



Intuitive Decision-Making

An invaluable process that helps keep pilots safe

BY **JAMES ALBRIGHT** james@code7700.com

Making timely and correct decisions is an important part of many jobs, but few professions require this skill at the level of a pilot flying a large, transport category airplane.

While it's true that a surgeon's decisions have a life and death weight to them, they are usually made dealing with one life at a time and without the

split-second timing required of a pilot at V1 during a balanced field takeoff. Likewise, a police officer may have to make a critical split-second decision, but probably only a few times throughout a decades-long career. By contrast, a pilot might face dozens of such decisions in just one winter season of operations in the Northeastern U.S. Then, too, there are dozens of foggy nights in which two

or perhaps three white lights masquerading as a runway beckon the pilot to land but allow a mere second to decide the fate of all on board.

So how do we do it? Part of this success story is that thanks to modern simulator technology, we are tested on the fields of battle unlike any other profession. But the real mystery is how we seem to make these split-second decisions without all the necessary information in evidence. Is it some kind of super power?

The typical business school model of optimized decision-making requires a brainstorming session during which options — the more of them, the better — are developed and considered. The evaluation criteria are constructed so that each option may be assessed, compared and prioritized. In the end a solution is proposed that promises to be the best possible choice after hours, days or even years of deliberation. Pilots don't have the luxury of such a process.

There is another profession that offers a clue into the pilot's decision-making process. It's one in which quick and accurate decisions based on limited information also mean the difference between life and death: The firefighter.



Firefighter training, U.S. Navy

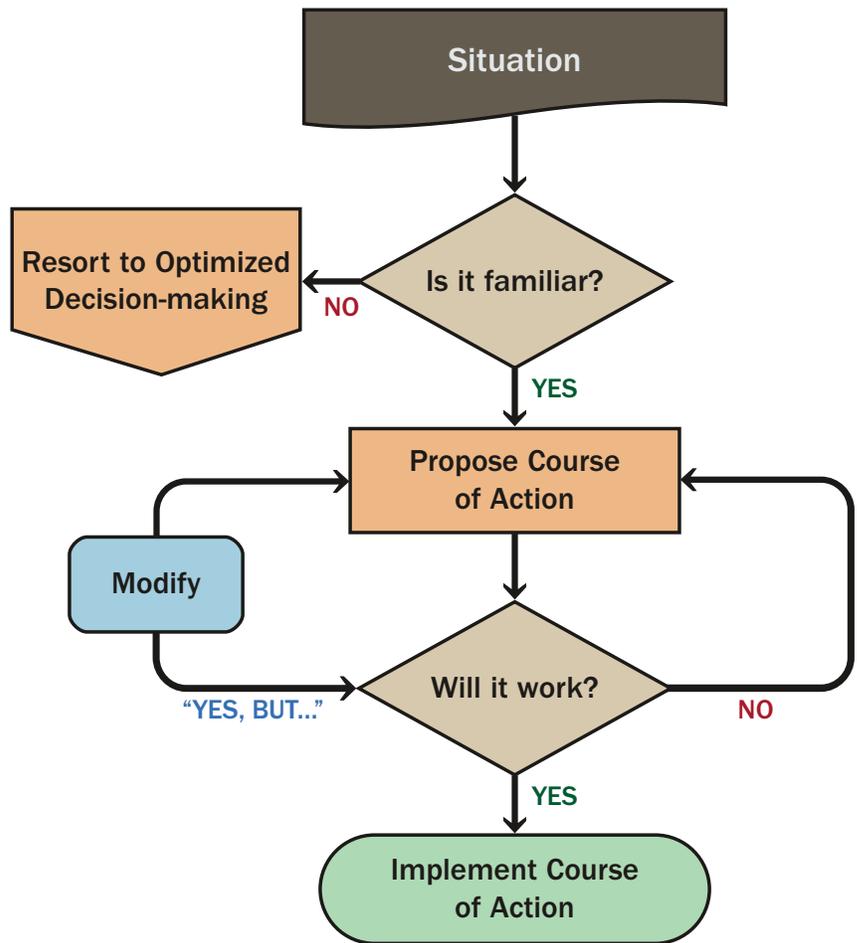
A Firefighter's ESP

Research psychologist Gary Klein attempted to validate a long-held theory that firefighters accelerated the conventional decision-making process — one where multiple options are considered, ordered and a choice made — by simply narrowing the number of options to two. He discovered there was no real world evidence to support the laboratory theory.

