framing effects, but they are not the same.
    - Framing effects – choices are the same but the descriptions are different.
    - Preference reversal – descriptions of objects are the same but the evaluation task is different.
Theories of the Preference Reversal Phenomenon

- Contingent weighting theory (Tversky, Sattath & Slovic, 1988): Compatibility & prominence effects
  ♦ I won't explain this theory in Psych 466.

- Evaluability (Hsee, 1996): Preference reversals occur because some attributes are more evaluable when performing one decision task than when performing a different decision task.
  ("Evaluability" will be explained next.)
Music Dictionary Experiment – Example of Evaluability

<table>
<thead>
<tr>
<th>Number of Entries</th>
<th>Condition of Dictionary</th>
</tr>
</thead>
<tbody>
<tr>
<td>10,000</td>
<td>Like new</td>
</tr>
<tr>
<td>20,000</td>
<td>Cover is torn. Otherwise it is like new.</td>
</tr>
</tbody>
</table>

WTP = willingness to pay (for something)

• Condition 1a: Separate Evaluation of A:
  How much would you be WTP for Dictionary A?
  ♦ This group sees only Dictionary A; it never sees Dictionary B.

• Condition 1b: Separate Evaluation of B:
  How much would you be WTP for Dictionary B?
  ♦ This group sees only Dictionary B; it never sees Dictionary A.
Music Dictionary Experiment – Example of Evaluability

<table>
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  ♦ This group sees only Dictionary A; it never sees Dictionary B.

- **Condition 1b: Separate Evaluation of B:**
  How much would you be WTP for Dictionary B?
  ♦ This group sees only Dictionary B; it never sees Dictionary A.

- **Condition 2: Joint Evaluation:** Consider Dictionaries A and B.
  How much would you be willing to pay (WTP) for each of them?
Results of Dictionary Experiment

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- Higher WTP for B in the joint evaluation but higher WTP for A in separate evaluation. Preference reversal!
- Why does this happen?

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FIG. 1. Mean WTP values for Dictionary A and Dictionary B in Study 1. The numbers in parentheses indicate numbers of participants.
Evaluability Hypothesis (Hsee, 1996):

“... joint-separate evaluation [preference reversals] occur because one of the attributes is *hard to evaluate* and the other attribute is relatively *easy to evaluate independently.* “

♦ “To say that an attribute is hard to evaluate independently means that the evaluator does not know how good a given value on the attribute is without comparisons ....”

♦ In the preceding example, “number of words in the dictionary” is hard to evaluate; new vs used/torn is easy to evaluate.

• Hypothesis: When options are described in terms of two attributes, one that is easy and the other that is hard to evaluate, the hard-to-evaluate attribute has less impact on separate evaluation than on joint evaluation.
### Evaluability Hypothesis Applied to the Dictionary Experiment

<table>
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</tr>
<tr>
<td><strong>Evaluability</strong></td>
<td>Hard to evaluate</td>
<td>Easy to evaluate</td>
</tr>
</tbody>
</table>

- The number of entries is hard to evaluate in isolation (how good is 10,000 entries for a music dictionary?).
- The condition of the dictionary is easy to evaluate in isolation (we know what "torn cover" means).
- In the comparison (joint evaluation), the superiority of Dictionary B is obvious, but not in separate evaluation.

![Graph showing mean WTP values for Dictionary A and Dictionary B in Study 1. The numbers in parentheses indicate numbers of participants.](image)

FIG. 1. Mean WTP values for Dictionary A and Dictionary B in Study 1. The numbers in parentheses indicate numbers of participants.
Less is better (Less can be better.)

• Two ice cream (IC) vendors.
  H: 8 oz. IC in 10 oz. cup.
  L: 7 oz. IC in 5 oz. cup.

