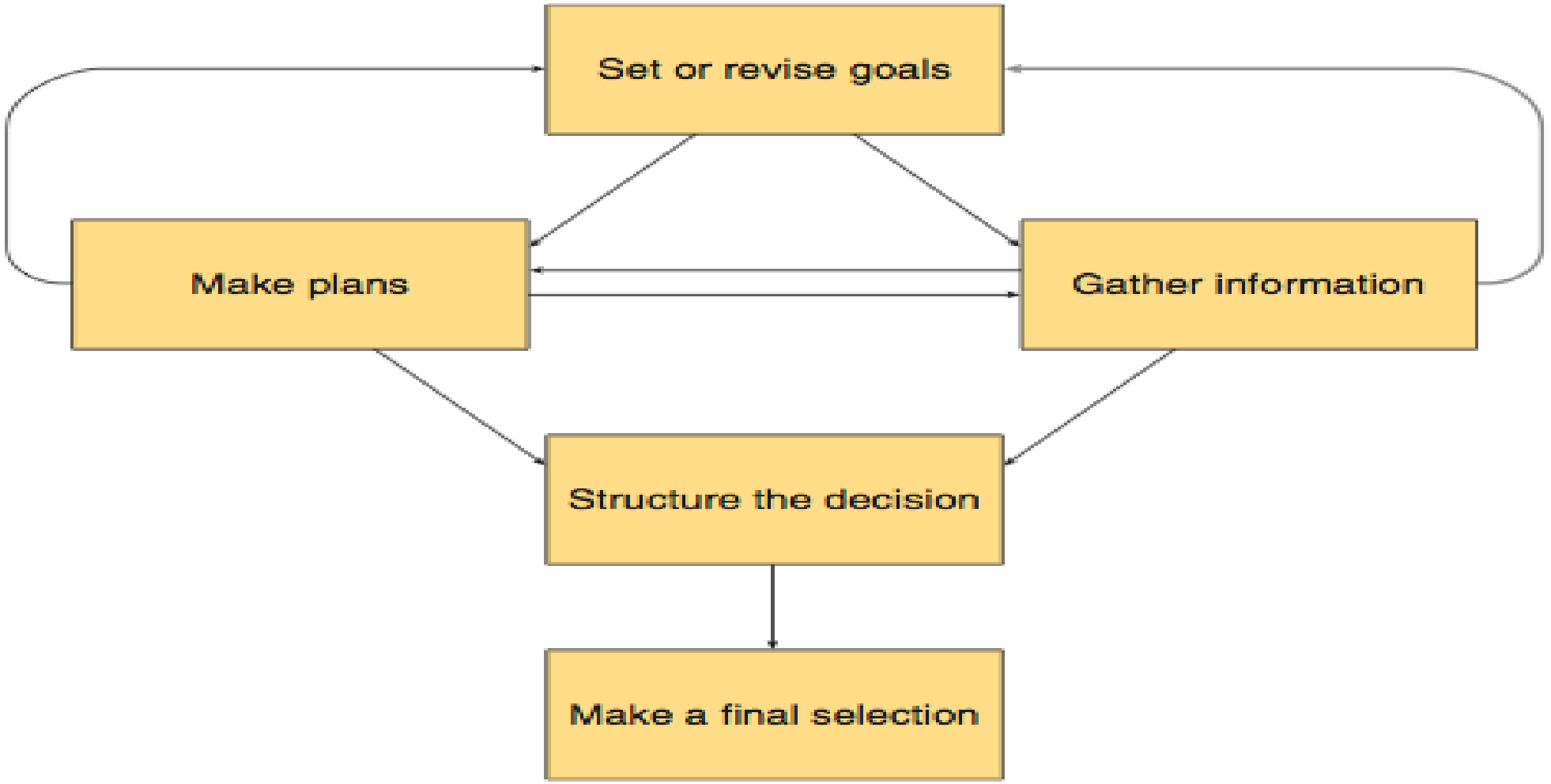
Decision making



Decision Making

Despite the errors that occur when we make judgment, these judgment form an important part of the database for the process of decision making. Decision making includes a choice between alternatives. With the increase in the number of alternatives available the probability/chance of alternatives being wrong also increases – leading to the increase of risk/uncertainty in choice

According to the *threshold approach of choice* (Clemen,1991), if a decision depends on the likelihood of another event happening, then the attractiveness of the option should increase as the probability of the other event increases. Once that probability reaches a minimum level of certainty, the alternative would be chosen.