Perhaps the best example from his casework was of a firefighter lieutenant who claimed extrasensory perception (ESP) had once saved the day. The lieutenant's team was fighting what appeared to be a simple fire in a one-story house in a residential neighborhood. The fire was in back, in the kitchen. The officer led his hose crew into the building, to the back, to spray water onto the fire, but the fire just kept roaring back. He thought the water should have had more of an impact. He ordered his men back to the living room to regroup. Then, feeling that something wasn't right, he ordered his men to evacuate the building. As soon as they left, the floor they were standing on collapsed. Had they still been inside, they would have plunged into the fire below.

The lieutenant said this kind of "sixth sense" was a tool of every skilled commander. He had no reason to suspect the house had a basement or to doubt the source of the fire was the kitchen. After close questioning, researchers were able to uncover the lieutenant's subconscious thought process. The fact the fire kept roaring back did not make sense for a small kitchen fire. The noise level in the kitchen was abnormally low; fires are usually noisy affairs. Once they retreated into the living room another oddity became apparent. The living room itself was hot. The entire pattern of events did not agree with the lieutenant's expectations. In hindsight the indicators make perfect sense. Because the fire was actually underneath the living room, the firefighters' efforts in the kitchen were fruitless. The floor itself muffled the noise from below. The lieutenant was using his wealth of experience to make the call, not ESP.

Studying example after example of their experiences revealed firefighters rarely, if ever, approached situations by considering their options and making decisions with an aim of optimizing the results. Instead, they immediately selected a course of action and evaluated that single option with the thought,



"Will it work?" They almost never had time to devise the perfect solution; they were only interested in a satisfactory solution.

The Power of Intuition

Klein calls this decision-making process a "singular evaluation approach," one that gets the job done as quickly as possible. Rather than deliberate over multiple options, a person with the necessary experience can immediately come up with a suitable course of action. It is, quite literally, the first thing that comes to mind. Then the person need only evaluate the course of action with a simple question: Will it work?

We see evidence of this decision-making approach by pilots in their day-to-day operations, not just during time-critical emergencies. When taking off behind a larger aircraft, for example, an experienced pilot can immediately assess that airplane's takeoff performance and conclude he or she will rotate before and out-climb the heavy.

Expert decision-making model based on the Recognition-Primed Decision model pioneered by Research Psychologist Gary Klein

No deliberation was necessary. If the heavy unexpectedly leaps off the runway and the first theory proves false, the pilot can again immediately realize wake turbulence will be a problem and the takeoff must be delayed. In each case, the pilot relies on prior experience to propose and implement courses of action without the need to brainstorm through multiple options. Intuition allows us to bypass the conventional decision-making model and jump right into the singular evaluation approach.

Of course this method only works when the decision-maker has the necessary background and experience. Those people can be accurately described as having an intuition: They recognize things without knowing how they do the recognizing. And Klein notes this intuition grows out of experience.

Three Steps to Improving Intuition

We've all known pilots who seem to have an intuition when it comes to flying or dealing with in-flight emergencies. And we've also known pilots who are helpless without a checklist. But knowing that firefighters and pilots alike are able to bypass conventional decision-making with the necessary experience, we can take steps to improve our intuition by improving our experience base.

(1) Decide. The natural way to improve your decision-making ability is to practice making decisions. This was easier in the days when aircraft engines were prone to quitting for no apparent reason and having a stack of write-ups for the mechanic was just another day at the office. These days we save most of this trauma for the simulator, but an everyday flight is filled with many decisions to be made. But that is only half of the process.

Before we get to the second step, a word to first officers and others without the four stripes on their epaulets. It is far too easy to sit back and be thankful the hard call is above your pay grade. Doing so is easy and natural, but it robs your subconscious of needed lessons. You should attempt to make the decision in real time, as if it were yours to make. Of course you need to apply your finest crew resource management skills before voicing any contrary opinions. But make the decision as if it were yours and keep track of the results.

(2) Self-critique. Whether the decision was yours or you were practicing as if it was, keep a mental record of it. (A written record would be even better.) Track the decision against the results and don't discount your mistakes as a normal part of the job.

The best way to learn from your critique is to place an emotional value on it. The secret to remembering something important is to learn it emotionally. Neurobiologists have come to call this the "modulation of memory storage." Emotional events are often remembered with greater accuracy than events that lack an emotional component.

(3) Broaden your experience. It is said that it is better to learn from the mistakes of others than go through the trouble of making them yourself. You can do this when studying accident case studies such as those in *Cause & Circumstance* or reading other publications or websites with appropriate content.

