

CHALLENGING BEHAVIOR

Original idea from John Wiley

Despite years of emphasis, some fundamental problems still plague crew interaction, suggesting additional focus on monitoring and challenging could yield safety benefits.



In December 1978, a DC-8-61 approached Portland, Ore., with a gear problem. Although the flight engineer (FE) visually determined the gear was down and locked, the captain continued trying to find out why the nose gear did not show a down and locked green light. Meanwhile, the first officer (FO) and the FE saw a more significant problem. They were running out of fuel.

Both crewmembers repeatedly tried to voice their concern about the fuel situation, the captain ignored them. When the captain said they would start the approach with about 3,000

pounds of fuel in about 15 more minutes, the FE, knowing fuel already was critical, said, *"Not enough. Fifteen minutes is gonna run us low on fuel here."* Shortly after that, the FE told the captain, *"We got about three on the fuel and that's about it."*

Four minutes later the FO told the captain, *"We're going to lose an engine,"* to which the captain replied, *"Why?"* When the FO said, *"We're losing an engine,"* again the captain asked, *"Why?"* The DC8 crashed about six miles from the airport. The FO and FE's fears were realized. The DC-8 ran out of fuel.

Four years later, in DCA, a furious snowstorm had snow crews and de-icing crews swamped. A recently upgraded captain and a relatively new FO cranked their Boeing 737 and taxied out. The pilots lacked experience with cold, adverse weather operations. The 737 was deiced, but it took another 45 minutes to reach the end of Runway 36. The 737 FO, like the DC-8 FO and FE, did not like what he saw, but his comments carried little weight.

"Boy, this is a losing battle here trying to deice those things. It gives you a false sense of security, that's all that it does," the FO said. A few minutes later he repeated his obvious concerns: *"Let's check those tops again, we've been sitting here for a while."* The captain shrugged off the input, saying, *"I think we get to go here in a minute."*

On takeoff roll, the FO again questioned the unusually slow acceleration and the captain once again rejected the vague comments, saying the situation was okay. It was not. Moments later, the 737 staggered into the air and munched along for only a few moments before crashing into the 14th Street Bridge and slamming into the Potomac River.

In 1989, United flights 232 and 811 hit the headlines. United 232, a DC-10, suffered a catastrophic failure of the number-two engine. This failure also took out all hydraulics. The crew had no procedures for how to deal with such a complex emergency and no procedures for how to fly the crippled airplane, much less land it.

United Flight 811 was a 747 that had a cargo door blow at 22,000 feet over the Pacific. The debris forced the crew to shut down two engines on one side, and once again, the crew worked together to devise methods to deal with an emergency that had no procedures.

All four of these accidents are well known and are often used as examples in CRM classes. Instructors use the first two examples to demonstrate what can go wrong when the captain does not respond to challenge and when FOs are not assertive. The second two accidents are hailed as what can happen when the captain and crew communicate, work together and focus on solving the problem.

However, more than 20 years after the Portland accident and more than 10 years after United 232, studies reveal FOs are still having problems regarding when and how to challenge errors. And captains are still having problems acknowledging errors and responding to challenge. Why?

CREW INTERACTION

Researchers have examined the issue several times. A 1994 NTSB study looked at 293 accidents that occurred between 1974 and 1990. Although the study is a bit dated, the information is still valid. The flightcrew was cited as a contributing or causal factor in 37 of the 75 accidents classified as major by the study.

In 80 percent of those accidents, the captain was the pilot flying (PF), and 73 percent of the accidents occurred on the first day the captain and FO flew together. Fifty-five percent of the flights were late departures and 27 percent of the accidents happened on takeoff. Slightly more than 51 percent occurred in the approach and landing phase.

These crews were not inexperienced. The captains had between 4,000 and 30,000 hours. The FOs had between 1,800 and 10,000 hours. Yet, in these 37 accidents, the Safety Board found 302 errors that were broken down into two groups primary or secondary.

Primary errors included: aircraft handling (stalled the aircraft), communications (did not read back frequency correctly), navigational (selected wrong frequency), procedural (did not follow checklist), resource management (failed to assign task to crewmember), situational awareness (descended below MDA prior to FAF), systems operation (turned off GPWS) and tactical decisions (failure to go around).

The failure to monitor or challenge a faulty action or inaction of another crewmember was a secondary error. With most of the accidents occurring with the captain acting as PF, it is easily understood why the Safety Board assigns most primary errors to the captains and most secondary errors to the FOs. But the Board makes an interesting assertion in the study. It notes that although the primary error was the last event prior to the accident, had the error been challenged the accident may not have occurred.

The most common errors were procedural errors, tactical decision errors and failures to monitor or challenge. The Safety Board wrote, *"Monitoring and challenging failures were pervasive [our emphasis], occurring in 31 of the 37 accidents. In the aircraft accident reports of those 31 accidents, the Safety Board had cited 90 percent of the errors that crewmembers did not challenge as causal or contributing to the cause of the accident."*

The report continued, *"The Board believes that a positive attitude toward monitoring/challenging can be developed and enhanced with appropriate training."* The Safety Board recommended classroom training, but it also suggested creating situations in the simulator where a crewmember would intentionally make an error. This would allow evaluators the opportunity to see if the monitoring pilot would challenge the error. The Board said that while the insertion of such intentional errors in Line Oriented Flight Tests (LOFTS) may seem to violate their premise, where crewmembers work together to solve problems, the benefits gained outweighed the negative aspect.

