Published in *The International Journal of Aviation Psychology*, (1996) 6(3), 211-231, , Lawrence Erlbaum Associates, Inc.

Cockpit/Cabin Communication: II. Shall We Tell the Pilots?

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ABSTRACT

In a previous paper, the authors explored the coordination between the "two cultures" in an airliner's crew: cockpit and cabin. In this paper, we discuss a particular problem, the dilemma facing the cabin crew when they feel that they have safety-critical information and must decide whether to take it to the cockpit. We explore the reasons for the reluctance of the flight attendant to come forward with the information: self-doubt about the accuracy or importance of the information, fear of dismissal or rebuke by the pilots, and misunderstanding of the "sterile cockpit" rule. Insight into crew attitudes was based on our examination of accident and incident reports and data from questionnaires submitted by pilots and flight attendants at two airlines. The results show confusion and disagreement about what is permissible to take to the cockpit when it is sterile, as well as imbalances in authority and operational knowledge. Possible remedies are proposed.

INTRODUCTION

On March 10, 1989, 24 people were killed when an Air Ontario F–28 crashed on take–off from Dryden, Canada due to an accumulation of ice on the wings. Before the aircraft was airborne, a flight attendant, Sonia Hartwick, saw wet snow building up on the wings, but thought that she should not call the cockpit because she had the feeling that pilots did not welcome operational information from cabin crew members. In the past, she felt that she had appeared stupid when relating safety concerns to pilots, due to their lack of responsiveness and disinterest. Hartwick testified that she had the feeling that Air Ontario's management was not supportive of flight attendants voicing operational concerns. She also placed an inordinate amount of faith in the pilots being aware of every situation, and the belief that their professionalism and training would suffice. Likewise, one off–duty airline pilot was concerned about the snow, but was reluctant to inform the flight deck because he did not wish to infringe upon another pilot's authority, a dangerous interpretation of "professional courtesy" (Moshansky, 1992, Chapter 39).

Why would a fully-qualified cabin crew member hesitate to report what she believed to be safety-critical information to the cockpit? Her own life, not to mention the passengers in her care, might be at stake. Compared to that, what did she have to lose?

The Air Ontario accident sets the stage for the question which we will explore in this paper: What is the decision process of the flight attendant who asks, "Shall we tell the pilots?" In order to investigate this process, we shall examine cockpit/cabin communication, the social psychology of

the cockpit and cabin, the influence of training, and finally, the influence of government regulations and company policies that may trammel the flight attendant who believes that she[1] has information that should be taken to the cockpit.

The Two Cultures

In a previous paper (Chute & Wiener, in press), we described what we saw as two seemingly separate crews operating an airliner: the cockpit and the cabin crew, and we discussed the hazards of such an arrangement. The primary problem is a lack of effective communication, especially about safety matters. It is not a trivial matter, as the accident above illustrates. Several accidents and numerous incidents have recently been documented where cabin crews, for whatever reason, failed to convey vital information to the cockpit, or their information was ignored. There are parallel cases involving communications failures from the cockpit to the cabin such as failure to warn flight attendants to prepare for an evacuation. The situation was considered serious enough that the National Transportation Safety Board (NTSB) has recently taken note, and has recommended that the problem be addressed through joint crew resource management (CRM) training with cabin and cockpit personnel (Cardosi & Huntley, 1988; NTSB, 1992; Moshansky, 1992; Kayten, 1993; Chute & Wiener, 1994).

The causes of the lack of communication are complex, and we caution against over–simplification. We described the problem as primarily arising from the fact that the two crews are drawn from two disparate cultures, one dedicated to and highly proficient in technical matters, particularly the operation of complex machinery, the other well-versed in sociability and public service. Needless to say, there is a gender difference as well: although the number of female pilots is increasing, flying remains a male-dominated profession. The same, but opposite, can be said of the flight attendant, although male flight attendants account for a far more significant fraction of their profession than female pilots do of theirs.

That there are two cultures, holding different values and performing different jobs aboard the same vessel, is not inherently bad. But this becomes a concern when the cultures find it difficult to communicate safety information to each other, or are hesitant to do so. In this paper, we shall focus on a single aspect of the communication problem that we have previously described: the decision that a flight attendant must make when she feels that she has vital information which she must convey to the cockpit.

So far we have spoken only of communication by the flight attendant physically entering the cockpit. We note that the cabin is also linked to the cockpit by interphone lines from several stations. The same questions apply to this form of communication as well: an interphone call may come while the cockpit crew, unknown to the caller, is in a high-workload activity. Also, the sterile cockpit rule applies to interphone, as well as face–to–face communication. However, the two means of communication have their differences: 1) it is probably easier for a pilot to be dismissive toward a message conveyed by a call from the cabin than a visit to the cockpit; and 2) certain elements of face-to-face information may be lost by use of an auditory-only mode of transfer.

