PHIOLOSOPHY 200

choices

Choice Theory:

- The relationship between probability and action is often complex, however we can use simple mathematical operations (so far all we've used have been the four arithmetic operations) to assist in making good choices.
- The first principles we will look at are: Expected Monetary Value and Expected Overall Value.

Expected Monetary Value:

- EMV = [Pr(winning) * net gain ($)] – [Pr(losing) * net loss ($)]
- Example, Lottery:
  - EMV = [(1/20,000,000) * $9,999,999] – [(19,999,999/20,000,000) * $1]
  - That comes out to -$0.50
  - That means that you lose 50 cents on the dollar you invest; this is a bad bet.

Expected Monetary Value:

- Consider an example with twice the odds of winning and twice the jackpot:
- Example 2, Lottery:
  - EMV = [(1/10,000,000) * $19,999,999] – [(9,999,999/10,000,000) * $1]
  - That comes out to $1
  - That means that you gain a dollar for every dollar you invest; this is a good bet.

Expected Overall Value

- Monetary value is not the only kind of value. This is because money is not an intrinsic value, but only extrinsic. It is only valuable for what it can be exchanged for.
- If the fun of fantasizing about winning is worth losing 50 cents on the dollar, then the overall value of the ticket justifies its purchase.
- In general, gamblers always lose money. If viewed as a form of entertainment that is worth the expenditure, it has a good value. If people lose more than they can afford, or if the loss hurts them, it has negative value.

Diminishing marginal value:

- This is a concept that affects expected overall value.
- Diminishing marginal value occurs when an increase in something becomes less valuable per increment of increase.
- Examples: sleep, hamburgers, shoes, even money (for discussion, how does diminishing marginal value affect tax policy?)

Assigning Utility Values:

- One useful way of thinking about how comparatively valuable different outcomes of choices are to you, you can assign numbers to different outcomes to reflect your preferences.
- For example, if only two outcomes of a choice are anticipated, and you would prefer the first outcome to the second, you could assign the first outcome a value of 2 and the second a value of 1.
  - You should think about how much more you prefer the first outcome to the second though.
  - If you really think outcome one is twice as valuable as outcome two, use the above assignment.
  - If outcome one is three times as valuable to you as outcome two, assign a value of 3 to outcome one and a value of 1 to outcome 2.
  - If outcome one is only a little more valuable to you than outcome two, assign values like 10 to 9 for outcomes one and two respectively.
- The numbers themselves are arbitrary. The goal is to express comparative overall value. You are the best judge of what you find valuable for you.

Decisions under risk:

- When a person has an idea of what different potential outcomes are, but does not know what the chances of such outcomes are, there are a number of strategies that can guide a decision.
- Consider the following table:

Outcomes (1-4) given choice (A-C)

	1	**2**	**3**	**4**
A	11	3	3	3
B	5	5	5	5
C	6	6	6	3

- Dominance is when one choice is as good or better in every outcome as any competing choice.
  - There is no dominant choice in the above.

Maximizing Expected Utility:

	1	**2**	**3**	**4**
A	11	3	3	3
B	5	5	5	5
C	6	6	6	3

- Expected Utility is what total value you can expect from a set of possible outcomes, given the values that you have assigned to those outcomes. The formula:
  - EU = [Pr(1) * Value(1)] + [(Pr(2) * Value(2)] … + [Pr(n) * Value(n)]
- If we do not know the probabilities of outcomes 1-4, we may assume they are equally probable, and simply take the simple average of all the values as our expected utility.
  - The EU of A and B are equal, at 5.
  - C comes out slightly better at 5.25, so nets the greatest expected utility

Maximin and Maximax Strategies:

	1	2	3	4
A	11	3	3	3
B	5	5	5	5
C	6	6	6	3

- Other strategies that make sense are:
  - Maximax: Choose the strategy with the best maximum (in this case, A)
  - Maximin: Choose the strategy with the best minimum (in this case, B)
- Which strategy choice makes most sense depends on how risk-averse the situation is.

Ch. 12, Exercise III:

1. EMV = [Pr(winning) * net gain ($)] – [Pr(losing) * net loss ($)]

That is: EMV = [.9 * $10] – [.1 * $10] = $8

This is a good bet, but would you be willing to risk your friend's life on it? I should say not. So the EMV is positive, but the EOV is not. In other words, the stakes are SO high for failure that it makes sense to use a maximin strategy, which is not to bet.