

RIGHT TALK FROM THE RIGHT SEAT

Original idea from John Wiley

Despite lessons drawn from cockpit resource management programs, the language of the flight deck varies by the seat being occupied - and peril can hide in the syntax. We need new rules of speech.

You're no rookie. You have more than 9,000 hours, but with less than 100 hours as first officer in your new assignment, a 747, you are still adjusting. Your captain is not only the senior 747 pilot, he is also the senior instructor and the guy who checked you out on the 747.

The crew has already encountered numerous problems. You had to divert to an alternate and the delays are eating into your duty day time limits. Delay much longer and you will not make it home tonight. The captain has changed his mind a couple of times about refueling at the alternate but now wants to get airborne with no more delays.



Fog is moving onto the field as you crank and head for the active but yet another problem crops up. Due to ramp congestion, the only access to the active runway is via back-taxi down the active. Another 747 cranks and follows you out. To everything else going wrong, add a language problem. You and the tower controller are having problems understanding each other.

You and the flight engineer (F/E) are still running checklists as the 747 reaches the end of the runway and the captain pivots it for takeoff. He shoves the throttles up and announces, "Let's go ... check thrust."

The F/E asks if the 747 following you out is clear of the runway. You are not sure, but the captain ignores the question and continues the takeoff. You radio the tower, "We are now at takeoff." Tower replies, "OK, standby for takeoff. I will call you." That is not what you expected to hear. You do not have a takeoff clearance!

What do you do? Be assertive? Do you repeat you are not cleared for takeoff and wait for a response? Do you close the throttles and set the brake? What do company guidelines say to do in this situation?

The answers did not come in time for the crews aboard KLM 4805 and Pan Am 1736 that terrible day in Tenerife. Or for the more than 500 innocents who lost their lives in the horrifying collision. What caused the accident? What failed? Who failed? Why? All good questions.

We can take the easy route to some answers. The captain took off without a clearance. The captain did not listen to his crew. The F/O was not assertive enough. The F/E was not emphatic in his challenge. It is not who is right, but what is right. Add some slides and you have the basics of most CRM courses, complete with buzzwords and phrases. But does it work? How about a one-, two- or three-day class review of accident causes, noting that human flaws factor in almost 70 percent of the losses and then telling crews they should work together to solve the problem?

Some people think not. Some believe significant problems remain and that without specific guidelines on who does what when, or without required behavior, CRM does not work as promised. Part of the problem is communication.

By the way, this is this not another touchy-feely article on how to get in touch with your inner self or some long and arcane treatise exploring the roots of vocal communication. Rather, this is about right talk from the right seat, about team talk and about finding a way for crews to respond to a challenge with more than a "Roger," a nod or a grunt.

Although CRM goes back more than two decades, F/Os are still having problems communicating concerns to captains, and the four-strippers still have problems responding to an F/Os challenge. This is demonstrated by a search of the NASA Aviation Safety Reporting System database for the years 1996 to 1999. The following excerpts, pulled from the database verbatim and with no attempt to translate, are indicative of many reports culled from the database using a word search for reports including "ignore" or "ignored." (The word may not appear in the extract.)

Accession Number: 82985 - While at 3000' msl approximately 22 mi of Jeffi LOM, was given a hdg of 170 degs to avoid restr area #3009 n of glynco arpt. Was then cleared to 2000' msl and cleared for an apch to the arpt. Capt upon hearing this initiated the VORLOC mode on the autopilot and the acft began a turn in an easterly direction. I asked him where he was going. No response. I then saw how the autopilot was configured and understood what was happening to us. I told him again, and he again ignored me. I again told him that the autopilot was set up wrong just as he was picking up the mic to call jax center about jeffi LOM monitoring normal. Jax center then asked us for our bearing to jeffi (Callback conversation with rptcr revealed the following: capt in question is the chief plt and was the original plt with the corporation. Executives feel he can do no wrong.)

Accession Number: 104078 - In addition to the alt diversion going on, he also completely ignored the specified missed apch proc hdgs and courses. He now circled around the NW side of the arpt which is specifically prohibited, and charted as "not auth." Finally, after being too high all this time, we turned left base to final and dragged in well below the VASI. Additional factors- normal and professional cockpit procs and callouts are not used. The acft is operated as a "one man show." Detailed knowledge of legal apch parameters and procs seem to be missing. Left seat intentions are not known by anyone other than the capt. Right seat input is neither solicited, allowed or acknowledged. The flight dept does no simulator in instrument training. The copilot has a natural fear of unemployment and has prioritized food on the table at too high a level for this particular type of operation.

