By Stan Shapiro

Decision Making Under Pressure

From emergency rooms to space missions, many decision-making situations allow no room for error. An ER physician reflects on what went wrong as flight managers assessed the potential damage on the space shuttle *Columbia*.

I was working a late night shift as an emergency-room physician in February 2003, shortly after the space shuttle *Columbia* disaster that resulted in the death of seven astronauts. As I reflected on the disaster, one persistent thought troubled me: If the best and brightest of NASA management could not avoid such disastrous outcomes from their decision making, what hope was there for me and my decision skills in the emergency room? What could I learn from this disaster?

My "Shuttle Thinking" model resulted from those rare, quiet moments when I would put my feet up on my desk and try to analyze my own decision-making process, searching for ways to improve it. I studied the *Columbia* disaster and compared it to my own style of making decisions. If the *Columbia* had been a patient, what would I have done differently? How could I improve my own decision process and then share it with others? "Shuttle Thinking" is what I now call a set of five common pitfalls that I believe undermine our critical decision-making process.

Five Pitfalls in Critical Decision Making

To improve my decision-making process, I now consciously examine the impact of Shuttle Thinking on every high-level decision I make, using the *Columbia* disaster as an example. Other examples could also serve to illustrate common decision-making pitfalls — the meltdown of large financial institutions, government decisions involving Hurricane Katrina, or the sinking of the *Titanic* also follow the same path of poor decision making that doomed *Columbia*.

As you recall, shortly after *Columbia*'s launch, a piece of insulating foam about the size of a large briefcase apparently broke off from the external fuel tank, hitting the shuttle's left wing. The extent of the damage to the left wing was not known. NASA managers felt that no action was needed, and the *Columbia* was allowed to return to Earth. A normal, uncomplicated reentry was expected. However, after the loss of the *Columbia* and crew, the Columbia Accident Investigation Board (CAIB) found fault with the decisions of NASA management.

Pitfall One: Unique Situation

Unique situations, by definition, have no learning curve. NASA management had no training-manual solution for the space shuttle *Columbia* incident. Instead, NASA management evaluated the situation as it unfolded; they became the learning curve. As is often the case with bad decisions in unique situations, the eventual horrific outcome was never even an initial consideration.

Key lesson: Unique situations must be approached cautiously, considered inherently risky and dangerous, and should be considered invitations to poor decision making. Scenario planning may be helpful in identifying potential sources of trouble, but unique situations require extra attention.

Pitfall Two: Data Deficit

Sometimes, not enough data exists to help you make wise decisions. Important decisions are sometimes made on little or no information. In the case of *Columbia*, there was no available information to determine if the left wing of the craft had been damaged. There were limited structural sensors in the wing, and no direct visualization of the wing from the shuttle was attempted.

So, not only was minimal data available, but there were few options for obtaining any additional data. Extravehicular activity (space walk) or launching another shuttle to "fly by" the *Columbia* to take a "visual" and check for damage were not simple options, even if they had been considered. The option recommended by engineers was to use Defense Department technologies to attain high-resolution images of the wing; however, NASA management did not exercise this option, believing that the damage was likely too minor. The CAIB investigators later concluded that the decision-making process itself contributed to the disaster.

Key lesson: Data deficits, with inadequate information for a critical decision, make it mandatory to obtain additional data.

Pitfall Three: Emotional Denial

Given the variable-outcome choices in our daily lives, we may naturally tend to gravitate toward the positive potential outcomes while ignoring or even denying the fact that painful, negative outcomes are possible. If we did not have this propensity toward optimism, we might become paralyzed in our daily

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activities, even avoiding that "risky" commute to work, for instance. Some outcomes, such as the *Columbia* breaking up on reentry, are so uncomfortable that we often choose to not give them the full consideration they deserve. Many times, denial of the difficult or threatening components of our decisions allows us to choose the easier, more comfortable options. In the case of the *Columbia*, the easiest decision was to simply deny that there was a serious problem and to do nothing.

Key lesson: Emotional denial frequently shifts our decision making toward the easier, more comfortable solutions. Negative scenarios may be dismissed, but often at our peril.

