

Cockpit/Cabin Communication: I. A Tale of Two Cultures

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ABSTRACT

Several dramatic accidents have emphasized certain deficiencies in cockpit/cabin coordination and communication. There are historical, organizational, environmental, psychosocial, and regulatory factors that have led to misunderstandings, problematic attitudes, and sub-optimal interactions between the cockpit and cabin crews. Our research indicates that the basic problem is that these two crews represent two distinct and separate cultures, and that this separation serves to inhibit satisfactory teamwork. A survey was conducted at two airlines to measure attitudes of cockpit and cabin crews concerning the effectiveness of their communications. The paper includes recommendations for the improvement of communications across the two cultures.

Well, we have - the pilots and the flight attendants have respect amongst one another as friends but when it comes to working as a crew, we don't work as a crew. We work as two crews. You have a front-end crew and a back-end crew, and we are looked upon as serving coffee and lunch and things like that.

Sonia Hartwick, surviving flight attendant, Air Ontario accident, Dryden
(Moshansky, 1992).

INTRODUCTION

Recently certain airline accidents and incidents have been laid at the doorstep of poor cockpit/cabin communication and coordination. The role of the flight deck in airline safety has been well-documented (Wiener & Nagel, 1988), but the flight attendant's role in safety has been seen to date as keeping a fairly orderly cabin, and if ever called upon to do so, conducting a safe evacuation. Airline training has said little about communication between cockpit and cabin, except in extreme cases such as evacuation or hijacking. Regrettably, the safety role of the flight attendant has been trivialized. Customarily a female occupation, the flight attendant (previously "stewardess") has been the victim of an emphasis on the part of the public, and perhaps the airline industry itself, on feminine glamour and sexual innuendo ("coffee, tea, or me?"). Safety duties were seen as secondary to passenger service and public relations.

Several movements have converged which compel a reexamination of the safety implications of cockpit/cabin communication: 1) the crew resource management (CRM) movement, previously confined to the cockpit (Wiener, Kanki, & Helmreich, 1993); 2) the emergence of the two-pilot crew, even on wide-body jets and trans-oceanic routes; and 3) the recognition by the National Transportation Safety Board (NTSB); (NTSB, 1992; Kayten, 1993) and the FAA (Cardosi & Huntley, 1988) of its critical role in accidents and incidents.

MANIFESTATIONS

Traditionally, the commercial airliner has been separated into two geographical and sociological environments: the cockpit and the cabin. Each environment has distinct boundaries, space constraints, technological differences, and cultures. The cockpit is a confined area and the personnel involved perform highly-specialized tasks in an isolated, highly-structured atmosphere. Those who work there generally do not come into contact with their customers and are sedentary while performing operational tasks. The cabin, on the other hand, is more spacious, and the personnel working in it are more physically active and socially interactive than those on the flight deck. Compared to the cockpit, the work force in the cabin is essentially unstructured (Chute & Wiener, in preparation). Additionally, in most U.S. airlines, pilots and flight attendants are administratively separated into two departments that operate independently. This separation of the two departments can even lead to inconsistencies such as discrepancies in manuals and procedures. The fragmentation fosters the feeling that there are two crews rather than one. It is these differences (and more) that contribute to misunderstandings and problems in coordination and communication on the part of airline crews in the performance of their duties. These issues can become even more apparent when, in abnormal situations, the two crews must unite and act as a cohesive team.

There are different areas of responsibility for flight-deck and cabin crews and, due to factors that will be examined in this study, two separate cultures in the aircraft. The captain is in charge of the operation of the aircraft and leaves the responsibility for the cabin to the flight attendants, until a problem is brought to his or her attention. Generally the crews function together harmoniously; however, communication is not always optimal. In the extreme, the crews can be antagonistic, as seen in this excerpt from a NASA Aviation Safety Reporting System (ASRS) report by a captain on a flight from Denver to Dallas:

Asked to get crew meal during flight. Based on flight length and new copilot, requested flight attendant to bring meal to cockpit. Flight attendant refused to bring meal forward. Flight attendant waited until start of descent to bring meal forward. I wolfed down what I could of meal--copilot did not get a chance to eat. . . . ATC became very hectic and busy. Constant airspeed changes, vector headings, and altitude changes. . . Suddenly approach control said "Stop descent immediately. Unidentified traffic at 12:00." Did not see any traffic at 12:00, looked out left side of aircraft and saw light plane pass directly under in the dark. May have been near miss. During all the hectic action in the cockpit, well below 10,000', the flight attendant opened door, flooding cockpit with light and creating a distraction as trays were removed from the cockpit. The approach was unsafe. The captain is helpless to plan the approach anymore. The flight attendants ignore requests and directions from the captain. They work for marketing department and don't hesitate to tell pilots they don't have to listen to them. On this flight, the flight attendant's blatant disregard of captain's request resulted in an unsafe approach. . . If the flight attendant had listened to captain's request to bring meals up, she would not have been in cockpit at low altitude causing a distraction. (ASRS No. 63881)

In the preceding example, the service of the crew meal was the superficial problem, but the underlying friction was poor communication stemming from a lack of awareness and understanding of each other's duties. From the captain's point of view, the flight attendant disobeyed his orders for a meal to be served immediately and exhibited a lack of concern for his

well-being and, therefore, that of the flight. Additionally, in his eyes she had violated the "sterile cockpit" regulation (F.A.R. 121.542) by entering the cockpit below 10,000 feet to remove the meal trays. Furthermore, the division is intensified by the perception that the flight attendant is only answerable to the marketing department, therefore, the chain of command on board the aircraft is ineffectual.