The Flight Attendant's Dilemma

Why is this a problem at all? Why should the flight attendant be the least bit hesitant to convey what she considers vital information to the flight deck? The answer is that cultural directives, status differentials, past experience, and the ambiguity of a federal aviation regulation (F.A.R.) make it a risky business. While the pilots may accept the information graciously, the flight attendant knows that she faces the possibility of being rebuked by the pilots if her information is incorrect, improperly worded, or not accepted as critical. At worst, she fears that she may be violating an F.A.R., rendering her vulnerable to sanction by her company. Finally, she may be concerned that the information she delivers may simply be ignored by the cockpit crew (e.g. an obstreperous passenger) leaving her to deal with the problem.

Thus, if the information is about a possible hazard to flight or safety in the cabin, the flight attendant must make a decision: 1) ignore the problem or, in the case of a cabin–related hazard, deal with it herself; or 2) face a possible "put down" from the cockpit crew. If the choice is between the safety of the aircraft and passengers, not to mention her own well being, and avoiding a possible social slight, she has the professional obligation to bring the matter to the cockpit's attention. If that means possibly enduring minor embarrassment, so be it. The same can be said if the reluctance is due to a perceived threat of disciplinary action by the company.

In fairness to all, most flight crews operate in harmony and have reasonably good and safe working relations. The two crews are generally courteous to each other and most pilots appreciate being consulted when flight attendants bring matters to their attention. However, having attended joint cabin/cockpit CRM sessions at five airlines in the last year, we are struck by the degree of submerged hostility that comes to the surface, and many of the sessions degenerate into what both crews refer to as "gripe sessions." Most of the hostility stems not from major grievances, but from minor slights and miscommunications. The almost universal complaint of the flight attendants was surprisingly that the pilots (particularly the captain) fail to introduce themselves as they board the aircraft (Chute & Wiener, 1994). Often, pilots are in a hurry to enter the cockpit. Production pressures are great, especially at hub airports (Degani & Wiener, 1994). Social graces may be yet another victim of airline deregulation. Long before the crews board the aircraft, the stage is set for poor communication.

The Influence of Cockpit Automation

Finally, we take note of the influence of cockpit automation. With the onset of cockpit automation, the industry is witnessing the disappearance of the flight engineer (Wiener, 1988). New, highly-automated aircraft, even wide bodies flying transoceanic routes, are operated by two–pilot crews. We wrote in our previous paper (Chute & Wiener, in press) that "traditionally, the flight engineer was the cockpit's emissary to the cabin. Not only was the flight engineer the communication interface (due largely to the location of the panel aft of the pilots and near the cockpit door), but he could help out with mechanical problems or difficult passengers in the cabin."

The loss of this interface is significant for the problem at hand. The flight engineer served in a sense as not only an information relay, but a filter. The flight attendant probably found it easier to communicate with the flight engineer, whom she might expect to be less judgmental, owing to his relatively lower status in a highly hierarchical cockpit. Furthermore, his physical proximity to the cockpit door made communication easier. Additionally, he usually was, or appeared to be, not actively engaged in flying the aircraft; interrupting his duties was not seen as a problem. The flight engineer's filtration function was invaluable. He could decide whether to pass the information on

to the captain, or deal with it himself, possibly by entering the cabin to investigate the complaint, or possibly by a more gentle dismissal than the flight attendant might receive from the captain. Thus, the three–pilot cockpit contains a communications buffer: the cabin crew need not deal directly with the captain.

In the following report, the captain blames turbulence injuries in the cabin, in part, on the loss of the third pilot.

> *The flight encountered severe turbulence at FL410 for 5–10 seconds. Prior to the turbulence the flight was in smooth air. The injuries in the cabin to passengers and flight attendants were to the extent that the flight was diverted for medical assistance. A large percentage of the passenger injuries could probably have been prevented had they heeded the announcement which our flight attendants make after the seatbelt sign is turned off. This cautions the passengers to keep their seatbelts fastened even when the sign is off. The first officer could have been more responsive to the problems in the cabin had a third crew member been present. Even with the automation of this plane, flying the airplane, handling communications with ATC and your company and conferring with the flight attendant in charge during a problem just about pushes a 2–pilot crew past the point where they might be able to adequately handle the airplane. (ASRS #93254).*

In the following section we shall examine a few representative cases where poor cockpit/cabin communication resulted in, or could have resulted in, untoward consequences.

EXAMPLES OF COMMUNICATION FAILURES

Cockpit Skepticism of Cabin Report of Danger

Flight-deck crews are sometimes skeptical when flight attendants report problems. In 1988, on approach into Nashville, an American Airlines flight attendant and an off-duty first officer notified the cockpit of smoke in the cabin. The captain was dubious of their report of smoke as, on a prior flight, there had been a problem with the auxiliary power unit (APU) which resulted in fumes. This time the problem was the result of improperly packaged hazardous materials. Even when informed that the floor was becoming soft and passengers had been reseated, the cockpit crew persisted in refusing to acknowledge that there was serious jeopardy to the aircraft and their passengers. No emergency was declared. Consequently, the aircraft was not evacuated immediately on landing, exposing the crew and passengers to the threat of smoke and fire longer than necessary. The NTSB determined the cabin crew used CRM techniques well; however the cockpit crew did not. The NTSB found a "deficiency in communication between the cockpit and cabin crews and expressed concern about the reluctance by the captain to accept either crew member's report as valid or to seek additional information." NTSB recommendations to the FAA were to "require joint cockpit and cabin crew training with respect to emergency procedures and that attention should be given to conducting drills where cockpit/cabin crew coordination and communication are practiced" (NTSB, 1988).