Accession Number: 126987 - We were doing about 350 kts when he pulled the brake and we needed to maintain that speed to make the restriction but for some reason he slowed down and we crossed our point about 800' high. As we go sailing by, he turns to me and says "800', not too bad." I would have been flabbergasted at this attitude but in five yrs of airline flying, this is about the third capt that seemed to be under the impression that these restrictions are an approximate rather than hard restriction. I possibly could have been more forceful in my insistence that we were not going to make it. I feel though, after flying with the capt all month, that he would have ignored me to show he was capt. In spite of the new CRM courses (which our airline has not yet instituted), I think there are always going to be the guys with the big egos or whatever that don't take suggestions well that will continue to make the copilot's job interesting.

Accession Number: 303312 Taxiing wbound on taxiway A, ATC instructed us to give way to the Company B-737 at the next intersection (on 1). I acknowledged and pointed out the B-737. The capt stopped and flashed his landing light twice. When the B-737 did not move, the capt advanced throttles and started forward. At the same time another company's F- 100 approached the intersection from the right, facing the B-737. I said we're supposed to give way' but the capt continued forward and responded angrily "he's not moving." I said "that doesn't auth us to continue. He's waiting for the F-100." The capt exploded: "Hey, you do the copilot's things and I'll do the capt things. We're going to have a long talk when we get to the gate." Fortunately the F-100 applied brakes and averted collision, probably by about 10 ft.

Accession Number: 314831 - We had departed from YUMA enroute to LAX. Our usual request after takeoff is direct IPL, direct PDZ, V16 LAHAB, LAX. As we were passing through approx 10000 ft, the ctlr told us upon reaching 16000 ft, we were clred direct PDZ. I repeated this back and looked at the capt to assure he had heard the clearance. He replied *"after 16000 ft, direct pdz, great."* After passing IPL, approx 14400 ft, he started to turn towards PDZ. I again repeated the clearance. He acknowledged and said *"I'm going to cheat a little."* I then said *"we probably should not do this."* He basically ignored me and said *"I've done this a million times before."* Shortly later, at about 15400 ft, Controller came on the radio and said *"what are you doing?"* I looked at the capt and said *"you tell them.;"* He told them what he was doing and they said *"I told you upon reaching 16000 ft direct PDZ". You are in a hot area, turn to 230 degs immediately."* He then turned as instructed. As an F/O we must be given more support by our companies when we stand up to capt's. With me being an F/O on probation, because I have only been with act fbr 5 1/2 months, I tried to do all I could.



Ute Fischer, a research scientist at Georgia Tech, has developed and conducted numerous cockpit communication studies. Fischer co-authored a recent study, *"Error Challenging Strategies: Their Role in Preventing and Correcting Errors,"* with Judith Orasanu. It looks at some communication problems and solutions for notifying the other person that something is not right. She begins with a look at Air Florida that winter day at DCA.

The F/O is apparently concerned about the conditions and the accumulation of ice as he offers hints to the captain: *"Boy, this is a losing battle here trying to deice those things. It gives you a false sense of security, that's all it does."* On takeoff, when acceleration is unusually slow he hints again at the problem. *"That don't seem right, does it? Ah ... that's not right. . ."*, he says. The captain replies, *"Yes, it is. There is 80 [knots]."* The F/O objects one more time before giving in. *"Naw ... I don't think that is right. [seven-second pause.] Ah, maybe it is."*

Maybe he could have said, *"We have a problem and I think we should abort this takeoff,"* but he does not. His hints are ignored by the captain and they continue the takeoff. Fischer says the F/O was relying on a typical tool of F/Os - the hint or suggestion. The F/O never says directly that he has serious misgivings about the operation or that he thinks it is unsafe. He hints but he does not state it explicitly.

Again, snap analysis may suggest this accident could have been avoided if the F/O had been more blunt. But Fischer explains, *". . . one may conclude that crewmembers ought to be maximally explicit and direct in their error challenges. The call for maximal explicitness and directness, however, underestimates the important role that social considerations play in interactions."* Fischer continues, *"Superiors, by virtue of their social status, may be licensed to give direct commands to their subordinates. If subordinates use the same linguistic strategy, however, superiors may perceive them as threatening or rude or refuse to comply."*

It's all about territory. Captains use commands or directives. F/Os use hints and suggestions. The lines are usually pretty well drawn and unless crews have been trained on specifics of how F/Os challenge error and how captains are required to respond to challenges, F/Os are likely to violate this territorial boundary only once or twice before being counseled or admonished about trying to be "co-captains" and "trying to fly the captain's airplane."