It should be noted that there is another side of this story to which we do not have access-- that of the flight attendant involved. There could be a variety of explanations for her actions ranging from a full cabin, to a meal service on a short leg, an unruly passenger, or a combination of those factors. In any case, it is evident that there is no spirit of teamwork in this crew. We could ask another question: If there had been an emergency situation, would they have instantly united and trusted each other's judgment? If not, lives would have been endangered.

Psychosocial Differences

We would like to be able to discuss personality differences between pilots and flight attendants as a way of understanding the differences between the two cultures. However, while there is an abundance of research on pilots, there is very little on flight attendants. We have found two studies worth mentioning which contrast pilot and flight attendant attitudes and orientations.

In order to explore differences in personality dimensions of pilots and flight attendants, America West CRM facilitators utilized the Myers-Briggs Type Indicator (Vandermark, 1991). They found pilots to be task-oriented, preferring a cognitive style of problem-solving based on logic and systems-oriented reasoning. Flight attendants, however, preferred an affective cognitive style and orientation to decision making. These differences in attitudes between predominantly male and female groups are probably not confined to the airline industry, but may be especially prevalent among flight crewmembers due to self-selection and organizational selection criteria.

Merritt's (1993) study of crewmember attitudes toward appropriate crew behavior found large differences between U.S. pilots and flight attendants. Using multidimensional scaling, pilots' attitudes loaded heavily (.86) on a dimension that indicated self-reliance and personal responsibility for success or failure. While good crew coordination was seen as important, pilots exhibited less perceived need for pre-flight briefings, verbalization of plans, or coordination of cockpit and cabin crews. Three groups of U.S. flight attendants all scored very low on this dimension (.21, .11, .08). The reverse was true on a dimension that emphasized good communication and the captain's encouragement of questions from other crewmembers. U.S. flight attendants scored .68, .75, and .85 while U.S. pilots scored .19 illustrating the differences in approaches to authority and teamwork, and perhaps differences in the nature of their job.

Traditionally, pilots have approached their job as a career; however, flight attendants have historically viewed theirs as a temporary job, even though many changed their minds once they had experienced it for a few years. Furthermore, the pilot profession is male-dominated and considered a highly-skilled profession, while the ranks of flight attendants are female-dominated, and theirs is considered a service occupation. While the gender mix in both of these populations is changing, the identification with the dominant sex is still the prevalent view and probably will continue to be so for some time.

Organizational Separation

As previously mentioned, the crews are usually administratively organized into separate departments. The pilots are customarily under flight operations where safety is stressed, but the cabin crews are typically part of the marketing department where the emphasis is on service. The division has historical roots that date back to 1930 and the inception of stewardess service. A quote from the first stewardess training manual of Boeing Air Transport in 1930 stipulates: "The pilots are from the Operating Department while the Stewardesses are from the Traffic Department so there is no real need for conversation or contact" (Mahler, 1991). The stewardesses were also forbidden to conduct conversations with pilots on duty or to enter the field office except when necessary. Remnants of this historical philosophy still characterize some crew member interactions by avoidance unless absolutely necessary and distrust of motives for contact.

David Adams, Australian accident investigator, concluded regarding the impact of organizational separation of pilots and flight attendants:

If you look at almost any company, you will usually find that the cabin attendants and the flight crew are very very clearly separated. They work for different branches of the company in most cases. The culture is one of almost complete separation. Yet the fact of the matter is, in a safety situation, these two sections of the company have to work together. And the consequences of not efficiently working together quite often means a bunch of people get killed. (Moshansky, 1992, p. 1087)

Segregated training compounds the problem by creating gaps in the instruction that crews receive. As an example, through personal observation in a recurrent training class at a major air carrier, we learned that flight attendants from one airline had been trained for nine years that in an emergency they could expect to receive four critical pieces of information from the cockpit crew: type of emergency, signal to brace, signal to evacuate, and time available to prepare. Not one of the pilots had ever heard of this and all had difficulty guessing what the four pieces of information might be.

Scheduling. Unions negotiate on behalf of their constituency, but since the crews have separate unions there is no uniformity of contracts in coordinating issues such as scheduling, duty times, and hotels. Also, FAA regulations governing duty hours and legal rest are different for the two crews. In many airlines, the scheduling of crews is such that often the cockpit and cabin crews may see each other only briefly before a flight, if at all. While there are airlines which schedule crews together for the month, it is also frequently the case that crews split apart to join other crews during one day's schedule. This type of crew pairing strategy does not allow for a rapport to be established between the two crews. Additionally, while cabin crews typically board a flight 45 minutes before departure, pilots often join the flight minutes before, or during, boarding. Briefings, and often introductions, are therefore precluded. The consequences of this may become apparent in emergency situations when crew members must spring into action as a team, seeing each other for the first time.

Research by Foushee, Lauber, Baetge, and Acomb (1986) supports the concept that familiarity plays an important role in the quality of flight operations. They found that post-duty flight crews, even though fatigued, performed at a higher operational level than pre-duty crews. In fact, there were no cases where pre-duty crews were rated as better than post-duty crews. This was attributed to the fact that post-duty crews had increased familiarity, more accurate expectations, and more comfort with each other's style of communication. It should follow that

the entire flight crew would function at a higher level if it had an opportunity to develop a rapport and a smooth operating system.