In the following rare ASRS report filed by a flight attendant, the cabin crew had to resort to extreme measures to gain the attention of the captain to have the aircraft deiced on a winter day in Denver:

After being on the ground in Denver approximately 1/2 hour, passengers and flight attendants began to notice snow and ice mounting on the airplane wings. The captain was asked three times about deicing. He claimed it was not necessary. More time passed and more snow and ice became visible on the wings. Agents in Denver told us that they were surprised the captain refused to deice and that other aircraft out of Denver had been deiced. Because we were in fear for the lives of our passengers and ourselves, we once again asked the captain to deice. He still refused. Due to this, the flight attendants left the aircraft. (The first officer had earlier shown concern and fear because the captain wouldn't deice.) After about 15 minutes in the gate area, the chief agent came out and told us the captain would deice. We reboarded the aircraft and arrived safely in Atlanta. We were only concerned for the safety of our passengers and ourselves (ASRS #79716).

Passenger Information of Hazard - Cockpit Denial

The following exemplifies an attitudinal problem as reported by a flight attendant in response to an open-ended question on the questionnaire:

A passenger informed me that a piece of the wing was separating. Upon inspection, the metal covering was separating from the wing close to the flap. The flight deck said it was on the flap and was supposed to do that, even though I repeatedly described the problem accurately. The pilots told me if I checked the other wing I would see the same thing happening. I went back to the flight deck to tell them it was not the same and that what appeared to be insulation material was showing. I made four visits to the pilots and was not taken seriously. Upon landing (about 20 min. later) the pilots checked it out and made a joke about not believing me. The plane was grounded and the next flight was canceled. I really resented the pilots' attitude (Chute, 1994).

Failure of Flight Attendant to Pursue Information

On July 19, 1989, a United Airlines DC-10 experienced the catastrophic failure of its No. 2 engine, resulting in the loss of all hydraulic systems. When the lead flight attendant reported to the cockpit for instructions to prepare the cabin for an emergency evacuation, she elected not to ask how much time remained because the pilots were "working so hard" (NTSB, 1992). She, therefore, delayed briefing of the passengers regarding the emergency landing and the flight attendants continued with the clean-up of meal trays until approximately 30 minutes after the original failure of the engine. Consequently, the passengers were notified of the impending emergency by a brace instruction announcement made by the captain who assumed they had already been briefed. The Safety Board found that while the "prelanding preparation improved the prospects of survivability it was accomplished without adequate time management" (NTSB, 1992).

BARRIERS

Regulatory: The Sterile Cockpit.

Nothing has caused more confusion among cabin crew members than the so–called "sterile cockpit" rule. Although its intention was good, its application to the cabin has been muddled, has

left flight attendants in fear of violations, and has demanded judgments about technical matters beyond their training and abilities.

As a result of controlled flight into terrain (CFIT) accidents (Ruffell Smith, 1968; Wiener, 1977) which plagued the industry in the 1970's, notably Eastern Flight 212 in Charlotte (NTSB, 1975), the FAA in 1981 initiated FAR 121.542. (For a detailed discussion of this regulation, see Sumwalt, 1994). FAR 121.542 states that no flight crew member shall perform "any duties during a critical phase of flight except those duties required for the safe operation of the aircraft." (Critical phases of flight include "all ground operations involving taxi, takeoff, and landing, and all other flight operations conducted below 10,000 feet, except cruise flight.") Furthermore, it states that no flight crew member may engage in any activity during a critical phase of flight which could distract a crew member or interfere in any way with the proper conduct of the flight. "Nonessential communications between the cabin and cockpit crews" are prohibited. It is this clause that has caused the greatest confusion in interpretation by airlines and crew members. Flight attendants, many already intimidated by the authority of the flight deck, are now expected to determine which situations are essential to the safe conduct of the flight. So consider once again what we have called "the flight attendant's dilemma." She must not only be concerned about the reception she will receive in the cockpit, but must also pass judgment on whether the information she considers conveying to the captain is "critical." And if she is wrong, she is subject not only to the reprobation of the pilots, but the disciplinary process as well.

The scales appear to be tipped toward taking no action. Rather than take the chance of being wrong and thereby breaking the law, or at the least embarrassing themselves and perhaps subjecting themselves to a reprimand from the captain, they would likely opt not to communicate valuable, safety-related information to the pilots. The puzzlement is that it is hard to say which choice is "erring on the side of caution." Whose caution? The flight attendant's caution over the possibility of violation and/or reprimand, or over a possible accident or unmanageable cabin situation? The Dryden accident is a tragic reminder of opportunities lost.

Initially, when the sterile cockpit regulation was instituted, it was the pilots, not the cabin crew, who had created the distraction by conducting non-essential conversation while on approach. While this ruling was <u>not</u> the result of anything of their doing, the cabin crew were, nonetheless, affected and included. In the fatal crash of Delta Flight 1141 at Dallas/Ft. Worth, a flight attendant had stood in the cockpit chatting with the pilots for 17 minutes, while they were taxiing the aircraft and running checklists. The crash occurred because somewhere in the checklist process the flaps were not set for takeoff. The NTSB left no doubt where the responsibility for the infraction lay: "Had the captain exercised his responsibility and asked the flight attendant to leave the cockpit, or, as a minimum, stopped the non–pertinent conversations, the 25–minute taxi time could have been used more constructively and the slat position discrepancy might have been discovered (NTSB, 1989a)."