Pitfall Four: Gambling on Probabilities

This is the pivotal point in our decision-making process. I certainly was not in the NASA conference room during their risk assessment of the *Columbia*. However, I can imagine that NASA management struggled with their unique situation, used the limited available data, and finally opted not to obtain any additional data. This initial problem analysis, coupled with a degree of denial of the seriousness of the situation, likely allowed them to conclude, "There is probably no damage caused by the foam piece, and nothing further needs to be done."

Would the outcome have been different if the NASA team restructured their conclusion by thinking of "probability" more critically as "risk assessment"? When lives are at stake, gambling on probabilities can be fatal.

Key lesson: Relying uncritically on one probable outcome should be considered synonymous with gambling. The full extent of the gamble and its consequences then needs to be considered.

Pitfall Five: Positive Reinforcement

Long before *Columbia*, NASA management had noted smaller pieces of foam breaking off during multiple previous shuttle missions. Because no problems resulted from these foam events in the past, they knowingly accepted the fact that small pieces of foam break off. These foam events were subsequently considered to be a normal mission variant. In other words, NASA management had gambled in the past—and won. This winning mind-set unfortunately minimized their perceived risks and reinforced their willingness to continue to gamble.

Key lesson: Gambling and winning tends to reinforce the option of taking additional risks.

Decision Making in the Emergency Room

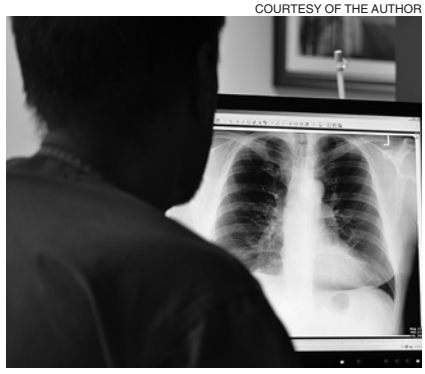
ER physicians are faced with life-or-death decisions on every shift. Early in my career I learned that, once you have made the diagnosis of "probable heartburn or indigestion" in 100 patients, you then expose yourself to the risk of one of those 100 patients returning to the ER with an actual heart attack instead of heartburn. Ninety-nine patients were correctly diagnosed with indigestion, but one patient returns with a true myocardial infarction (heart attack). Do you continue to gamble with your "probable" diagnosis style knowing that the one case in 100 will eventually return?

The practice of medicine is replete with similar examples, and physicians eventually learn by trial and error that, unless you completely verify the diagnosis by searching out additional data—such as an electrocardiogram (EKG) and heart blood tests—the laws of probability will eventually catch up with you. Because physicians are faced with these reoccurring decision scenarios in statistically large enough numbers, they rapidly learn the consequences of making a diagnosis based on probability.

Patients often misinterpret this need for additional testing (acquiring data) as the physician practicing "defensive medicine," but in reality, the physician is trying to protect the patient from the rare event (unique situation) and from the laws of probability.

NASA management faced a unique situation, used the limited available data, opted not to obtain additional information, and likely had a degree of denial of the severity of the situation. All of this resulted in a critical decision—a gamble—that lost. The remote possibility of a *Columbia* disaster, which eventually became a reality, was not given the full consideration it deserved by the key decision makers.

COURTESY OF THE AUTHOR



Author Shapiro studies X ray in emergency room. Decision making requires data, even when we're under pressure.

We are all constantly surprised when very smart people and their teams make seriously flawed decisions. No person, company, or government agency is immune. If your decisions are based on poor data and probability, eventually your luck will run out. Whether it is the financial system, space missions, or Hurricane Katrina, many of our most flawed decisions share the same common process. Sometimes when you gamble big, you lose big.

The most important step toward better decision making is early recognition of this "shuttle thinking" pattern and the role of "probability" in your decisions. To improve my decision-making process, I now consciously examine the impact of shuttle thinking on every high-level decision I make.

About the Author
Stan Shapiro is a licensed Idaho physician with 20 years of experience practicing as an emergency-room physician. His seminar, ERThink, is designed to train people in the unique critical thinking skills that he learned from the emergency room. E-mail mail@stanshapiro.com; Web site www.ERthink.com.