cause Decision-maker to revise his/her beliefs. If p is Decision-maker's prior probability of Red, and p' is the posterior probability (i.e. p' is the updated probability of Red after the observation), then it can be shown that

$$p'\,|_{x=0} = \frac{.36\,p}{.6 - .24\,p};$$

$$p'\,|_{x=1} = \frac{.48\,p}{.4 - .08\,p};$$

$$p'\,|_{x=2} = 1.$$

Note that Decision-maker now has the possibility of multiple looks. Bayesian Decision Theory provides a clear prescription for carrying out a multi-look policy. First, Decision-maker must decide whether to wait for a satellite pass or to act immediately (and, if so, how). After the satellite information has been received, Decision-maker must use it to update his/her probability of Red, and then decide whether to act immediately or await another satellite pass, etc. When evaluating the option of waiting for satellite information, Decision-maker must always take into account the likely value of the information, as well as the cost increase if the true state is Red. The decision to await satellite information is therefore recursive; in the optimal policy, no action is taken as long as the expected gain from the information that is about to be received exceeds the expected cost increment.

The illustrative case presented above is fairly easy to analyse, because it can be shown that information from a satellite pass will be used at most twice. In fact, Decision-maker's complete optimal policy is as follows:

- If $p > .1284$, Alarm.
- If $p < .1284$, Await Next Pass; then Update p to p'.
    - If $p' > .1240$, Alarm.
    - If $p' < .1240$, Await Next Pass; then Update p' to p''.
        - If $p'' > .10$, Alarm.
        - If $p'' < .10$, Accept.

The expected cost for this optimal policy is shown as a function of p in Figure 8. Also shown in Figure 8 is the expected cost of optimal immediate action and the expected cost of the optimal policy if Decision-maker must act after at most one satellite pass.

The tendency of Decision-maker to seek out more information when almost sure of Green should not be surprising, for if the true state is Green, then the information is free. It is only the small risk of Red, and the substantial costs Red would imply that limit the use of satellite information in this model. If satellite use had a fixed cost irrespective of the true state, then no matter how small that cost, Decision-maker would Accept immediately, as soon as p or p' became small enough (i.e. as soon as Green became sufficiently likely). On the other hand, if delay costs were lower, Decision-maker would use more satellite passes, continuing up to a new, higher maximum, or until the accumulated evidence made a violation sufficiently likely.

Figure 7:

Probability Table for One Pass

	Observe 0	Observe 1	Observe 2
Green	0.60	0.40	0
Red	0.36	0.48	0.16