## Problem

A conservative design team, call it C, and an innovative design team, call it N, are asked to separately design a new product within a month. From past experience we know that:

- (a) The probability that team C is successful is 2/3.
- (b) The probability that team N is successful is 1/2.

(c) The probability that at least one team is successful is 3/4.

If both teams are successful, the design of team N is adopted. Assuming that exactly one successful design is produced, what is the probability that it was designed by team N?

## Solution:

There are four possible outcomes here, corresponding to the four combinations of success and failure of the two teams:

SS: both succeed, FF: both fail, SF: C succeeds, N fails, and FS: C fails, N succeeds.

We are given that the probabilities of these outcomes satisfy

P(SS) + P(SF) = 2/3, P(SS) + P(FS) = 1/2, P(SS) + P(SF) + P(FS) = 3/4.

From these relations, together with the normalization equation

P(SS) + P(SF) + P(FS) + P(FF) = 1,

we can obtain the probabilities of all the outcomes:

P(SS) = 5/12, P(SF) = 1/4, P(FS) = 1/12, and P(FF) = 1/4.

The desired conditional probability is

 $P({FS} | {SF, FS}) = (1/12) / (1/4 + 1/12) = 1/4$ 

Source:

Introduction to Probability

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