To make matters worse, there is no clear and easy way for the cabin crew to know the altitude of the aircraft (since there is no altimeter in the cabin). In order to comply with the F.A.R., some airlines installed a warning light to signal the cabin crew not to disturb the cockpit crew. Of course, this light is not visible to flight attendants in the back of the aircraft, especially on a wide body. [As a human factors note, one airline installed a *green* annunciator light on the cockpit door which was turned *on* when cockpit was *sterile* (Wiener, 1985). The reader can imagine the

resulting confusion. The airline later reversed the sensing and all went well.] For a more complete discussion of the signaling problem, see Cardosi and Huntley (1988).

The following ASRS report submitted by a pilot illustrates the obstacles to effective communication caused by confusion surrounding the sterile cockpit rule.

> *Landed with flight attendant's still standing with service equipment still in aisle. Initially the reason for the slow service was twofold; 1) The entire crew was reserve and brand new to operation, 2) the signal to alert the flight attendants that it's all right to get out of their seats failed to function causing them to remain seated excessively long. Contributing factors: 1) Lack of experience--all flight attendants less than 1 month on the line. 2) Poor system for notification --in airplanes everything is cause and effect. Turn on a switch, look for something to happen. With our aircraft the flight attendant is alerted with the Fasten Seat Belt or (usually) No Smoking sign and chime. Cockpit crew assumes they receive the message--the flight attendants don't give an answer. 3) Negative transfer from training program. Flight attendants are trained not to contact the cockpit during sterile cockpit procedures. Flight attendants interpret this to mean under no circumstances do they "bother" the pilots, even if the cabin is not safe for landing. My opinion is emphasis should be on keeping cockpit crew and the captain informed of unusual or potentially dangerous conditions--always! (ASRS #108356)*

In the following ASRS report, the flight attendants did not report injuries because of their interpretation of the sterile cockpit regulation.

> *Approximately 35-40 nautical miles (from) Orlando, severe turbulence encountered. No radar return. Remainder of flight normal with normal approach and landing. After landing, flight attendant entered cockpit and advised flight crew that both cabin attendants had sustained injuries and several passengers injured due to seat belts coming loose at attach points. Because the flight attendants thought sterile cockpit had been signaled, cockpit crew was not advised of their injuries till aircraft parked after landing. Their training emphasizes sterile cockpit importance. However, in this situation, had further problems developed requiring flight attendant assistance, the flight crew would have been unaware of flight attendant's injuries and restriction of their assistance capabilities (ASRS #88205).*

The sterile cockpit regulation continues to be a source of considerable confusion for both flight deck and cabin crews. We will shortly discuss possible remedies both on the regulatory and the training fronts. As one captain put it:

> *I am well aware of the importance the FAA puts on this (sterile cockpit) time, however it is my experience that in the real world short interruptions do not compromise safety. I would rather hear about things that might not be important during this time than possibly miss some important information because someone was afraid to interrupt the "sterile cockpit".* [2]

And from a flight attendant who witnessed a misinterpretation of the regulation:

Teach flight attendants that it's OK to get up under 10,000 feet for certain problems. I just watched 2 flight attendants remain seated until 10,000 feet while large containers of juice spilled onto the floor behind the cupboard (I was a passenger).

Chain of Command

Communication difficulties between cabin and cockpit also result from an ambiguous chain of command. Again, the problem has its origins in the two crews, two cultures, answering to two vice–presidents (Chute & Wiener, in press). In general, the flight attendants are in charge in the cabin, and the pilots are not concerned with passenger service unless a problem (e.g. medical emergency) or request (e.g. gate information) is brought to them by cabin personnel. Typically, there is a lead flight attendant (also called "A line") who is the ranking crew person in the cabin. In theory, she exercises authority over the cabin crew, and would be responsible for any major decisions, certainly ones concerning safety rather than service. Also in theory, she is the cabin person with whom the cockpit would want to deal. We emphasize "in theory" because the cabin is organized along a loose chain of command. The lead flight attendant tends not to exercise much authority: the relationship between the lead and other flight attendants is nowhere as structured as that between the captain and his crew members. She does not, as a strict chain of command would dictate, serve as the exclusive link between cabin and cockpit. Other flight attendants are free to walk into the cockpit at will, and they do so.

In contrast to the cockpit, and to other traditional, hierarchical management structures, the position of lead flight attendant may not go to the most experienced or senior crew member. In some carriers, it is not a highly-desirable job: the pay differential is slight or nonexistent, and the responsibility, workload, and exposure to discipline are great. Consequently, the job often goes to very junior personnel.