Formal briefings and introductions can alleviate some of the detrimental impact of short crew pairings. A briefing can establish expectations, set the tone for crew interactions, address particular problems or requirements for a flight, and serve as a refresher for emergency and security procedures. At the very least, an introduction can set the tone and open the lines of communication for ongoing requests and clarifications.

Training. Flight attendant training is a rigorous course, typically lasting about six weeks. There is a strong emphasis on safety, particularly with respect to evacuations. However, two points must be made. First, although the FAA must approve an airline's syllabus for flight attendant training, the graduate is not licensed by the FAA, and hence cannot be disciplined by the government. If the FAA, either as the result of an inspection, or an accident or incident, finds a flight attendant's performance deficient, it can only report the fact to the company for discipline. Second, at the time of a possible strike by a flight attendant union, the company can easily obtain approval of a truncated course which will allow it to rapidly train its ground employees and new hires and place them on the aircraft. When the flight attendants' union at a major carrier threatened a strike in 1993, the airline quickly obtained FAA approval to reduce training from six weeks to eight days. We cannot say that this compromises safety, but a reduction of this magnitude clearly trivializes the cabin crew's job and training regime, and perhaps leaves the public wondering what goes on in the full-length course that is so unimportant that it can be easily deleted.

Physical Separation.

The cockpit door provides a physical barrier that exacerbates psychosocial differences and isolation. This geographical distinction means that neither crew can see nor hear what the other is doing or become aware without a direct effort to make contact. Restricted contact results in little awareness on the part of either crew of the other's duties during normal flight or in an emergency (Vandermark, 1991). This lack of awareness can result in unrealistic expectations regarding the performance of duties by the other crew. For example, a flight attendant may think that the pilots are sitting idly during cruise, when in fact, they are scanning the instruments, monitoring the radio frequencies, or preparing for the approach. Conversely, the pilots may expect crew meals to be delivered at their request and be unaware of high passenger service demands in the cabin, or of how turbulence can affect the workload of the cabin crew.

We note that cockpit automation has influenced cockpit/cabin coordination. Traditionally, the flight engineer has served as 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 or she could easily leave the cockpit and help out with mechanical problems or difficult passengers in the cabin. With the introduction of sophisticated automation, three-pilot aircraft are being retired and replaced by two-pilot models (Wiener, 1988). Workload in these aircraft does not allow one of two pilots to perform the interface function as effectively, and certainly not to leave the cockpit to repair a movie projector. Clearly the loss of the flight engineer contributes to the insularity of the two crews.

Attitude Survey

In order to examine the status of intracrew interactions, we surveyed pilots and flight attendants from two U.S. airlines. Survey items included personal data regarding experience and current situation, and addressed the topics covered in the introduction such as sterile cockpit confusion, joint preflight briefings and introductions, length of time crews spend together, attitudes about each other, and situational scenarios.

METHOD

Subjects

The subjects in this study were 177 current line pilots and 125 flight attendants from two U.S. airlines who voluntarily returned surveys ($N = 302$). Two hundred surveys were distributed to each of the four groups of crewmembers (pilots and flight attendants of each airline) for a total distribution of 800 surveys.

Survey Form

The survey consisted of questions on demographic data related to airline experience, multiple choice questions, and 5-point attitude scales on various topics. For most items, the equivalent question was asked of both crews in order to detect differences in perceptions and behavior. In a few cases, a question was not relevant to both flight deck and cabin crews, such as a query regarding flight attendant-filed ASRS reports. Therefore, the question appears on flight attendant surveys only. Additionally, open-ended questions were included to provide for free response and anecdotal data. These data are not included in this paper. A complete report of the study is in preparation by the authors.

Procedure

The surveys were distributed to a random sample of pilots and flight attendants by leaving them in randomly selected company mailboxes. Each included a stamped envelope addressed for return directly to NASA-Ames Research Center. Due to differences in airline terminology (e.g., America West calls their flight attendants "customer service representatives"; Alaska Airlines refers to sterile cockpit issues as "safety of flight"), four versions of the survey were constructed to accommodate these differences.

RESULTS AND DISCUSSION

Analysis of Demographic Data

Two airlines were sampled in order to increase the sample size. We were not interested in differences between the companies, so the data from the two companies were merged. Contrasts between pilots and flight attendants on attitude scale responses were analyzed as contingency tables, using the chi-square statistic. Some results are simply reported as descriptive statistics, without any inferential contrasts.

Analysis of the personal data for pilots ($n = 177$) revealed that the majority of pilots surveyed were males (99%) and the mean number of years as a pilot with the current airline was

7.31 ($SD = 4.72$). The sample consisted of captains ($n = 91$), first officers ($n = 81$), and second officers/flight engineers ($n = 5$). The mean number of total flight hours was 10,658 ($SD = 4137$). Fifty-three percent of the pilots received their training in the military, while 47% received their training as civilians. Twenty-eight percent were on reserve scheduling; and 72% were on preset schedules.

