Solution Question 8.18

Assess the probability that you will be hospitalized for more than one day during the upcoming year.

$$Pr(Hospital) = Pr(Hospital|Accident)Pr(Accident) + \\ Pr(Hospital|No\,Accident)Pr(No\,Accident)$$

I would asses: $Pr(Hospital|Accident) = 1$ (I drive a motorcycle!)

When I assess: $Pr(Hospital|No\,Accident)$ I only need to consider my general health condition and possibly other external events, for example getting injured while exercising.

$Pr(Accident)$: This could be assessed from accident data using a similar driver profile as mine (possibly age dependent).

$Pr(No\,Accident) = 1 - Pr(Accident)$

Solution Question 8.20

After observing a long run of red on a roulette wheel, many gamblers believe that black is bound to occur. Such a belief is often called

Gambler's Fallacy

because the roulette wheel has no memory. Which probability assessment heuristic is at work in the gambler's fallacy? Explain

We know that: $Pr(Red) = 0.50$ and $Pr(Black) = 0.50$. Hence, we feel that in a string of sequences, these probabilies should be closely approximated (even when this string is relatively small). This is a form of the representative bias in the sense that one feels that any finite observed sequence should be representative of these probabilities.

Of course, the history of a series of occurences on the roulette wheel does not affect the next occurence at all. (Recall, each trial experiment is independent from the previous one).

Solution Question 8.25

It is not necessary to have someone else set up a series of bets against you in order for incoherence to take its toll. It is conceivable that one inadvertently get one-self in a no-win situation through inattention to certain details and the resulting incoherence, as the following problem shows.

Suppose that an executive of a venture-capital investment firm is trying to decide how to allocate his funds amongst three different projects, each of which requires a $\$100,000$ investment. The projects are such that one of the three will definitly succeed, but is not possible for more than one to succeed. Looking at each project as an investment, the anticipated payoff is good, but not wonderfull. If a project succeeds, the payoff will be a net gain of $\$150,000$. Of course, if the project fails, he loses all of the money invested in that project. Because he feels as though he knows nothing about wheter a project will succeed or fails, he assigns a probability of 0.5 that each project will succeed, and he decided to invest in each project.

a. According to his assessed probabilities, what is the expected profit for each project:

$$E[Profit\,per\,Project] =$$
$$0.5 \times (\$150,000) + 0.5(-\$100,000) = \$25,000$$

Hence, the investor believes according to his assessed probabilities that he will have an average profit of $\$75,000$.

b. What are the possible outcome for the three investments, and how much will he make in each case?

Indication a succesfull project with (1) and a failed project with (0) we have the following possible outcomes:

Project 1	1	0	0
Project 2	0	1	0
Project 3	0	0	1

Hence we have for the overall associated payoffs:

Project 1	\$150000	-\$100000	-\$100000
Project 2	-\$100000	\$150000	-\$100000
Project 3	-\$100000	-\$100000	\$150000
Total	-\$50000	-\$50000	-\$50000

Conclusion, the investor is guaranteed to loose money.

c. Do you think he invested wisely? Can you explaun why he is in such a predicament? No, he should have assessed Pr(Project i Successfull) $= \frac{1}{3}$, $i = 1, 2, 3.$

d. "Knowing nothing" about the occurrence of a particular event does not mean it's probability of occurring equals $0.5.$

This works well for the case of throwing a coin, but it did not work well for the previous example.