Other than the sociability of having flight attendants drop in to visit, which many pilots enjoy during low workload phases of flight, the flight crew would possibly prefer to deal in a more structured fashion only with the lead, certainly when decisions were required. The culture of the pilot is steeped in military discipline, with clearly-established, strongly-enforced authority lines. The flight attendant culture is more egalitarian: it would seem quite unnatural to some flight attendants to report to a lead flight attendant with information for the cockpit, rather than conveying it themselves.

The chain of command was a recurring theme from pilots in the crew member survey. The following responses were elaborations on reasons pilots would like to be organized under the same department as cabin crew:

- *Chain of command and "captain's authority" issues would be much easier to resolve. Also better standardization of training.*
- *More definite chain of command, currently everybody thinks they are in command.*

And pilot suggestions about improvements in cockpit/cabin communication:

- *Change company philosophy concerning flight crew authority, chain of command, and teach it from Day One to new hires, reinforced during recurrent flight attendant training.*

• *Assign one cabin crew member to be in charge and act as a chain of command to the cockpit and be held accountable for actions and operations of the cabin crew. Our management has consistently resisted this because they will not compensate flight attendants for such additional responsibility. I believe that action alone would solve 90% of the coordination problems.*

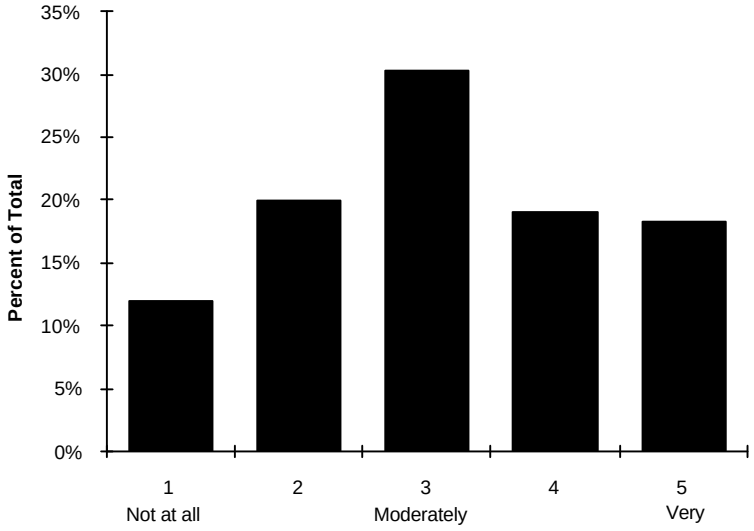
In the Dryden accident cited earlier (Moshansky, 1992), the Commission of Inquiry concluded that lack of crew coordination contributed to the accident and that closer cooperation between pilots and flight attendants in operational safety matters was highly desirable. They recommended that CRM training be required of flight deck and cabin crews in all Canadian air carriers and made specific recommendations for the transfer of operational information between crew members, especially in hazardous weather conditions (Moshansky, 1992).

Training

F/A Operational Knowledge. It is essential that cabin crews are knowledgeable concerning aircraft systems and basic components. Valuable time can be wasted in the inaccurate transfer of information, especially when pilots cannot leave the flight deck to validate the accuracy of the information. Nobody expects a flight attendant to possess a pilot's knowledge of an aircraft, but some basic knowledge of the parts and terminology is necessary in order to convey information in a timely and accurate manner. When the information is not correctly stated, misunderstanding, distrust, and possibly derision ensue.

For example, in the United Airlines Sioux City accident (NTSB, 1989b; 1992) a flight attendant called the cockpit and told the crew there was damage to the "back wing". The second officer proceeded to the cabin and looked at the wing, but the damage was to the horizontal stabilizer. Fortunately, there was adequate time available and personnel in the cockpit to check the validity of the flight attendant's report. However, in a more time-critical situation, valuable minutes could be wasted re-diagnosing the problem or proceeding down the wrong solution path.

With the transition of aircraft fleets to the two-person flight deck, the cabin crew will be relied upon increasingly more for the accurate transfer of operational information. In our study, flight attendants were queried as to their confidence in their ability to describe mechanical parts or malfunctions of the aircraft. The results, as depicted in Figure 1, revealed a symmetrical



distribution across the 5-point scale.

Figure 1. Results of question asked of 125 flight attendants at two airlines: "How confident are you about your ability to accurately describe to the pilots parts or malfunctions of the aircraft that are visible to you (such as the flaps or the horizontal stabilizer)? Subjects responded on a five–point scale.

Since 58% responded "moderately" or less, there appears to be considerable room for improvement in the training of theory of flight and basic aircraft systems. Cabin crew have numerous opportunities to assist the flight deck. The following incidents were reported by flight attendants:

- *Flight attendant reported MD-80 engine "sounded funny" - after inspection found it near failure. Pilots had no idea.*
- *Flight attendant reported excessive oil spillage 727-200 tail engine. Missed on walk-around. Found broken oil line.*
- *On three separate taxis, same aircraft, I called the flight deck to tell them about a sound that appeared unusual. Finally, the captain came back, during our latest taxi, to listen and feel. He promptly said, "we're going back". Ultimately, it turned out that the engine was on its very last leg. The airline was able to save the engine (and the aircraft) with only an overhaul. P.S. I'd been told in the beginning, that no gauges were showing any problem.*

And these were reported by pilots:

- *A flight attendant reported to me an unusual vibration in the aft cabin (she apologized for bothering me). We reported it, and thought we got it fixed. It appeared again and she once again called me (during the next leg). I grounded the aircraft at the next stop. The engine had failed internally. It would have not made the next leg.*
- *During taxi-out, the flight attendants in rear of stretch DC-8 (another airline) informed captain that they had heard a "thump" during taxi. Captain called for inspection team out by the runway. They discovered a broken wheel rim and flat tire.*
- *During a flight, a flight attendant called the flight deck and told us about some liquid from the under side of right wing (a fuel cell had sprung a leak). We noticed the imbalance on right fuel gauge and landed. Lost several hundred gallons of fuel.*

The data indicate that flight attendants can be useful in the detection of mechanical anomalies. However, it seems that many flight attendants have not been taught comprehensive reporting skills such as the consequences to the carrier of reporting a landing as "hard" or of referring to turbulence as "severe". (The aircraft will be grounded and an airframe inspection performed before it is allowed to resume operations.)

In the Dryden inquiry, it was speculated that Katherine Say (deceased flight attendant) may have been under the impression that the F-28 was equipped with ground de-icers, which it was not (Moshansky, 1992, p. 1073). The Board of Inquiry cited this as an example of the need for joint training with the cockpit crew in order to educate cabin crews on the hazards of take-off with

contaminated wings and on proper de-icing procedures. Other appropriate subject matter would include assertiveness training and sensitivity to times in flight when interruptions can create a distraction.

Another aspect of the lack of knowledge on the part of the cabin crew is a complete reliance on the pilots for the operational safety of the aircraft. Not only are the flight attendants nonconversant in technical knowledge, but their input is not cultivated as a source of information. As David Adams pointed out in the Dryden inquiry:

> *The real heart of the communications problem and therefore the potential coordination problem, is not that Cabin Attendants are universally discouraged from talking to the flight crew, but rather, they are discouraged from talking to the flight crew about specific subjects (Moshansky, 1992,p. 1089).*

He goes on to say that it would be seen as appropriate for a flight attendant to talk about a piece of cabin equipment, but not acceptable to comment on an operational matter such as the possibility of too much snow on the wings.

Over-Emphasis on Sterile Cockpit Rule.

Airline training programs typically over–emphasize the sterile cockpit rule, without giving the flight attendant trainees much guidance in its application. We shall discuss this further in the "remedies" section of this paper. Obviously no individual, and no airline, wants to court trouble with the FAA. In the training programs, "erring on the side of caution" probably means not taking information to the cockpit when in doubt. After all, there is nothing specific in the regulations aimed at the flight attendant who decides not to tell the captain.

Passenger Service Ambiguities

In a survey by the authors conducted of crew members at two U.S. airlines, six scenarios designed by Alaska Airlines (Rinehart, 1991) were used to investigate which subject matter flight attendants deemed appropriate to convey to the flight deck and what pilots want to know -- especially in relation to the sterile cockpit. For details on the methodology of this study, see our previous paper (Chute & Wiener, in press). For each scenario, the pilots were given three options:

1. I would want the flight attendant to call the cockpit immediately with this information, even during sterile cockpit.
2. I would want the flight attendant to pass this information to the flight deck, but not during sterile cockpit.
3. I would not feel the information was important enough to tell the flight deck at all.

The flight attendants were given similar response options, but in the first person, about what they would do in each situation, and were given an additional option which was not appropriate for the pilots:

4. I would tell the lead flight attendant and leave it to her/him to pass it on or not. (This choice was included to reflect the real-world and was interpreted to mean they would not contact the flight deck themselves).

Two findings emerged from the analysis of responses to the six scenarios. The first was in the following: "*Three minutes before scheduled departure a flight attendant notices that catering didn't put any milk on board.*" An analysis of the data revealed that 64% of the pilots wanted to be notified of this problem, 24% even if they had to be told when the cockpit was sterile. However, only 8% of the flight attendants reported that they would tell the flight deck of this problem at all (see Figure 2 for the distribution of crew member responses). Second, and most important, responses of "1" indicate that what 24% of the pilots were inviting, and all but about 4 % of the flight attendants were resisting, was unambiguously a sterile cockpit violation. FAR 121.542 clearly lists "ordering galley supplies" as a proscribed activity during sterile operations.

The results indicate pilots want to be kept informed regarding problems that affect the well-being of the flight and the happiness of the passengers, and that certain factors, perhaps sterile cockpit and/or a general reluctance, are preventing the cabin crew from transferring this information. The concern about an adequate supply of milk is commendable from a service point of view, but nonetheless a violation of a federal regulation.