An analysis of the flight attendant data ($n = 125$) revealed that 67% of the flight attendants surveyed were female ($n = 84$). The mean number of years as a flight attendant with the current airline was 7.00 ($SD = 3.53$) with a range of 20 years. Like the pilots about one-quarter (24%), were on reserve, as opposed to 76% who were not. In response to the question of whether they view working as a flight attendant as a short-term job or long-term career, the majority (81%) viewed it as a career, nevertheless 66% said their feelings about how long they would work as a flight attendant had changed since they were hired. These findings contradict the popular view that most flight attendants view their job as a steppingstone, and consequently do not take it seriously. Furthermore, while it appears that most flight attendants' intent is to make flying a short-term job at the outset, they later discover the virtues of the occupation and continue with it as a career. Most flight attendants were qualified on three to five aircraft types.

Organizational Separation.

Crew members were asked whether they felt it would be beneficial to have both pilots and flight attendants under one department, and if so, why? Approximately 63% of pilots and 68% of the flight attendants agreed that it would be in their best interests if there were one department only for flight crews (see Figure 1). Fourteen flight attendants and 11 pilots either failed to answer this question or indicated on the form that they had no opinion. These were excluded from the analysis.

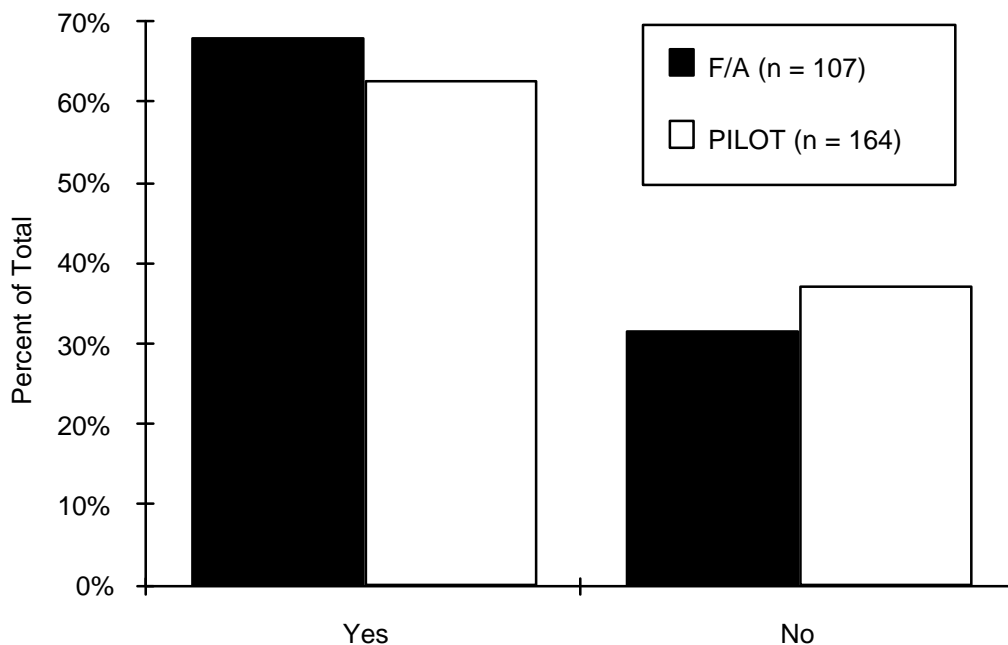


Figure 1. Frequency of yes/no responses to the question: "Do you think it would be beneficial to have the cockpit and cabin crews under the same department in your company?"

As Figure 1 clearly indicates, the proportion of pilots and flight attendants responding "yes" was not significantly different ($\chi^2 < 1$). Single-sample tests of pilots and flight attendants tested the null hypothesis that the proportion of "yes" and "no" responses were equal ($p = .50$). In both cases, the results were highly significant ($Z = 3.99$ for flight attendants, 4.48 for pilots).

No tabulation of the reasons given has been done at this writing, however typical responses were as follows:

Yes! Our jobs are to work together. Being in two different departments hinders communication and often times results in mis-information. (Pilot)

I believe this would enable us to have more of a family effect: i.e. same goals and would make communication better. Our company builds walls between employees . . . by making everyone work in different groups. (Flight attendant)¹

Objections to combining the departments included the notion that the jobs are dissimilar, with different needs and responsibilities. Many of those against unification, however, conceded that a more coordinated training effort would be advisable. Additionally, the lack of synchronization of training, manuals, and procedures was perceived as a problem by many pilots and flight attendants. The lack of coordination between the two departments appears to result in instances where communication affecting both crews is only transmitted to one, or information is erroneously transferred.

Introductions and Briefings. There are many actions and courtesies that both crews can perform to relieve tension and assist in conducting a more cohesive, and therefore safer, operation. Furthermore, they cost nothing. One example is the preflight briefing. However, these pilot-to-cabin briefings, while mandated in some crew manuals, seem in practice to be the exception rather than the rule.

When asked how often the cabin crew receives a formal briefing from the flight deck, there was substantial disagreement in the responses of the flight-deck and cabin crews. Due to the fact that the questions had to be worded differently for the two crews, we did not perform statistical contrasts between the responses. It is clear, however, from an examination of Figure 2 that the pilots perceived a much higher frequency of pilot-to-cabin briefings than did the cabin crew.