Decisions which involve over-confidence in judgment attain the minimum level of certainty too easily leading to choice of wrong/un-rewarding choices

Does the minimum level of certainty vary with culture?

Expected Utility: A Normative Approach

Economists are interested in the factors involved in choice and what type of model describes rational choice behavior. One of the well-established theories of decision making is *expected utility theory*

the theory states that when faced with some type of uncertain choice, we make our decisions based on two factors

1) the expected utility of the outcomes
2) their respective probability

Utility refers to whatever end a person would like to achieve, be it happiness, money or something else. Broome (1991) suggests – utility refers to the amount of good that comes out of a decision. Thus while making decisions we weigh the good that might come out of each alternative against the cost of that alternative. We also access the probability of each alternative occurring. Whatever alternative provides the best combination of "good" and "likelihood" will be the chosen one. Consider

flip a coin; if it turns up head, you get $40
Roll a dice, if it come up 4, you get $50.

Which option would you chose?

Violation of Expected Utility

One of the normative predictions made by expected utility theory is that our choices should show *invariance's*; that is, a decision maker's choice should not depend on the way a choice is presented. If I prefer choice A over choice B in situation 1, then I should prefer choice A over choice B in situation 14 (as long as A and B are identical in the two situations)

People often switch their preferences of one outcome over another, based on how these outcomes are presented, demonstrating *irrationality*. Consider the *preference reversal* shown (Lichtenstein & Slovic, 1971). Their general procedure involved having subjects look at two different gambles and decide – (1) which gamble they would like to play & (2) how much the gamble was worth.

1) 80% chance to win $ 4.00 20% chance to lose $ 0.50	4) 10% chance to win $ 40.00 90% chance to lose $ 1.00
2) 95% chance to win $ 3.00 5% chance to lose $ 2.00	5) 50% chance to win $ 6.50 50% chance to lose $ 1.00
3) 99% chance to win $ 4.00 1% chance to lose $ 1.00	6) 33% chance to win $ 16.00 67% chance to lose $ 2.00

Lichtenstein & Slovic expected that the choice of which gamble to play would be influenced by the probability of winning, whereas the choice of the selling price for the gamble would depend on the potential dollar amount to be won. Why is this preference reversal irrational?

The *preference reversal* phenomena demonstrates the inadequacy of expected utility as a descriptive model of decision making. The expected utility model fails to provide a good description of how we make choices in many circumstances because it assumes too much; humans rarely have all the information necessary to make a decision. Even if they did, they lack the ability to combine and weigh the information accurately

Multiattribute Utility Theory (MAUT)

- What if the choices differ on many dimensions?
- Example: Choosing a major
- Majors differ in many ways: your interest in them, the job market after graduation, the faculty, etc.
- How should one choose?

Steps in MAUT

1. Break the decision down into its important dimensions.
2. Determine the relative weight (importance) of each dimension.
3. List all of the alternatives.
4. Rank the alternatives along each dimension.
5. Multiply each ranking by the appropriate weight.
6. Choose the alternative with the highest value.

