

# **Emotions in Decision Making**

## **Two Systems (Modes) of Thinking**

### **The Somatic Marker Hypothesis** (Damasio, 1994)

The necessary presence of affects in decision making

### **Two-Factor (SP/A) Theory** (Lopez, 1981)

Conflicts between Situational Constraints (Aspiration level) and Dispositional Motives (Potential-minded and Security minded)

### **Risk-as-Feelings hypothesis** Loewenstein, Weber, Hsee, & Welch (2001)

Role of Anticipatory Emotions in Decision Making

## **Experienced Conflict between Rational Preference and Emotional preference**

Embedded in common language is evidence that people are intuitively aware of two modes of thinking.

Kahneman (1999) assumes that the brain continuously constructs an affective or hedonic commentary on the current state of affairs.

A body of previous research has shown that emotional reactions to risky situations often diverge from cognitive assessments of those risks (e.g., Denes-Raj & Epstein, 1994; Loewenstein, Weber, Hsee, & Welch, 2001).

Both CEST (Cognitive-experiential self theory, Epstein, 1994) and the Risk-as-Feelings Hypothesis (Loewenstein, Weber, Hsee, & Welch, 2001) posit that in most situations the affective system is dominant over the rational system because it is less effortful and more efficient.

### **The Affect Heuristic in Judgments of Risk and Benefit**

Judgments of risk and benefit are negatively correlated.

### **Emotional Intelligence:**

Ability to reduce the discrepancy between expected utility and experienced utility

### **Affects as Probability Weights**

Rottenstreich and Hsee (2001) proposed an affective rather than psychophysical deconstruction of the weighting function based on two assumptions. First, preferences depend on the affective reactions associated with potential outcomes of a risky choice. Second, decision outcomes possess not only high or low monetary values but also rich or poor affective values.

They hypothesized that a given change in probability at the two end points would be in part amplified by two different affects, hope and fear. A change from impossibility of winning to possibility (whenever the probability of winning is greater than zero) generates hope while a change from certainty of winning to uncertainty (whenever the probability of winning is less than 1) elicits fear.

They predicted that weighting functions will be more S-shaped for lotteries involving affect-rich than affect-poor outcomes.

In a series of experiments, they found that an affect-poor prize (e.g., a \$500 coupon for tuition reduction) was preferred over an affect-rich prize (e.g., a \$500 coupon for a summertime European vacation) under certainty, but the direction of preference reversed under low probability.

These authors suggested that the assumption of probability-outcome independence may hold across outcomes of different monetary values, but not different affective values.

Prob. at the two end points

### **Affects as Probability Weights at Reference Points**

Based on the **Tri-Reference Point Theory**:

Goals and MRs demarcate and define the value location for impossibility and certainty.

Weighting functions will be steeper for gambles with payoff distributions over both sides of a Goal or MR referent point.

Weighting functions will be flatter for gambles with payoff distributions over both sides of the status quo.

### **Emotional Basis of Learning**

Susan Mineka (1992) showed monkeys one of two videotapes. In one tape a monkey was shown displaying tremendous fear of a snake. The second videotape was identical to the first one except that the snake was replaced by a flower. Monkeys who watched the first tape subsequently avoided snakes themselves, exhibiting observational learning (Bandura, 1977). But monkeys who watched the second tape did not subsequently avoid flowers and showed no observational learning even the fear responses were exactly the same in the two videotapes.

A conclusion from this study is that even observational learning - learning derived from watching others - requires positing prepared propensities inside the learner. \*\* We argue that the propensities are implemented by means of affects. Without any affects inside the learner being activated by the observed behavior, learning would not occur. From this standpoint, the children in the Bandura (1977) study were not just copying either pro-social or anti-social behaviors in a similar context but experiencing the affects that trigger these behaviors.

An **adaptive conservatism hypothesis** (Hendersen, 1985; Tomarken, Mineka, & Cook, 1989) has been proposed to explain a common tendency, characterized in anxiety

disorders in humans, to show fear of a wider range of objects or situations than actually pose the threat.

These findings suggest that emotions mediate learning effects. If we assume that emotional reactions to a snake are on average stronger than emotions elicited by a damaged electrical outlet, emotions then may be viewed as weighting functions for probability judgment. That is, presence and absence of certain emotions alter subjective probabilities assigned to different risky events.

### **Affects (Moods) as Predictors of Perceived Balance between Resources and Demands**

Morris (1999) found that elated and depressed moods are generally associated with mood-congruent memory and judgment, and that bad moods increase self-focus. Based on this evidence and a consideration of apparent antecedents of mood, Morris argues that mood has the attributes of an “evolved psychological mechanism” as described by Buss (1995). Specially, mood appears to be sensitive to a particular class of input, namely, the adequacy of resources given current levels of demand. Positive and negative disparities activate the mood system, causing it to influence other psychological systems in such a way as to maintain homeostatic balance between perceived resources and demands. From this viewpoint, mood is a feeling-based predictor of the near-term prospects of pleasure and pain.