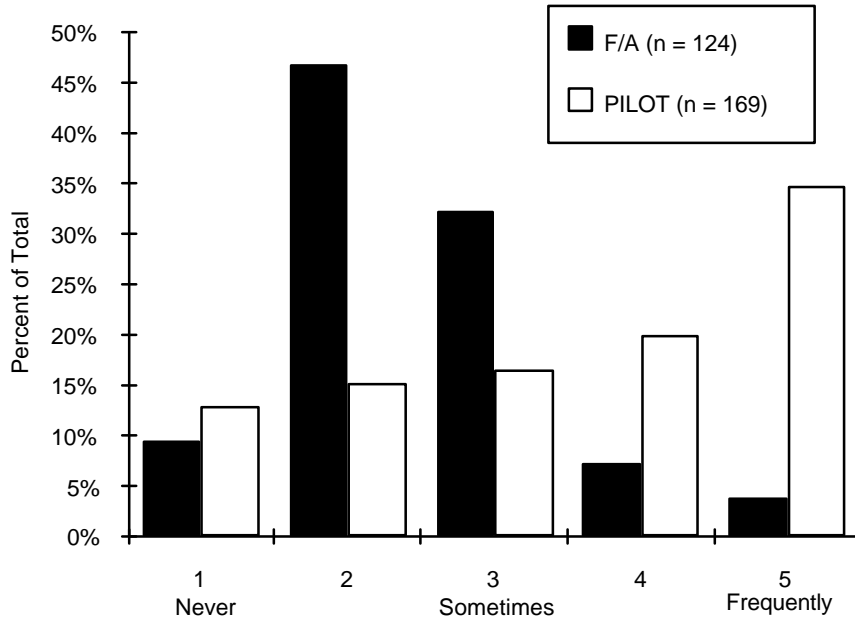


Figure 2. Responses to the question: "How often does the flight deck give the cabin crew a briefing?"

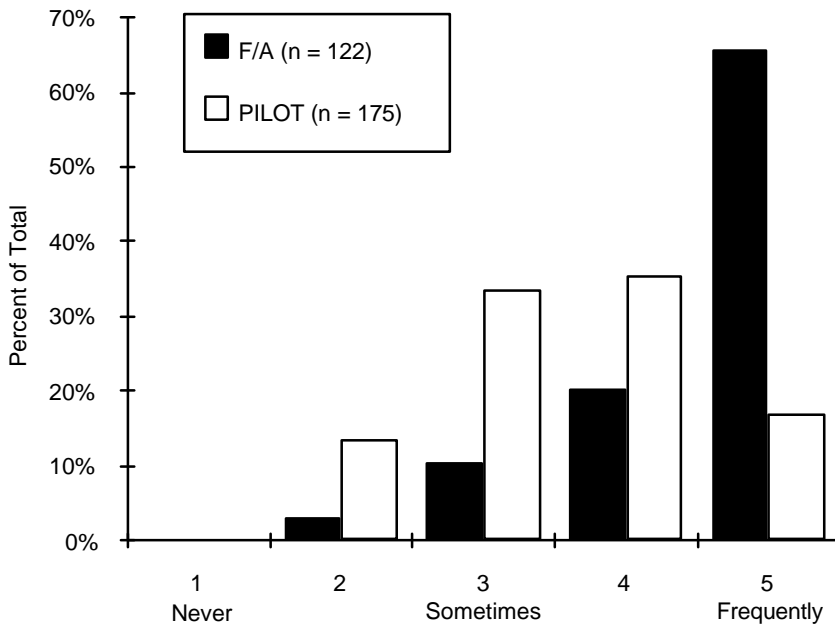


Figure 3. Frequency of flight attendant-initiated introductions to the flight-deck crew, as perceived by pilots vs. the flight attendants.

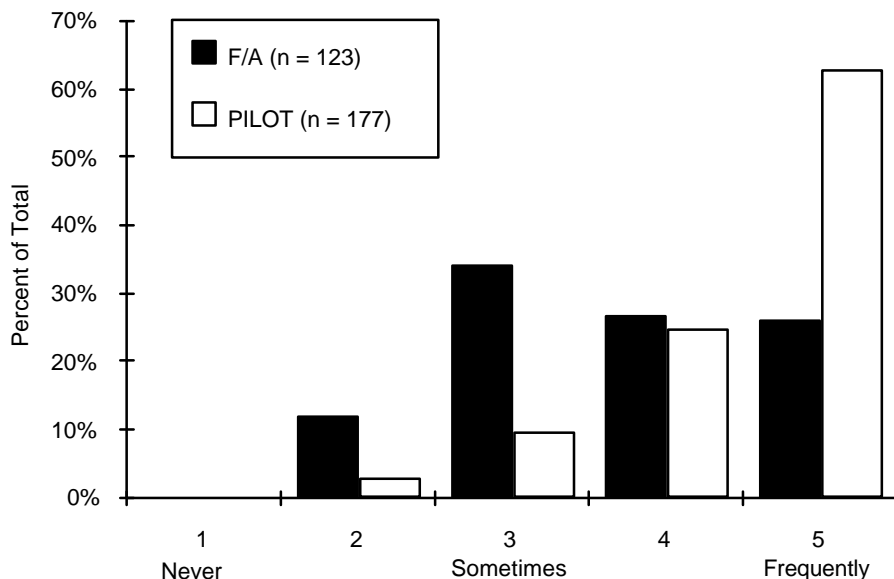


Figure 4. Frequency of pilot-initiated introductions to the cabin crew, as perceived by the pilots vs. the flight attendants.