An example of MAUT in action

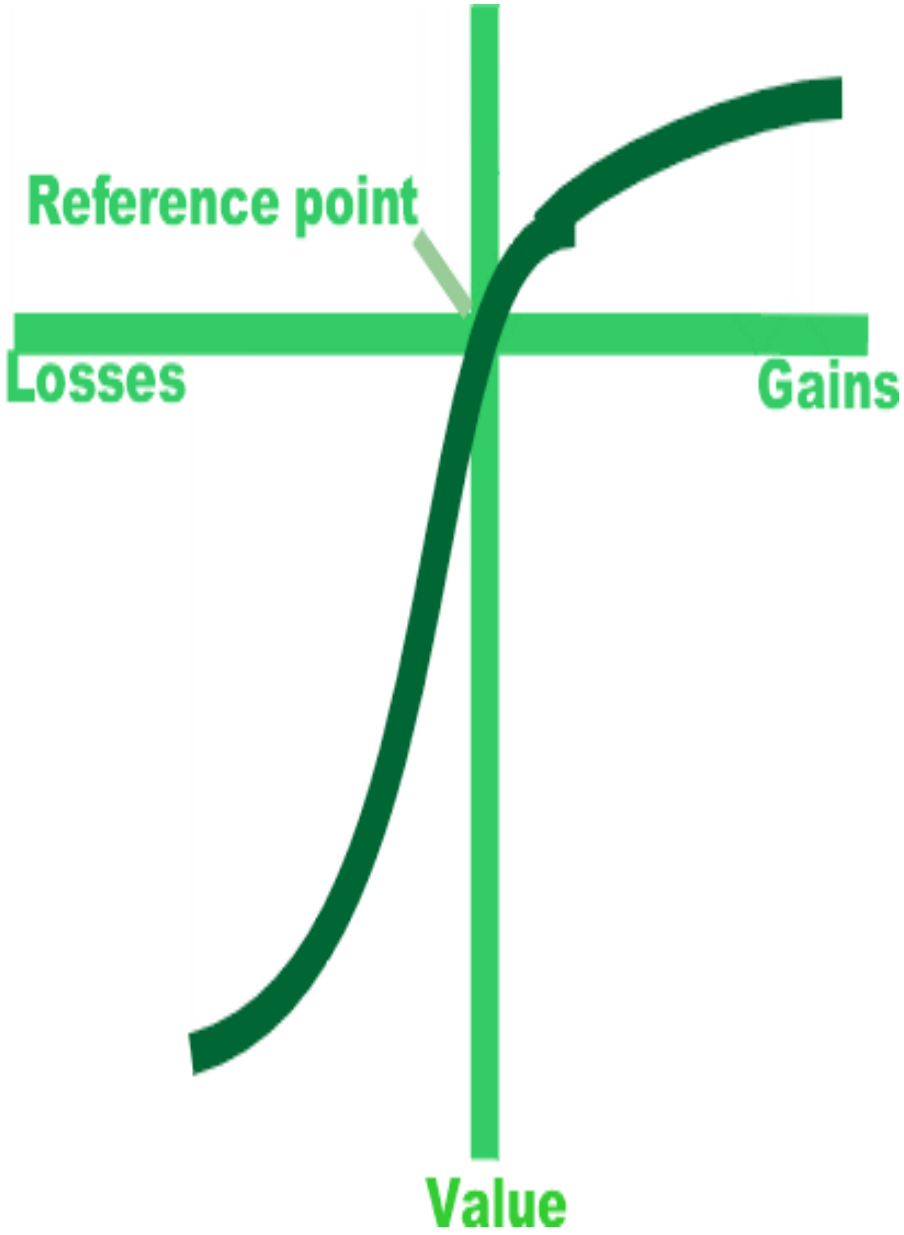
Criterion	Importance weight	Options				
		Major: Psychology	Major: Biology	Major: Mathematics	Major: Classics	Major: Sociology
Interest in topic	9	9	8	7	4	6
Job prospects	8	7	9	8	1	3
Faculty in department	5	3	4	3	9	5
Requirements	7	5	4	3	7	8
Model		**Summary Scores**				
Full Multiattribute Utility Theory		187	192	163	138	159
Equally Weighted Criteria		24	25	21	21	22
Top Criterion		9	8	7	4	6

Prospect Theory

One popular alternative to expected utility theory is Kahneman & Tverskys (1979) prospect theory. Prospect theory is a descriptive model of decision making that attempts to describe how we make decisions and why our decisions violate the expected utility model. The theory states

decisions are not valued based on the absolute value of the end result, as proposed by expected utility; instead we value decisions based on the amount of gain or loss from what we have right now. It also adds that gains and losses are on different scales of value.