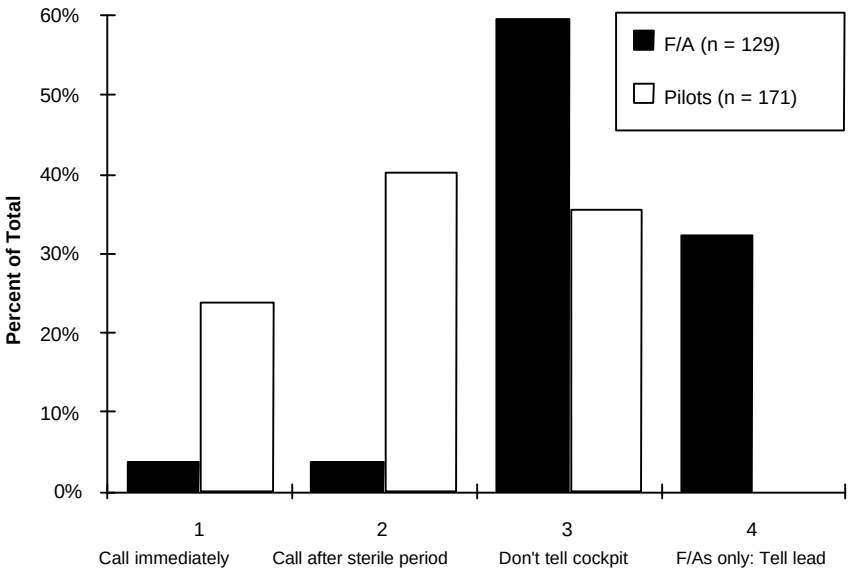


Figure 2. Responses to a prompt asking flight attendants how they would respond to the following situation: "*Three minutes before scheduled departure you notice catering didn't put any milk on board.*" Likewise the pilots were asked what they would like the flight attendants to do in this situation.

Team Formation and Briefing

The high-speed, high-productivity environment of hub-and-spoke operations has taken its toll on crew cohesiveness. The cabin crew and flight crew seldom fly an entire trip together; often there are two or three crew changes a day. So cockpit and cabin crews barely greet each other as they board and disembark in a fast–paced operation. There is little opportunity for team building, as described by Hackman (1993). In international operations, where the crews are together longer, and effective communication may be particularly critical, team building still suffers in today's environment. Often crews do not meet each other until they board the aircraft. One carrier we visited suffered from architectural barriers. International briefing rooms for pilots and flight attendants were on separate floors of the terminal building.

Be that as it may, the responsibility for briefings still remains with the captain. In a study of team formation in airline crews, Ginnett (1987) found that the inclusion of the cabin crew in briefings and their acknowledgment as part of the team were characteristic of high-performing captains. He also found that the high-performing captains acknowledged the barrier of the cockpit door and discussed its management.

One of the issues that surfaces in joint training is the weakness of the briefings. Sometimes there is no briefing by the captain at all; sometimes it is a perfunctory "Let us know if you need anything". The importance of proper briefing by the captain is emphasized in an article by Price, who gives an example of what a captain's briefing might say:

> *Let's start with the sterile cockpit policy. Don't you [cabin crew] worry about it! Let me do that. If anything happens that concerns you and you think we should know about it, pick up the phone and give us a call, or come see us. I'll let you know if it's a poor time to talk. We need and want to hear from you. (Price, 1993).*

REMEDIES

We shall now discuss briefly some of the actions that might be taken to improve the communication between cabin and cockpit. Some of these recommendations have already been implemented at some airlines, but by and large they address problems that still exist at most carriers.

Clarification of Sterile Cockpit Rule

Our first recommendation is addressed to the FAA. We believe that the largest single step in the right direction would be for the FAA to clarify the meaning and enforcement of FAR 121.542. Here is what we believe needs to be said:

> 1. The FAR was never intended to stifle legitimate communication. It was aimed at unquestionable breaches of cockpit discipline, as revealed in the investigation of EAL 212 (NTSB, 1975) and DAL 1141 (NTSB, 1989a), in which conversation and banter, which was in no way related to the conduct of flight, disrupted the cockpit and led to sub–standard performance, resulting in a fatal accident.
>
> 2. It is not required that a cabin crew member spend time ruminating over whether the information she would like to take to the cockpit is flight critical or not. If she has information for the cockpit, she should convey this information in a professional manner, guided by her training. She is not expected to be a lawyer or a mechanic.

3. Accordingly, FAA examiners will not "split hairs" over the criticality of information taken to the cockpit during sterile periods. They will report only blatant infractions of the regulation, and not enter into debates about whether one or another conversation was proscribed by the regulation.

Reexamine Teaching of Sterile Cockpit Rule

Consistent with the first recommendation, there is a need to clarify the meaning and intent, and enforcement, of the regulation. The emphasis in training should be placed on the importance of effective communications, and of professional behavior at all times. The examples that we have given indicate all too clearly that the airlines have failed to convey the meaning of the regulation, and particularly the fact that it is the safety of the aircraft, not the sterility of the cockpit, that is supreme. Captain Price's sample briefing message quoted above could also serve as an effective training aid.

Joint CRM Training

We have explored the question of joint cockpit/cabin CRM in previous papers (Chute & Wiener, in press), and have attended joint training sessions at five airlines. This training is somewhat expensive and difficult to schedule, but we feel that the investment is well advised. The particular form that joint training should take is yet to be determined. Research is needed in how to resolve friction between cockpit and cabin personnel, so that information can flow smoothly in both directions. The joint CRM sessions we have attended have shown some tendency to drift into "gripe sessions." But it is worth note that almost everyone that we observed or interviewed, be they pilot or flight attendant, agreed that the sessions were valuable, too brief, and that more joint training would be beneficial.