It is all too easy to read an aircraft



Southwest airlines Boeing 737 (N6685W)

mishap report and discount the chain of errors that led to the accident. "I would never have done that," is a common reaction but may not be entirely honest. You should read these reports in exacting detail with an eye toward the decisions made. Analyze more than just the decision; investigate the reason behind the decision. Put yourself in the shoes of the pilot and answer the question, "What would I have done differently given those same circumstances?" Let your blood run cold and your skin crawl with the realization that it could have been you. Only by making this emotional connection can you be sure your inner psyche will register the mishap crew's action into the mistake category. Years later, your subconscious might overrule an action you are about to take, simply because it remembers something from the mishap that is buried deep in your mind's recesses.

A Case Study in Decision-Making

On March 5, 2000, the pilots of Southwest Airlines Flight 1455 made several bad decisions on the way to destroying their Boeing 737-300 while failing to stop on Runway 8 at California's Bob Hope/Burbank-Glendale-Pasadena Airport (BUR). Until that day, the captain had an exemplary career that included nearly 10,000 hr. with the company and in type, of which more than half was as pilot-in-command. The first officer, while new to the company, also had a distinguished career. Most of his flight time was logged piloting U.S. Air Force

fighters, but he had over 2,500 hr. in type. Thankfully they managed to stop their airplane without hurting anyone.

You could read the NTSB report and conclude, "I would never have done that." But dismissing their misfortune robs you of the chance to learn, really learn, from their decision-making mistakes.

Flight 1455 was vectored for a visual approach to Runway 8 with a restriction to maintain 230 kt. "until advised." The crew was cleared for the visual approach with a restriction to remain at or above 3,000 ft. MSL until passing the Van Nuys VOR, about 6 mi. from the runway. At that point they would have needed a 4-deg. glidepath, which the crew evidently decided was salvageable. (A decision with which most pilots would have agreed.) Their speed at the time would have made that more difficult, but the speed restriction was technically canceled once they were cleared for the approach. The crew missed this and kept their speed up for another minute before extending the speed brakes.

An analysis of the previous 70 aircraft showed the vector to intercept the final approach course occurred between 9 and 15 nm from the runway. Flight 1455's vector was at 8 nm. The accident report cites the controller for positioning the airplane "too fast, too high and too close to the runway to leave any safe options other than a go-around maneuver."

The current ATIS indicated the winds were 240/6, giving them a 5-kt. tailwind. Their computed approach speed was 138 kt. The crew did not use

their onboard performance computer, as required by the airline for tailwind conditions or when landing performance was in question.

Passing through 1,800 ft., the aircraft's vertical speed was above 2,900 fpm and the ground-proximity warning system (GPWS) progressed from "sink rate" to "whoop, whoop, pull up" almost continuously. At 500 ft., the aircraft was in excess of company stable approach speed, altitude and sink rate limitations. The captain could not explain why he did not go around. Their average speed in the flare was 195 kt. (57 kt. above approach speed) and it took them 3,000 of the runway's 6,032 ft. to finally touch down. The aircraft departed the end of the runway at 32 kt.

Once the airplane was stopped and the engines were shut down, the captain said, "Well, there goes my career."

You would never have done that, right? Really? How often does a controller's "too fast, too high and too close" vector result in a go-around? When you salvage a bad approach, even one

that's not of your own construction, do you pat yourself on the back and never reexamine the circumstances? Or do you sit down and diagram the approach and critically analyze the "would have, could have, should have" options? Remember that your subconscious thirsts for this kind of knowledge and studying the case of Southwest Airlines Flight 1455 should induce an emotional reaction in any pilot. "That could have been me."

At what point would you have thrown in the towel and broken off the approach? When you were given the tight vector? Now you're too close. When given the 230-kt. speed restriction? You're now flying too fast, but you've seen that before. What about the 3,000-ft. crossing restriction? Seen that, too? Now you are too high. Your "can do" pilot attitude is well practiced at getting it done. Read this report and get upset: upset that air traffic control set them up; upset that the pilots failed to realize a stabilized approach was impossible the moment the altitude restriction was

issued and that they forgot their stable approach rules. And get upset that this could happen to you. Do this, and your subconscious may someday overrule your "can do" spirit and tell you, "No you can't. Go around."

The Firefighter of the Flight Crew

As pilots we tend to be technically oriented and many of us are dispassionate. We can be excused for having ice water running in our veins. The cold, unemotional aviator has a role to play and can be a lifesaver at times. But all pilots can benefit from an extra boost of intuition. Just as the experienced firefighter is able to bypass conventional decision-making strategies, an experienced pilot can benefit from a singular evaluation approach. Call it "the sixth sense," "the right stuff" or even ESP. Whatever you call it, intuitive decision-making is a valuable tool in any firefighter's or pilot's arsenal. **BCA**

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