The F/O's usual response is a retreat to a less confrontational position, the hint, but nothing is free. Hints and suggestions may come across as so polite and so weak that they are considered insignificant and may be ignored. This position may be argued in the Air Florida accident. In the first part of Fischer's study, she used 157 airline pilots (69 captains and 88 F/Os). They were given four descriptions of incidents rated low risk and four incidents rated as high risk. One example was: *While cruising in IMC at FL310, you notice on the weather radar an area of heavy precipitation 25 miles ahead. F/O Henry Jones, who is flying the aircraft, is maintaining his present course at 0.73 Mach even though embedded thunderstorms have been reported in your area and you encounter moderate turbulence.*

The pilots were asked to ensure their aircraft did not penetrate the cells and they were to write down verbatim what they would say to F/O Jones. Fischer broke responses into eight groups, six grouped under "requests" and two grouped under "speaker-centered communication."

Requests

- **Commands** "Turn right 30 degrees."
- **Crew Obligation Statements**... "We need to deviate right about now."
- **Crew Suggestions**..... "Let's go around the weather."
- **Queries**..... "Which direction would you like to deviate?"
- **Preferences**..... "I think it would be wise to turn left or right."
- **Hints**..... "That return at 25 miles looks mean."

Speaker-Centered Communications

- **Self Directive**..... "I am going to get a clearance to deviate around these storms."
- **Permission/Seeking Questions**.... "You want me to ask for a clearance to deviate around this weather?"

Not surprisingly, Fischer found that captains used commands to correct F/Os and F/Os used hints to get action from the captain. Fischer writes, *"This pattern of findings indicates that while pursuing identical communication goals, captains take a more direct route than F/Os do. As expected, captains were more likely than F/Os to specify the action that should be taken, and expressed their intention more forcefully; i.e., there was a stronger obligation for F/Os to comply with the captain's request than vice versa."* She continues, *"In 57 percent of their speaker-centered communications, first officers sought assurance that the captain agreed with their planned action. Captains, on the other hand, almost never used permission requests, relying on self directives [91 percent]."* However, when faced with increased threats, both crewmembers increased the use of direct commands.

In the second part of Fischer's study, 116 airline pilots (59 captains and 57 F/Os) participated. Fischer gave the pilots an incident and eight responses. Captains were told the responses came from an F/O and F/Os were told the responses came from the captain. Pilots were then asked to rate the effectiveness of the challenge in changing the situation. First, pilots would rate how direct the communication was; i.e. *"How clear it was what the speaker wanted and how much pressure he put on the addressee to act."* Half of the group received communications with supporting statements while the other half received communications without supporting statements. (Supporting statements are comments that point out goals or problems). Fischer then asked the pilot group to rate the effectiveness of the communication, effectiveness defined as *"highly appropriate to the problem while maintaining a positive crew climate."* To counterbalance the study, some pilots were asked to rate directness first and then effectiveness, while others were asked to rate effectiveness first and directness second. This precludes the results being skewed due to the order in which tasks are completed. F/Os preferred to hear from captains crew suggestions, crew obligations, and preference statements over direct commands.

Captains judged that F/Os use preference statements, crew obligation statements and hints. To anyone who has crewed a two- or three-man airplane, Fischer's finding that constant commands received a low rating is no surprise. But one interesting fact emerged that may reflect an airline culture. Pilots from one carrier indicated that supporting statements had a significant effect on communication while pilots from another carrier said that it made little difference.

"The real task is not so much teaching first officers how to talk like a captain as much as it is teaching crews to talk like a team," says Fischer. "We have to get crews to appeal to solving problems as joint tasks. It needs to be understood that the challenge is not correcting an individual but 'We have a problem and we have to deal with it.'"

"We have to instill team talk. If the first officer begins with team talk such as 'we have a problem' and does not get the expected response or change in behavior, he can then move up the scale to more direct communication. However, if the first officer begins with a strong command, he has no place to go if that is ignored."

The real twist came when Fischer combined the two studies and found that captains' preferred method of communication may not be the most effective ones. Captains liked F/Os giving them hints, but Fischer said accident reports show F/Os' hints rarely change the captain's course of action. Fischer says this can be reconciled by differentiating between weak and strong hints. With a hint such as *"I show us 15 knots slow,"* it is obvious what the F/O wants the captain to do.