Somewhat the same phenomenon can be seen in the data regarding self-introductions of the two crews. Figures 3 and 4 indicate that each group perceived itself as offering far more introductions than did the recipient group. By attending joint cockpit/cabin CRM instruction at several airlines, we learned that introductions from the pilots are not considered a trivial courtesy by the flight attendants. They consistently maintained that an introduction by the pilots was their "number one wish," as the following responses from flight attendants indicated when asked to complete the sentence "I like it when pilots . . ."

hold briefings - or at least introduce themselves and establish communication.

introduce themselves and give a short briefing regarding communication, etc. It shows respect.

introduce themselves, give us a briefing on what they like to do in emergencies. Let us know about any problems that may arise including weather and delays.

introduce themselves and talk a little before a flight. That way you know who you're depending on.

Likewise, pilots requested that flight attendants take the initiative to introduce themselves, although to a lesser extent. This is consistent with the findings of Merritt (1993) in a cross-cultural study of flight crewmembers. She found that U.S. pilots scored low relative to flight attendants on a dimension that measured the perceived importance of coordination between cockpit and cabin crew. Consequently, it appears that each crew often waits for the other's members to introduce themselves; however, in order to break this cycle someone must take the

initiative. Again we note that the obvious intervention strategy costs nothing, requires little training, and involves no compromises with other duties.

We asked not only about the desirability of a briefing, but what its content should be. Pilots and flight attendants agreed on the element of a briefing that they considered most important. We provided a list of six possible elements of a briefing and asked the crews to rank order their importance. They were also permitted to leave an element blank--that is, to assign no rank if they considered it totally unimportant for inclusion in a briefing. We obtained the total of the ranks assigned to each category, and in turn ranked these from 1 to 6, "6" representing the activity deemed most important.

Figure 5 displays the ranks assigned to the six briefing topics. Both groups assigned the highest rank to setting the tone for crew communication.

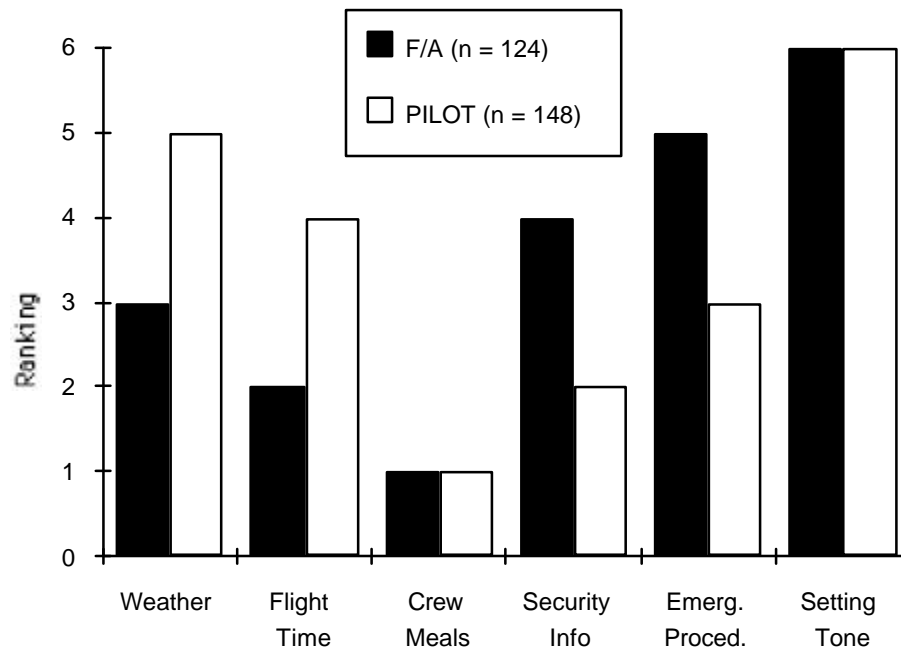


Figure 5. Ranks assigned to the importance of six elements of a crew briefing. High ranks indicate high perceived importance.

The frequency of those topics which crews would have left out of briefings altogether is displayed in Figure 6. Note that each crewmember could assign as many or as few blanks as he/she wished. Again crew meals heads the list. It is somewhat puzzling that some pilots also rejected emergency procedures and security information. The explanation for this is probably not that the topics were considered unimportant, but that they are covered annually in recurrent training, and further briefing may have been deemed unnecessary.

These results underscore the need for airlines to provide time, perhaps through check-in or aircraft boarding procedures, for crews to become familiar with each other, to discuss mutual expectations for the flight, and particularly to brief on any unusual circumstances pertaining to

that flight. Introductions allow a rapport to be established, and pave the way for more effective exchange of information as time permits.

Scheduling. Compounding the organizational obstacles is the fact that flight-deck and cabin crews often work together for only one or two flights of a sequence. As many as four or five different crews may work together in one day. Although there are schedules in some airlines where an entire flight crew may fly all of the trips in a month together, this appears to be the exception in the industry rather than the rule. Flight attendants and pilots have different union contracts with different work rules and duty periods which may intensify the dilemma.

