Mini Case 9.1

BIOMETRIC SECURITY

If your ATM could recognize your physical characteristics (e.g., fingerprint, face, palm, iris), you wouldn't need an ATM card or a PIN. A reliable biometric ID system could also reduce the risk of ID theft, eliminate computer passwords, and speed airport security screening. The hypotheses are

H_0: User is legitimate

H_1: User is not legitimate

Fujitsu Laboratories has tested a palm ID system on 700 people, ranging from children to seniors. It achieved a false rejection rate of 1 percent and a false acceptance rate of 0.5 percent. Bank of Tokyo-Mitsubishi introduced palm-scanning at its ATM machines in 2004. DigitalPersona of Redwood City, California, has developed a fingerprint scanner (called *U.Are.U*) that is able to recognize fingerprints in 200 milliseconds with a 1 percent false rejection rate and a 0.002 percent false acceptance rate. In some high-end devices, false acceptance rates as low as 25 per million have been achieved. These low rates of false acceptance (Type II error) are encouraging, since they mean that others cannot easily impersonate you. Fingerprint scanning is popular (e.g., at the entrance gates of Disney World or Universal Studios) because it is cheaper and easier to implement, though some experts believe that iris scanning or several combined tests have better long-run potential to reduce both error rates. Any such system requires a stored database of biometric data.

Sources: *BusinessWeek,* November 22, 2004, p. 127; *Scientific American* 290, no. 6 (June 2004), p. 108, and 289, no. 4 (April 2003), p. 74; and *PC Magazine,* April 22, 2003, p. 74.

PRODUCT SAFETY

Firms are increasingly wary of Type II error (failing to recall a product as soon as sample evidence begins to indicate potential problems):

H_0: Product is performing safely

H_1: Product is not performing safely

They may even order a precautionary product recall before the statistical evidence has become convincing (e.g., Verizon's 2004 recall of 50,000 cell phone batteries after one exploded and another caused a car fire) or even *before* anything bad happens (e.g., Intel's 2004 recall of its 915 G/P and 925X chip sets from OEMs (original equipment manufacturers), before the chips actually reached any consumers). Failure to act swiftly can generate liability and adverse publicity as with the spate of Ford Explorer rollover accidents and eventual recall of certain 15-inch Firestone radial tires. Ford and Firestone believed they had found an engineering work-around to make the tire design safe, until accumulating accident data, lawsuits, and NHTSA pressure forced recognition that there was a problem. In 2004, certain COX_2 inhibitor drugs that had previously been thought effective and safe, based on extensive clinical trials, were found to be associated with increased risk of heart attack. The makers' stock price plunged (e.g., Merck). The courts often must use statistical evidence to adjudicate product liability claims.

SECTION EXERCISES

connect

9.1 If you repeated a hypothesis test 1,000 times (in other words, 1,000 different samples from the same population), how many times would you expect to commit a Type I error, assuming the null hypothesis were true, if (a) $\alpha = .05$; (b) $\alpha = .01$; or (c) $\alpha = .001$?

9.2 Define Type I and Type II error for each scenario, and identify the cost(s) of each type of error.

a. A 25-year-old ER patient in Minneapolis complains of chest pain. Heart attacks in 25-year-olds are rare, and beds are scarce in the hospital. The null hypothesis is that there is no heart attack (perhaps muscle pain due to shoveling snow).