• Joint evaluation:
  WTP for H = $1.85  ← Preferred
  WTP for L = $1.56

• Separate evaluation:
  WTP for H = $1.66
  WTP for L = $2.26  ← Preferred

• Easy-to-evaluate attribute: Generosity of serving
  Hard-to-evaluate attribute: Amount of ice cream
Evaluability and Preference Reversals

Suppose we ask people to choose between G1 and G2:

G1 = ($97, .08, $3) ← "$ gamble"   EV = $10.52
G2 = ($11, .90, $6) ← "p-gamble"   EV = $10.50

Empirical finding: G2 pref G1 but MSP(G2) < MSP(G1)

• Assumption: Probabilities are harder to evaluate than $ amounts.
  (For most people)

• Choice (joint evaluation): Value of high chance to win is more obvious – prefer p-gamble.

• Selling Price (separate evaluation): Amount to win is more influential in setting price.
Reminder: Decision Utility & Experienced Utility

• Decision Utility – the *predicted* utility of options and outcomes. The decision utility influences choices and decisions.

• Experienced Utility – the *experience* of happiness/unhappiness and pleasure/displeasure that is associated with the actual result of a decision or choice.

• Ideally the decision utility should accurately predict the experienced utility of the resulting experience, but this doesn't always happen.
Discrepancy Between Decision Utility & Experienced Utility

- Focusing illusion – differences that are obvious at the time of choice seem more important than they actually turn out to be.

- Impact bias, duration bias & immune neglect – we exaggerate the impact of events or the duration of our response because we neglect factors that help us to adapt.

- Joint evaluation versus separate evaluation
  * Often, decisions are based on joint evaluations
  * Almost always, life is experienced in separate evaluation
Mischoice –
Choice Errors Regarding Future Experienced Utility

• Can people's choices systematically misjudge the experienced utility of outcomes?
  I.e., are there situations where ....

  People choose A over B. (JE, i.e., joint evaluation)

  People who experience B express greater satisfaction than people who experience A. (SE, i.e., separate evaluation)

• Method for creating this situation: Create choices that oppose a difference on a hard-to-evaluate dimension with a difference on an easy-to-evaluate dimension.
Experiment with Predicted & Experienced Utility

- Subjects were 243 students at a large Chinese university.

<table>
<thead>
<tr>
<th>Task</th>
<th>Reward</th>
</tr>
</thead>
<tbody>
<tr>
<td>Option A</td>
<td>recall failure</td>
</tr>
<tr>
<td>Option B</td>
<td>recall success</td>
</tr>
</tbody>
</table>

- Condition 1: Choose between options A and B. Experience it.
- Condition 2: Choose which option will be a better experience for someone else. (These subjects don't experience the outcome).
- Condition 3: No choice. Perform Option A and experience it.
- Condition 4: No choice. Perform Option B and experience it.
# Experiment with Predicted & Experienced Utility

<table>
<thead>
<tr>
<th>Option A</th>
<th>Option B</th>
<th>Task</th>
<th>Reward</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>recall failure</td>
<td>15 gram Dove bar</td>
</tr>
<tr>
<td></td>
<td></td>
<td>recall success</td>
<td>5 gram Dove bar</td>
</tr>
</tbody>
</table>

- **Qualitative Difference**: Harder to Evaluate
- **Quantitative Difference**: Easier to Evaluate

- **Condition 1**: Choose between options A and B. Experience it.
- **Condition 2**: Choose which option will be a better experience for someone else. (Ignore this condition)
- **Condition 3**: No choice. Perform Option A and experience it.
- **Condition 4**: No choice. Perform Option B and experience it.

Results for Predicted versus Experienced Utility
Most subjects chose Option A (unpleasant task, larger reward) over Option B (pleasant task, smaller reward).

- This result occurred regardless of choosing for self (condition 1) or choosing for someone else (condition 2).
- About 65% prefer Option A in both conditions 1 and 2.

Subjects rated the quality of their experience (doing the task & eating the reward). Subjects rated the experience of Option B over the experience of Option A.

- Results hold for experiencers as well as for choosers.

These subjects were not given a choice.

These subjects experienced what they had chosen.