FOCUSING ON THE PNF

In these accidents, the question begs, "Why didn't the FOs speak up, and why didn't the captains respond?" Some answers are found in a 1997 study done for the FAA, and the U.S. Navy. The study, "Identifying Critical Training Needs for junior First Officers," looked at the training and initial operating experience of FOs. Researchers interviewed captains and FOs for the study.

In interviews, FOs complained that training focused primarily on passing checkrides and preparing for proficiency checks. There was very little time spent on performing pilot-not-flying (PNF) duties, and there was little direction on what was expected of them while acting as PNF.

FOs said the lack of emphasis on PNF duties gave them the clear impression that those duties were not that important. FOs also complained there was little time to practice CRM duties from the right seat.

The timing of CRM training also came under criticism. CRM lessons often were inserted in the middle of ground school, a time when pilots were almost exclusively focused on learning aircraft systems, memorizing procedures and technical data. Some, if not most, of the CRM lessons were lost due to this poor timing. Once on the line, FOs faced additional problems. Where the simulator training had centered on flying skills and PF duties, line flying required FOs to perform PNF duties while balancing the right-seat workload. Inexperienced in the quick pace of line flying, FOs frequently felt overloaded. They fell behind, but were reluctant to speak up for fear of being judged weak, inept or incompetent by the captain.

The FOs' fear was not without some foundation. Captains complained that FOs lacked flexibility in "real world operations," often were not able to see "the big picture" and fell behind in the quick pace of line flying. But balancing workload and running PNF duties were only part of the FOs' problems. FOs still wondered when and how they were supposed to challenge errors and what errors warranted challenge. While FOs agreed there was little problem speaking up in blatantly unsafe conditions, they lost their way when situations were deemed less threatening.

For instance, FOs were afraid to challenge captains who deliberately deviated from Standard Operating Procedures (SOPs), thinking such challenges would be seen as aggressive behavior from a subordinate. But FOs also were concerned that not challenging errors could be seen as a failure to perform their job as expected. Either way, FOs said they were especially concerned about the impressions captains formed since they would write the evaluations, and poor evaluations could mean termination. Thus, FOs were often primarily concerned with not getting fired.

FOs said clues on when and how to challenge often came from the captain. Captains strongly influenced the tone and climate of the cockpit and initial impressions were very important. FOs were more likely to speak up when captains had a good attitude toward the job and the company, and wore the uniform in a neat and professional manner. FOs were more likely to challenge errors when captains gave good briefings or when they advised FOs to speak up if they saw anything wrong. Captains who acknowledged errors and positively reinforced the input opened communications.

CONDUCTIVE COCKPITS

In research studies, first officers repeatedly indicate they take their lead from the captain with whom they are flying. If the captain creates the right environment, CRM is more likely to result in breaking the error chain. Here are some of the behaviors first officers said both encouraged & discouraged them from working with a captain.

POSITIVE

- Good attitude toward the job
- Good attitude toward the company
- Neat, professional uniform
- Good briefing skills
- Encouraging FOs to speak up when they have a problem

NEGATIVE

- Quiet demeanor
- Negative attitude
- Failure to state expectations
- Negative reaction to input
- Inability to admit mistakes

Captains who were very quiet and those who failed to brief created negative impressions and kept FOs guessing as to what was expected of them. Also, pilots who did not admit mistakes or who reacted negatively to challenges inhibited input.

SPECIFICS COUNT

A recently released NASA study titled *"How to Challenge the Captain's Actions"* highlights that CRM has yet to reach many pilots. For the study, researchers presented eight scenarios that varied in type and severity of problem. Captains and FOs were asked to write out precisely what they would say to the other when faced with each situation, such as being below an assigned altitude of 9,000 feet. Captains were likely to use commands such as "Climb back to altitude" whereas FOs would offer a gentle hint such as *"We were assigned 9,000 feet."*

In the book, *Flight Discipline*, author/ aviator Tony Kern writes, *"When we do call out deficient performance, it tends to be vague. Instead of an FO on probation telling the captain he is 10 knots slow on final approach, he often will cloak the criticism with a comment like, "You're a little slow."* He adds, *"Assertiveness with respect is seldom taken personally. In fact, it will often mark the junior person as someone with integrity who can be counted on to provide timely, accurate and important information. Counter the tendency to be vague and ambiguous by using specifics. Instead of "Sir, you're a little slow," try, "Sir, airspeed is 10 knots below reference and decreasing." Avoid recommendations unless absolutely necessary. The experienced pilot will recognize what to do after you point out precisely what is wrong."*

Kern is right. He concisely covers what many CRM classes have tried to explain. Avoid ambiguity. Be specific. Speak up. Simple tasks. Yet it is somewhat distressing to read these recent studies that point out some pilots still do not get it. After reams of studies, after countless slides have been shown in thousands of classrooms, after thousands of hours in the simulators flying LOFTS, many pilots still can not grasp the fact that: (1) an error is an error and it needs to be corrected; (2) errors will occur; and (3) when errors or deviations occur, someone must challenge the error or deviation. Also, some captains still perceive a challenge to error as the FO being aggressive and attempting to usurp their authority, even though the challenge and observation are valid. Some FOs are still hesitant to challenge error for fear of losing their job, and in so doing, render one of the last major error defenses useless.

It is true that CRM has come a long way since the Portland accident; however, these recent studies indicate CRM still has a long way to go.