If the findings of Foushee et al. (1986) that cockpit crews improve operationally with contact can be extended to the entire flight crew, it would follow that the quality of the working interactions would improve with more time together. The subjects in this study were queried as to whether they noticed any work-related differences when they were paired with the same crew for several legs of a trip, as opposed to one or two legs. Consistent with the findings of Foushee et al., the majority of crew members (78% of flight attendants, 72% of pilots) said that they do notice differences in the quality of interactions (see Figure 7). The difference between these proportions was not statistically significant ($\chi^2 = 1.11$, $df = 1$). Single-sample Z tests of the null hypothesis that the proportion of "yes" and "no" replies were equal ($p = .50$) were highly significant ($Z = 6.5$ for pilots and 7.3 for flight attendants). Thus we conclude that, based on this sample, it is safe to infer that pilots and flight attendants at these airlines feel that keeping cockpit and cabin crews together on a schedule for an entire day or trip is beneficial.

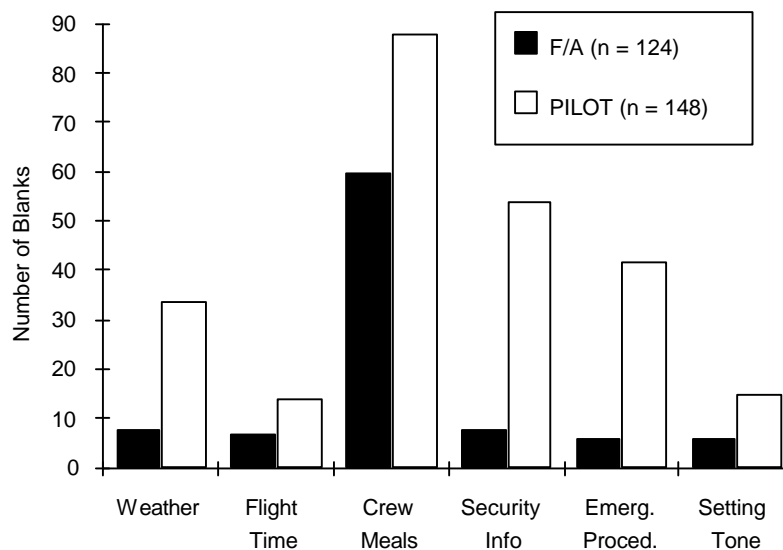


Figure 6. The number of blanks (in place of ratings) assigned to the importance of six elements of a crew briefing. A blank indicates the crew member felt the element had no importance.

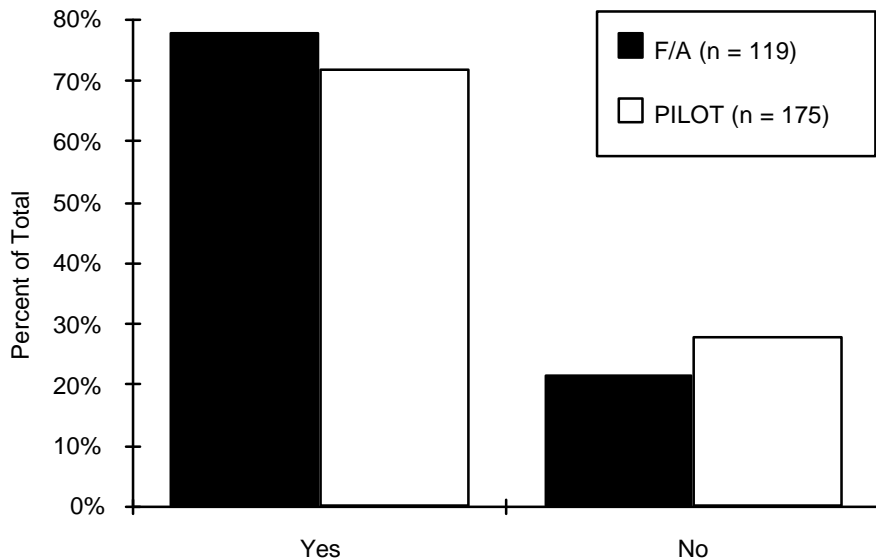


Figure 7. Frequency of yes/no responses to the question: "Do you notice work-related differences when crews are paired together for more than 1-2 legs?"

Representative comments regarding what the differences are included below:

Flight attendants:

Increased level of confidence and support.

You know who is who. You know how the flight deck crew flies - what is normal and what is not. You can depend on them for the things they do, e.g. Capt. Jones always tells us if it's turbulent, he taxis fast so be aware, his landings are hard, etc.

Pilots:

Cockpit and cabin crews learn what to expect from one another. Set routines, likes and dislikes, etc.

Carryover procedures and problems are understood, i.e. weather problems, passenger problems, delays, mechanicals etc.

Better communication and working relationship. More openness between crew.

Overall, the results of this analysis indicate that crew members prefer to have enough time to establish a smooth working relationship with one another. Responses indicate that there may be safety implications, especially in emergency situations. Further research needs to be done to measure the quantity and quality of interaction that occurs with greater familiarity and the impact on aviation safety.

Physical Separation

As mentioned previously, the cockpit door provides a physical barrier that results in a lack of awareness of each crew's normal duties and feelings of alienation. As one pilot put it: "I don't

like it when flight attendants feel that the door between us separates us and that we have separate duties that are not related." Because there is no visual contact unless one crew member enters the other's territory, pilots may be completely unaware of problems in the cabin, such as the severity of turbulence in the rear of the aircraft when it is fairly mild up front.

