Épreuve de section européenne

Conditional probabilities and the dying of a plant

Have you ever had that anxiety dream where you suddenly realize you have to take the final exam in some course you've never attended? For professors, it works the other way around, you dream you're giving a lecture for a class you know nothing about.

That's what it's like for me whenever I teach probability theory. It was never part of my own education, so having to lecture about it now is scary and fun, in an amusement park, thrill-house sort of way.

Perhaps the most pulse-quickening topic of all is "conditional probability", the probability that some event A happens, given (or "conditional" upon) the occurrence of some other event B. It's a slippery concept, easily confused with the probability of B given A. They're not the same, but you have to concentrate to see why. For example, consider the following word problem.

Before going on vacation for a week, you ask your spacey[1] friend to water your ailing[2] plant once during that period. Without water, the plant has a 90 percent chance of dying. Even with proper watering, it has a 20 percent chance of dying. And the probability that your friend will forget to water it is 30 percent. (a) What's the chance that your plant will survive the week? (b) If it's dead when you return, what's the chance that your friend forgot to water it? (c) If your friend forgot to water it, what's the chance it'll be dead when you return?

Although they sound alike, (b) and (c) are not the same. In fact, the problem tells us the answer to (c). But how do you combine all the probabilities to get the answer to (b)? Or (a)?

Adapted from *Chances Are*, a post by Steven Strogatz, New York Times' Opinion Pages.

Questions

1. Why does the author find lecturing about probabilities scary?
   What does he compare it to?
2. "In fact, the problem tells us the answer to (c)." Find that answer in the text.
3. Illustrate the problem with a probability tree.
4. Find out the answers to (a) and (b).
5. Imagine another situation illustrating the possible confusion between the probability of A given B and the probability of B given A.

[1] spacey = eccentric
[2] ailing = ill, suffering