Experiment with Predicted & Experienced Utility - Results
Theoretical Implications of Evaluability

• Joint and separate evaluations involve different information processes.
• Separate evaluations are difficult when dimensions are not familiar to the judge.
• Evaluative processes often involve explicit or implicit comparisons to standards that are drawn from memory.
• Joint evaluations make differences salient. Remembered standards are not required or are less important.
Practical Implications of Evaluability

Decisions versus the Experience of Life
* Often, decisions are based on joint evaluations
* Almost always, life is experienced in separate evaluation

- Life choices: Money (salary) versus quality of life
- Is buying a car a problem in joint or separate evaluation?
- If your product (or you) are better on a hard-to-evaluate dimension, try to create a direct comparison between your product (yourself) and the alternatives. If your product (or you) are better on an easy-to-evaluate dimension, try to create a separate evaluation of your product (yourself) and the alternatives.
Next: Introduction to the case against deliberative decision making.
• Prevalent scholarly opinion is that analytical, reflective strategies produce better decisions.
Benjamin Franklin’s Decision Method

From a letter to the British scientist Joseph Priestley:

“My way is to divide half a sheet of paper by a line into two columns, writing over the one Pro, and over the other Con.

Then, during three or four days consideration, I put down under the different heads short hints of the different motives, that at different times occur to me, for or against each measure…

I find at length where the balance lies; …

When each [reason] is thus considered, separately and comparatively, and the whole lies before me, I think I can judge better, and am less likely to make a rash step.”
Benjamin Franklin’s Decision Strategy

Reasons For (Pro) and Against (Con) Taking a Particular Action

<table>
<thead>
<tr>
<th>Pro Reasons</th>
<th>Con Reasons</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Pro Reason #1</td>
<td>• Con Reason #1</td>
</tr>
<tr>
<td>• Pro Reason #2</td>
<td>• Con Reason #2</td>
</tr>
<tr>
<td>• Pro Reason #3</td>
<td>• Con Reason #3</td>
</tr>
<tr>
<td>• Pro Reason #4</td>
<td>• Con Reason #4</td>
</tr>
<tr>
<td>• Pro Reason #5</td>
<td></td>
</tr>
</tbody>
</table>

Raiffa: Divide and Conquer

“... the spirit of decision analysis is divide and conquer: "

Decompose a complex problem into simpler problems,
Get your thinking straight in these simpler problems,
Paste these analyses together with a logical glue,

... and come out with a program for action for the complex problem.”

(p. 271)
Contrasting View

*He who deliberates lengthily will not always choose the best.*

Attributed to Goethe

*Go with your gut.*

Many speakers, e.g., the TV character Leroy Jethro Gibbs on the TV show NCIS.
Are Reflective, Analytical Decisions Always Better

• Need to evaluate the track record ("batting average") for a decision strategy – any decision method can produce a great outcome on a single lucky occasion.

• How to evaluate the quality of a decision strategy?
  ♦ If an objective standard exists, e.g., college GPA for high school applicants, then compare decisions made by one strategy to decisions made by another strategy.
  ♦ Evaluate the post-choice satisfaction.
  ♦ Compare choices to expert choices.
• Are there situations where intuitive decisions are better than carefully reasoned decisions?
  ‣ Intuitive decisions: Individual does not attempt to give explicit reasons for the decisions.

• Hypothesis: In many domains, people have adaptive, functional means for weighting information about the decision.
  ‣ E.g., deciding what food they would like best.
  ‣ Asking people to give reasons for their decisions may cause them to give greater weight to attributes for which they can articulate a rationale and underweight attributes for which a rationale is not readily available.
  ‣ In these domains, giving reasons may cause people to choose less desired options.
How does reflecting on a decision affect the decision?

• Basic Issue:
  When are our reasons readily accessible?
  When are our reasons relatively inaccessible?

• Sometimes people have not worked out a verbalization of their reasons (maybe they don't usually need to verbalize their reasons).

• Sometimes the reasons that are easy to verbalize imply different choices than the true reasons.

• People access reasons that are available – but what if important reasons are not readily available or are overshadowed by less important reasons?
Are There Circumstances in which Intuitive Decisions Are Better than Reasoned Decisions?