### **Affects as Domain Specific Value Functions**

Fessler, Pillsworth, & Flamson (2003) argue that despite considerable research on the influence of emotions on risk taking, investigators have yet to agree on an explanatory framework.

Adopting an evolutionary perspective, Fessler et al predicted that, despite having similar appraisal tendencies, anger and disgust would have opposite effects on risk taking because anger functions to deter transgression through aggression, while disgust functions to ward off contamination; an evolutionary perspective also led them to predict sex differences in these effects.

Using a gambling task involving substantial real stakes without deception, Fessler et al. demonstrate that anger increases risk taking in men, while disgust decreases risk taking in women.

### **Emotions within Reason (Rational and Emotional Modes of Decision Making, Wang, 2006)**

Previous studies have examined how different factors differentially activate either affective or rational mode of decision making but have rarely investigated how decision makers naturally resolve ongoing conflicts between their emotional preference and rational preference and how the risk domains and information presentations influence such conflict resolutions.

### Empirical Paradigm of the Present Study

We developed a choice task to compare the relative impact of emotional and rational modes of decision making on the overall risk preference of the decision maker.

This method also allowed us to examine how people resolve emotionality-rationality (E-R) conflict in decision making without any overt experimental manipulations that differentially activate the two systems.

### Empirical Paradigm of the Present Study

Given the fact that we all experience explicitly the rivalry between emotional preference and rational preference, it was assumed that the decision makers themselves can be trusted to distinguish the directional effects of gut feelings versus rational assessments on their risky choices.

Participants were asked to make risky choices among a set of (or pairs of) choice options, involving different risk domains, including moral dilemma, traffic accident, health risk, bio-terrorism, monetary gamble, and investment risk.

Decision Problems: (1) Druggist problem, (2) Trolley problem, (3) Personal investment problem, (4) Terrorist problem, (5) Family disease problem, and (6) Monetary gamble problem.

Two Framing Versions for the terrorist problem, the disease problem and the monetary gamble problem

(1) Which of the above options do you prefer based on your emotional reactions and feelings?

A or B

(2) Which of the above options do you prefer based on your rational analysis and thinking?

A or B

(3) Please indicate your overall preference for each of the choice options on a 7-point scale with 1 representing not preferable at all and 7 representing very preferable.

Option A: If Plan A is adopted, 3 of them will be saved.

1-----2-----3-----4-----5-----6-----7

Option B: If Plan B is adopted, there is a 50% chance that all of them will be saved, and 50% chance that none of them will be saved.

1-----2-----3-----4-----5-----6-----7

### Working Hypotheses and Predictions

Instead of predicting a general taking-over of the affective (or experiential) system when a conflict between affective (emotional) preference and rational preference occurs, we hypothesized that resolution of such conflict involves risk domain-specific heuristics.

Hypothetical resolutions and strategies include rationalism (always conform to rational preference), sentimentalism (always follow emotional preference), eclecticism

(compromise, average risk preferences in two modes of decision making).

Second, the conflict between the two decision modes should be sensitive to the information format and presentation, such as risky choice framing.

#### Predictions

- (1) Emotional choice preference and rational choice preference often in conflict in different risk domains.
- (2) The magnitude of the overall choice preference would be higher when the emotional choice and rational choice of the decision maker are in agreement with each other.
- (3) Conflict resolution would show different heuristic patterns across risk domains.
- (4) Emotional choice preferences should be more susceptible than rational choice preference to the hedonic tone of risky choice framing.

#### Research Questions and Empirical Tests

- \* Were There Conflicts between Rational Decisions and Emotional Decisions?  
Yes.

It was evident that emotional choice preference and rational choice preference were two distinct modes of decision making.

Within a risk or task domain, the emotional choice preference was often the opposite of the rational choice preference.

Across different problem arenas the percentage of the participants who had the opposite risk preferences in different decision modes ranged from 13 to 44%.

- \* Would Emotional Preference be more Risk Seeking than Rational Preference?  
Yes.

This general trend suggests that emotional preferences invoked by gut feelings have a higher baseline level towards risk seeking than rational preferences based on cognitive assessments.

- \* Would the Strength of Choice Preference Increase as the Total Number of E-R Conflicts Decreases?  
Yes.

- \* Would the E-R Conflicts Promote either Risk-Averse Preference or Risk-Seeking Preference?  
No.

The total number of risk-seeking choices did not vary with the total number of E-R conflicts.