The value we attach to gain increases more slowly as a function of the size of the gains than does the (negative) value we place on the loses as a function of the size of the loss. Basically we feel losses more acutely then we feel gains; the psychological pain associated with losing $50 is greater than the psychological pleasure of gaining $50. prospect theory predicts that people will be especially aversive to loss and will show difference in preference depending on how alternatives are presented or framed



Framing – is the term used to describe the effects on our decisions oh how a scenario is presented.

Prospect theory predicts our preferences will change whenever our reference point changes. Decisions can be influenced by how information is presented. If information is presented in terms of a positive “gain frame”, we will be more likely to avoid risk (risk averse) and pick a sure bet. However if the same information is presented in a negative “loss frame”, we will be more likely to take a risk (risk prone) to avoid loses.

Consider the results of a classic study by Tversky & Kahneman (1981). Subjects were presented with this scenario and two choices

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 for combating the disease have been proposed. Assume that the exact scientific estimate of the consequences of the program is as follows:

If program A is adopted, 200 people will be saved.

If program B is adopted, there is a 1/3 probability that 600 people will be saved and 2/3 probability that no one will be saved.

Other subjects were presented with exactly the same problem but with different choices

If program C is adopted, 400 people will die

If program D is adopted, there is 1/3 probability that nobody will die, & 2/3 probability that 600 people will die.

Psychological Accounting

this principle states that people will make different decisions depending on how the outcomes is felt or perceived. Consider

1) imagine you have decided to see a play for which admission is $10 a ticket. As you enter the theater, you discover that you have lost a $10 bill. Would you still pay $10 for a ticket to the play?

2) Imagine that you have decided to see a play for which admission is $10 a ticket. As you enter the theater, you discover that you have lost the ticket. The seat was not marked and the ticket cannot be recovered. Would you pay $10 for a ticket to the play?

In Kahneman & Tversky (1981) original study the subjects were less willing to purchase a ticket in scenario 2. Why could this be?

Sunk Cost

the sunk cost effect is another interesting variation of the notion of psychological accounting. This effect was demonstrated by Arkes and Blumer (1985) In one experiment

subjects were to imagine that they had purchased tickets for two different ski trips: one ticket (for trip to Wisconsin) cost $50, while the other ticket (for trip to Michigan) cost $100. the scenario made it clear that the trip to Wisconsin was preferable because it would be more enjoyable.

then a complication arose: the two trips were on the same weekend and the tickets were non refundable. Which trip would you choose to go on?

Affect and Decision Making

Positive and negative outcomes *feel* different to us, with predictable implications for the decisions we make. Affect thus is an important determinant of decision making, and can have sizable impact on psychological accounting process.

Hsee & Rottenstreich (2004) make this point by highlighting an important dimension of choice that interacts with affect, which they term *scope*; it basically refers to the sweep of a decision or action – how much impact will it have? Consider

suppose you gave $10 to help save one endangered tiger--- feels good. Now much would you give to save 4 endangered tigers?

The answer depends on whether the subjective value you derive from saving tigers is somehow multiplicative?

The authors propose a dual-process view of the relative impact of scope and subjective value on decision making. Their dual processes are – *a deliberate mode (which would map into the conscious reasoning) and an affective mode (which would map onto the unconscious reasoning).*

when we're in a deliberate decision making mode, we value things by calculation (4 > 2); while in an affective decision making mode we value things by feeling (help tigers). In deliberate decision making mode as scope increases subjective value increases correspondingly, while in affective decision making mode scope doesn't matter nearly as much and we are affected by the presence/absence of a stimulus