Intuitive Decisions Will Be Better than Reasoned Decisions When ....

- **Hypothesis 1**: .... when reasoned decisions distort the weight given to attributes due to the availability of rationales (or lack thereof).

- **Hypothesis 2**: .... when people consider more attributes of each option, they are more likely to include unimportant attributes in computing an overall average for each option.

- These factors may have stronger influence when the decision maker is inexperienced with *reflective* decisions in this domain.
  - ♦ Food choices – people have lots of experience, but not necessarily as reflective decisions.

- **Subjects**: 49 UW undergrad psych students.
- **Stimuli**: Five brands of strawberry jam
  - Ranked 1st, 11th, 24th, 32nd, and 44th by Consumer Reports experts. Experts rated 16 sensory characteristics (e.g., sweetness, bitterness, aroma) of 45 jams; these ratings were averaged for each jam to produce the rankings (note use of linear judgment model here).
Results for Jam Tasting

• Correlation between **CONTROL** subject ratings and expert rankings
  
  Mean correlation = 0.55
  
  Mean correlation was significantly greater than 0, $t(24) = 4.27$, $p = .0003$

• Correlation between **REASONS** subject ratings and expert rankings
  
  Mean correlation = 0.11
  
  Mean correlation was not significantly greater than 0, $t(23) = .80$, $p = .43$

• Correlation between **CONTROL** subject ratings & expert ratings
greater than*

  Correlation between **REASONS** subject ratings & expert ratings
  
  * $p = 0.02$, $t(47) = 2.53$

• Interpretation: Giving reasons changed the weightings of attributes for **REASONS** subjects in ways that deviated from expert judgment.
“Choosing a Poster” Experiment


Stimuli:

♦ Art posters:
   Monet (Nymphéas),
   Van Gogh (Les Iris)

♦ Humorous cat posters:
   Cat on a rope,
   cat on a fence.

*These are not the actual posters that were used in the experiment.*

Give me a break!
(not the actual stimulus)

One step at a time
(not the actual stimulus)

• All subjects see the posters (art posters and humorous cat posters)

• **REASONS condition:** Before making choice, write down reasons why you liked or disliked each poster. (Reasons were visibly thrown away.)

• **CONTROL condition:** Before making choice, answer questionnaire about why you chose to be a psych major; or why you chose U of Virginia.

• **Dependent measures:**
  ♦ Liking ratings for the posters at time of choice.
  ♦ Choice of one poster to keep.
  ♦ Liking ratings collected at the end of the semester.
Results for the “Poster Choice” Study

**ART POSTERS**

<table>
<thead>
<tr>
<th>Mean Rating by</th>
<th>Mean Rating by</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONTROL subjects</td>
<td>REASONS subjects</td>
</tr>
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> **CAT POSTERS**

<table>
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- **Choice:** 20 of 21 (95%) of Control subjects chose an art poster.
  14 of 22 (64%) of Reasons subjects chose an art poster.

  \[ p < 0.05, \chi^2(2) = 4.71; \text{ the difference is significant.} \]

- **Ratings at the end of the semester:**
  - REASONS subjects liked the poster they had chosen less than CONTROL subjects regardless of whether they had chosen an art or humorous poster.
  - The effect was especially strong ...
    - ... for REASONS subjects who had chosen a humorous poster.
    - ... for subjects who lacked knowledge about art.
  - The effect was weak for subjects who were knowledgeable about art.
Interpretations of the “Poster Choice” Experiment

- Giving reasons altered choices (at least for some people). Effect was greatest for people who were not knowledgeable about art.

- Giving reasons altered liking for art and humorous posters at the initial viewing.

- Giving reasons affected satisfaction at the end of the semester.

- Why do these effects occur?
  - Possibly, people generate reasons for liking/choosing a poster that are not valid (for the individual).
  - Possibly, people who generate reasons overlook attributes that are difficult to explain in words.
  - Over time, the true (inarticulate) reasons determine liking.
Tuesday, 28 November, 2017: The Lecture Ended Here