# Notes: Lecture 1

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# Why do we care about certainty vs uncertainty?

One can simply asset that we do and be done with it. That is, we care about having true beliefs independent of their usefulness.

The stoic answer would be that we should separate the world about things we can control and things we cannot control and simply focus on caring about those that we do.

Suppose that you must come into Milestone in the afternoon and you must cross a bridge to get here. It may rain or it may not rain, which will result in you being wet or not wet upon arrival. Should you care about whether it will rain or not?

If you are purely a consequentialist, the intuitive answer is that you should only care if you have an umbrella. What is the purpose of forming beliefs about the rain if you cannot affect whether you will be wet or not? Or indeed if it is completely costless to you to carry an umbrella around (maybe the umbrella magically just follows you around like the carpet in Aladdin), then once again, there is no reason to form a belief about the outcome.

It should be clear that if you could just rewind time and remake the choice, then there is no sense in forming a belief. This is Pandora box principle.

In other words, for a consequentialist to care about uncertainty it must be that 1) he has an action set which can affect outcomes he cares about. 2) The actions are not costless or at least in part mutually exclusive(in other words, actions should be non-reversible)

# Four different interpretations of probability:

1. Classical: Everything has equal chance
2. Physical/Frequentist: Probability that is measured, BIAS
3. Logical: Axiomatic system, more of a way of communicating
4. Subjective: People’s opinion

# Uncertainty in gambling:

A is willing to accept 8:1 odd that Orban will lose. So if he believes the probability of winning is p, then he expects to win p\*8 and expects to not win anything with (1-p). Otherwise he can simply keep his dollar. So he thinks there **is at least** 12.5% chance that Orban will lose.

But now suppose we approach A and ask him if he is willing to bet at 8:1 odds that Orban lose and A declines. What does this mean? Does it mean that he thinks that 1>p\*8 and hence he believes that Orban does not have a 12.5 percent chance of losing? So that means if we offer A the opposite bet, say 8:1 odds that Orban will win, maybe he should take it? What if A still says no?

If for the same odds, somebody is unwilling to take EITHER of the sides. Then that person is said to have uncertainty.

Note that the above discussion assumes that beliefs are separate from evaluations. This isn’t as self-evident as it appears. For example, it may make sense that you hold the belief that your wife is the best person in the world for the sake of motivating you to be a better husband.

**Aesop’s fable:** A fox could not reach some grapes and therefore decided to assume they were sour. This means that the foxes beliefs about the action set influenced the foxes beliefs about the satisfaction that would be received. .

Independence, how much information does one thing give us about another? Give an example of an airplane with 2 engines vs one with 3 engines. Ask the students to reveal what is wrong with the Gambler who will bet on red because he has seen 12 consecutive blacks on the roulette wheel.

When do we add probabilities and when do we multiply them? We add them when the events are mutually exclusive, and multiply them if they compound.

# Homework: selected problems from the textbooks

We discuss the basic approach of equiprobable sample space and explore permutations vs combinations approaches. We then proceed to explain the basic problem the basic problem of forming probabilistic beliefs from primitive gambling behavior and the the importance of choices and power using a metaphorical.

# Recommended Reading

Chapter 3-4 IAN

Chapter 2 Peterson

# Seminar Questions

What is the difference between risk and uncertainty?

When would a consequentialist be justified in making probabilistic beliefs about the future states world?

What is the classical interpretation of probability? What are the other interpretations discussed in class?

# Quiz questions

Suppose that the gamble is, if a six lands on a six sided die, then you gain 600 euros, otherwise, you gain 0. To play the gamble you must pay q= 100 euros. Suppose you start with a wealth of 10000 euros.

a)

b)

c)

d)

e)

f)

*g) For each utility function above, compute the value of q, for which the player will prefer to play the game*