Making Decisions in the Face of Risk and Uncertainty

A Brief Guide for Students

1) We'll assume a simple example. You face a situation in which you could follow course of action (or make choice) "A", "B", or "C".

2) The result of each choice (e.g., whether you avoid a crisis, or how much money you make) depends on the conditions that prevail in the future. Let's call these scenarios 1, 2, and 3. You can organize this using a simple table. In the following example, I've assumed a money payoff as the result under each scenario.

	Scenario 1	**Scenario 2**	**Scenario 3**
Choice A	$100	$(50)	$50
Choice B	$50	$200	$10
Choice C	$(60) – you lose $60	$130	$300

3) The classical theory of decision making in the face of risk shows you how to identify the best choice in this situation. It works like this: (a) Assign a probability to each scenario, so that the probabilities total to 100%. (b) Multiply each result by the probability of the scenario. (c) Add up the resulting numbers for each choice to obtain its expected value (that is, its expected result).. (d) Select the choice with the highest expected value. The following table shows an example of this:

	Scenario 1 (25%)	**Scenario 2 (50%)**	**Scenario 3 (25%)**	**Expected Value**
Choice A	$100 x 25% = $25.00	$(50) x 50% = $(25.00)	$50 x 25% = $12.50	$25.00 - $25.00+12.50 = **$12.50**
Choice B	$50 x 25% = $12.50	$100 x 50% =$50	$10 x 25% = $2.50	$12.50+$50+$2.50 **= $65.00**

Choice C	$(60) x 25% = ($15.00)	$130 x 50% = $65.00	$300 x 25% = $75.00	= $15.00 + 35.00+75.00 **=$125.00**

4) As you can see, classical decision theory in the face of risk tells you that "C" is the best choice, followed by "B", and then by "A" in last place. However, classical decision theory has some limitations.

5) The first is that the scenario probabilities are usually subjective. That means that two people who agree on the three choices could still disagree over which one is best simply because they believe the Scenarios have different probabilities.

6) Here is another problem. Sticking with our example, suppose two people, say, Austin and Stewie, differ in their willingness to lose money. Austin chooses "C" because he is willing to risk a loss of $60 for an expected gain of $125, while Stewie wasn't willing risk losing money, and so chooses "B" for an expected gain of $65. This violates classical decision theory, but makes perfectly good sense once you make people's relative aversion to losses as important as their desire for gains.

7) But there is an even bigger problem with classical decision theory. The problem is this: when we have to make decisions in the real world, more often than not we don't know all the possible future scenarios, much less their probabilities. In this situation, we have to make decisions in the face of "uncertainty" not "risk." So how do you approach this?

8) The first question to ask is "do I have to make this decision now?" In the face of uncertainty, if you can wait to make a decision, it is usually to your advantage, as you will have more time for "sensemaking" – developing a better understanding of the scenario that is developing. Unfortunately, in many cases, you can't wait, and have to decide.

9) In these situations, and particularly when you don't have much time to make a decision, the first question you should ask is "do I recognize this situation?" If you do, then that recognition should trigger the memory of what you did when you encountered it before, and how that course of action turned out. If it turned out well, you will probably decide to do the same thing again. If it didn't turn out well, you'll probably want to make some changes. This process results in your initial plan.

10) If you don't recognize the situation, you have to quickly gain a rough understanding of it. To do this, ask yourself three questions: (a) what are the most important elements (people, conditions, objects, etc.) in the situation I'm facing? (for example, we're having a picnic by the lake; there is a boat on the shore; the car is a half-hour hike away; I see fire on a ridgeline about a mile away; and the wind is blowing towards me); (b) What are the most important relationships between these elements? (for example: What is the probability the fire will reach us before we can get back to the car? Will the road be crowded with other cars and slow us down? Is the lake big enough that we could get in the boat, go out into the middle of the lake, and escape the fire?); and (c) How the situation is likely to evolve in the near future? (for example: do I see or hear any fire engines? Are other people starting to leave? Did some other group already take the boat?). This three step process develops what is called "situation awareness." Good situation awareness enables you to identify good choices or options, and to choose the one that, in your view, appears to have the highest probability of achieving your goal (in this case, escaping the fire).

11) The next step is to quickly test your plan before you put it into action. The best way to do this is called a "pre-mortem", which is like making up a little story about your course of action. Assume you are in the future, and your plan has failed. Tell a story (in your mind if you are along, or have your team do this if you are leading a group) about what went wrong. Usually, the key to this story will be an important assumption in your original plan that turns out to be wrong. Then ask yourself what you could have done differently to enable your plan to succeed. Here's a quick example. "My plan to have a picnic by the lake failed because of a surprise rainstorm. My plan to have a nice day out with my family could have succeeded if I

had also made reservations at that nice restaurant by the lake, just in case it rained." Making this reservation is called "hedging" – incorporating alternatives in your plan that you can follow if the original plan goes wrong. Usually, a pre-mortem will cause you to consider more hedges. Sometimes it will cause you to discard your original plan and make a new one. That's what makes it such a powerful technique to use when you are faced with having to make a decision in the face of uncertainty.

12) Once you have done this, mentally think about how your plan, complete with its hedges, will play out. This is called "mental simulation" and sometimes it too can highlight problem areas where you need to think about hedges, or to make other changes in the plan. Once you have finished this step, you've made your decision in the face of uncertainty, and you're ready to go.