Team Formation and Crew Briefings

As we have noted, the high intensity of today's airline operations often make it difficult to form cohesive relationships between the cockpit and cabin crews. Except in international flights, pilots seldom spend the entire day, let alone an entire trip, with the same flight attendants. It is not likely that this situation will change, so it is essential that training and procedures, and individual techniques, make the best of it. We recommend that airlines heed the writings of Price, Hackman, Ginnett, and others, which indicate that training in briefing all crew members be part of transition training, CRM, and above all, of captaincy training.

We also advocate the use of a simple handshake during crew member introductions. We have observed that a handshake is not a part of the flight attendant culture and that some flight attendants appear to be uncomfortable when compelled to give one or give a weak handshake. A handshake is a good team-building gesture. It establishes a professional atmosphere, equality, and a spirit of receptivity and trust between participants (Burgoon, 1991). We believe that a handshake with an introduction could set the tone for a synergistic relationship between the crew. If crew member proximity does not allow for a handshake, then at least a wave and a smile are gestures of acknowledgment.

Aircraft Technical Training for Flight Attendants

We have discussed the problems created by the flight attendants' relative lack of knowledge of aircraft terminology. We have also advised against the blind trust which flight attendants place in

pilots' abilities. We recommend that research be conducted to determine just what aeronautical information flight attendants need in order to communicate safety critical information to the cockpit, and that this become part of their training.

Jumpseat Familiarization Flights for Cabin Crew

The cockpit jumpseat offers a great opportunity for cabin crew training, at relatively little cost to the airline. An observation flight in the jumpseat would allow the flight attendant to become familiar with the duties of the cockpit, and particularly the variations in workload. One airline that we are aware of is now giving all new–hire flight attendants mandatory jumpseat training. This method is not cost–free; some scheduling and salary costs must be borne. Another company has sought to make jumpseat training available at a minimum cost by giving each flight attendant the opportunity to, on a voluntary, one-time basis, fly from her home base to any other direct destination and return. We believe that jumpseat familiarization has great potential for training and for improving communications between the two crews.

As one captain put it:

> *As a pilot, I have the opportunity to observe the flight attendants during their busiest times while I occasionally deadhead from station to station. Unfortunately, the flight attendants have no opportunity to observe the flight deck when we are working except to come to the flight deck during cruise. As captain, I would like the authority to invite one flight attendant to ride the cockpit jumpseat during takeoff or landing (providing the required number of flight attendants are in the cabin, the weather and other conditions seem suitable, and the first flight attendant agrees). I think the more we know about the jobs each of us are asked to do the better we are able to communicate with each other. I also think it would be valuable to have some common training time. I realize, in general, what the flight attendants responsibilities are in emergencies, but I have not actually seen what they do.*

Company Structure

In our previous paper, we dwelled on the fact that pilots and flight attendants are usually in two different departments, one devoted to flight safety, one to sales and marketing. This means that they serve under different vice presidents, and often very different corporate structures, with potentially conflicting objectives. Furthermore, the training of the two crews may not be consistent. We recommend that the airlines consider placing flight attendants under the same vice president as the pilots, for the sake of consistency in training, policies, and procedures. We believe that with proper study, this could be done with no loss of the passenger service and marketing orientations.

CONCLUSIONS

We have attempted to show in this paper that barriers to effective communication exist between cockpit and cabin crews, and that in the extreme these barriers inhibit the flow of safety-critical

information that could prevent an accident. Some of these communication problems result from the two cultures of cockpit and cabin (Chute & Wiener, in press) such as the discouragement of operational information contributed by flight attendants and skepticism of those reports on the part of pilots. Other problems are structural, based on ambiguities in federal regulations, on company policies and organization, and even the physical layout of the airplane. Still others are rooted in cultural conventions which vary between the crews, and gender protocol as well as customs.

But happily, all of the problems that we have discussed have solutions, and most of the solutions come with an affordable price tag. In order to implement the solutions, government, airline management, flight–deck and cabin unions, and the crew members themselves will have to surmount what may be the greatest barrier of all, the trivialization of the safety function of the cabin crew.

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AUTHOR NOTES

This research was supported in part by two research grants from NASA Ames Research Center: NASA Cooperative Agreement NCC 2-798 to San Jose State University Foundation, and NCC2-843 to the University of Miami. This paper is partially based on a study submitted by the first author as partial fulfillment of her requirements for the degree MA in psychology at San Jose State University.

The authors gratefully acknowledge the assistance of First Officer Jeannie Price of Alaska Airlines, and Dr. Elizabeth Lyall of America West, and the support of our colleagues at NASA Ames, in particular Dr. J. Victor Lebacqz, and Dr. Kevin Jordan of San Jose State University Foundation.

It is assumed that the reader is familiar with aviation terminology. The opinions expressed herein are those of the authors, and not of any agency or institution.

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FOOTNOTES

[1] The female pronoun will be used in this paper in reference to flight attendants as they are the predominant gender. No disrespect is intended toward male flight attendants.

[2] Comments which follow that are not otherwise attributed are from questionnaire data collected by the authors.