Fischer summed up the study saying, *"Our research showed that while pilots upheld a crew-oriented discourse in their effectiveness judgments, a status-based discourse model drove their productions. This discrepancy may indicate that crewmembers find it difficult to overcome ingrained norms for interacting with superiors and subordinates and to translate an abstract notion like "crew concept" into specific communication strategies. Consequently, crews may benefit from training initiatives that facilitate this translation process. Training approaches that provide examples of crew-oriented communication strategies and that coach individual members in these strategies may be essential in order to bring about change in well-established behaviors.'*

Skip Mudge, president of Cockpit Resource Management Inc., is trying to do just that. Mudge uses a program developed with his father, Bob Mudge, a retired Delta Air Lines L-1011 captain. Mudge explains, *"Our approach is procedurally oriented and our whole approach is to proceduralize as much as possible. We have studied what each crewmember is supposed to be doing and we tell each crewmember how they should do it. This means each crew member knows what is going to happen next and they know what they can expect from the other guy. It becomes a Standard Operating Procedure [SOP]."*

With this "proceduralization," Mudge says crews then know what to monitor, how and when. *"We try to make it as concrete as we can and by making it an SOP, we have required behavior. If it is required, we can then evaluate whether or not the crews follow procedure and point it out with specific instances."* He added, *"Everyone thinks they are doing it right, but without that objective criteria, you cannot demonstrate where they are missing the mark."*

"We developed through our study 240 specific behavioral objectives that can be observed and evaluated, but this was far too many. We boiled it down to a much smaller system that retains the ability to observe what procedures are being used and what is missing. This way you know what is supposed to happen and that is the only way you can effectively monitor. You have to know what you are monitoring and how to monitor it before you can effectively challenge something."

Rather than a two- or three-day course, Mudge's CRM is a continuing one because *"We are talking about changing habits that have developed over years and a short three-day workshop is not likely to have a long-lasting effect. People just don't change that quickly."*

The other problem Mudge sees with short courses is that aviators come in, get pumped up for a while and are then reimmersed in the old culture. *"He will use the new tools for a short while but the old culture is more comfortable and after a while, he slips back into the old ways. He may retain some of the stuff, but we have to create a greater depth and greater redundancy to ensure the effect is lasting."*

Mudge calls an F/O a "PM," shorthand for "Pilot Monitor" since his job is to monitor things. *"He is not usurping any authority. He is not trying to be co-captain. He is not being aggressive. He is just doing his job and if the other guy makes a mistake, which is going to happen, the PM says something,"* says Mudge. *"We are asking the captain to lead a team, not just fly the airplane and the guy who takes the old position, 'It is my airplane' is just not using all the resources available. Our program requires captains to buy into this process and abide by this contract. If the captain chooses not to use this method of operation, it creates huge problems for the guy trying to monitor the operation and challenge errors when they occur. Simply put, you can't have right talk from the right seat unless you have the left seat on board with the idea."*

Asked how conflict is resolved, Mudge says the crew defaults to the safest option. *"If we are not sure an airplane is on the runway, we default to worse case and assume there is an airplane on the runway."*

Mudge's procedures require continuing dialogue. Crews discuss what will happen and when. Targets are defined such as *"We will start down over ABC to make the crossing restriction" or "We will be configured for landing by DEF." If the airplane is not configured when the crew reaches DEF, there is a deviation from the plan and that problem has to be resolved." Targets are just that. Targets. But there are also bottom line targets."*

Mudge goes even further. *"A team member must continue the challenge up to the point where the air-craft is in danger and if there is still no response, the F/O must take the aircraft. If something has kept the crew from operating safely and if something is occurring that keeps them from reaching their objective, the crew must operate safely, and if the captain is not willing to respond, the F/O takes the airplane. If this happens, the F/O is doing what the crew has agreed to do and that is have a plan, follow the plan and fly safely."*

No doubt, many four-strippers will bristle at the last paragraph. But some airlines already use this procedure, albeit in very limited circumstances. For example, many autoland procedures are highly scripted with specific challenges and responses that occur at specific points. One airline uses a procedure whereupon reaching minimums, the F/O calls, *"Minimums."* The captain must respond either *"Landing"* or *"Go around."* There can be no delay in the response. If the F/O does not get a prompt response, it is his/her assigned duty to take the airplane and execute the missed approach.

A telling fact is that in the years of training this procedure, no one has complained that the procedure is an infringement on the captain's authority or that PIC authority is being usurped. Obviously, this is a highly defined event but the question must be asked. If one event can be scripted, can other operational events also be revised to include required behavior? How about unstable approaches? Descent below MDA?

No doubt, such a philosophical and cultural change is not easy to implement. The CRM has come a long way, significant problems continue to resist even the best efforts. It is apparent that training new F/Os how to challenge error without equally intensive programs training captains how they must respond, is partial training at best. As Mudge has noted, the behavior has to be defined and required. He says, quite rightly, *"You can't have right talk from the right seat unless the left seat is on board with the idea."*