One manifestation of physical separation has to do with turbulence warnings. In a question regarding how often they encountered turbulence without warning from the cockpit (asked of flight attendants only), 87% responded that this occurred "sometimes" or more often (3 or greater on a 5-point scale). While there is no nationwide tracking system of flight attendant turbulence injuries, the available data indicate that a problem exists that should be addressed. In 1992, one major air carrier experienced 206 turbulence-related injuries to flight attendants, many of which resulted in broken bones, crushed ankles, and back injuries (as reported in a training session attended by the first author, 1993). In the second quarter of 1993 at another major carrier, there were 36 reports of turbulence-related injuries, 26 of which resulted in injuries solely to flight attendants (as reported in an airline memo, 1993). A recent analysis by the FAA found that turbulence is the leading cause of serious injuries to flight attendants and passengers in non-fatal scheduled U.S. air carrier operations (FAA, 1993).

In a related question, flight attendants were asked how frequently they call the cockpit and ask for the seat belt sign to be turned on if turbulence occurs and the flight deck has not turned it on. The responses were fairly evenly divided across each of the five categories on the 5-point scale running from "never" to "frequently" (see Figure 8). No statistical contrast is appropriate for these data.

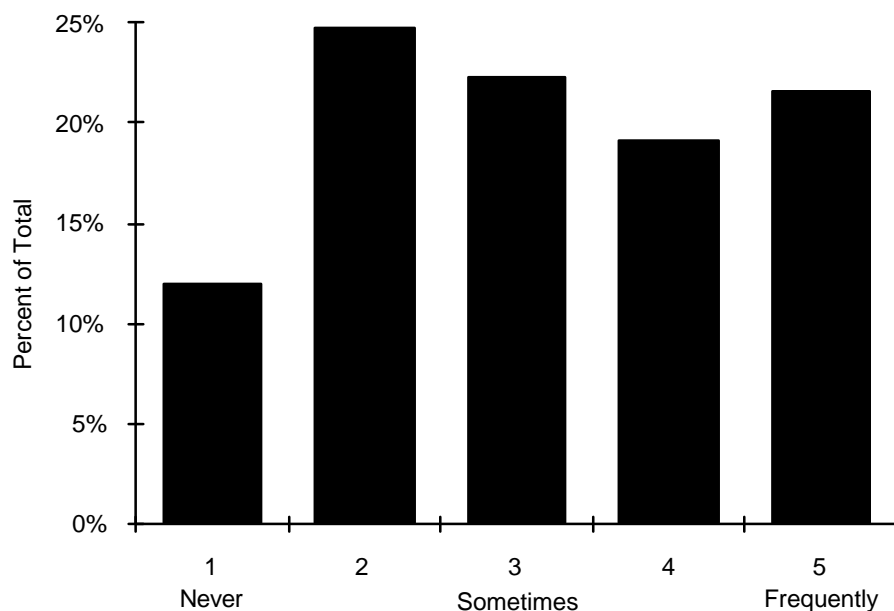


Figure 8. Responses of flight attendants to the question: "If turbulence occurs and the flight deck does not turn on the seat belt sign, how often do you call them and ask for it to be turned on?" (n = 125).

The results suggest that there is still substantial hesitation on the part of the cabin crew to contact the flight deck, even in conditions that may jeopardize their safety and that of their passengers. Future research is advised to determine how pervasive the problem is throughout the airline industry. A cause for concern is a response from a pilot completing the sentence "I don't like it when flight attendants. . ." He added, " Tell pilots to turn on seat belt signs." Perhaps all crew members need to be enlightened regarding the extent of the problem, and pilots to be reminded that turbulence can be far worse in the back of the aircraft than where they are sitting. As one flight attendant commented,

I can't tell you how many times I have been standing and gotten thrown around because of the turbulence. I know they (pilots) don't always know about it in advance. (But) I have had a flight deck insist that we do service when we could not stand without holding on to something.

Intervention Strategies. There are countermeasures for the lack of awareness of crew members' duties. These include joint training, and cockpit jumpseat rides for flight attendants. Southwest Airlines currently has a program whereby cabin new hires observe in the cockpit jumpseat for five hours. However, most airlines, citing economic reasons, do not have a program for flight attendants to ride in the cockpit. Many pilots who responded to the survey requested that flight attendants be allowed, or required, to fly one or two legs in the cockpit jumpseat to familiarize themselves with the normal procedures, workload, and learn more about the operation of the aircraft. Some pilots also suggested that they should have some cabin training themselves and perhaps work one flight in the cabin. This exchange of experiences could be invaluable in resolving many of the misperceptions and distrust that exist between the two crews. It is possible that many crew members would avail themselves of the opportunity to sample life on the other side of the cockpit door and would do so on their own time or as a part of recurrent training, in order to minimize the economic impact on the airline.

Joint CRM training has been initiated at some airlines and has been met with favorable reactions from crew members who participated in it. Many subjects suggested that joint training would be beneficial and should even be mandated by the FAA. At one airline represented in this survey, joint training was conducted for one year. Several crew members remarked that it was a good program and should be reinstated. The other airline has a popular CRM program for the pilots, and the pilots requested it be extended to the cabin crew. At the very least, joint training classes give the opportunity for crews to see each other as human beings with concerns about the professional conduct of their jobs rather than as "ogres" or "airheads."

GUIDELINES AND RECOMMENDATIONS

Based on our review of safety literature, accident and incident reports, attendance at four joint training classes, and data presented here, we have the following recommendations:

1. We strongly recommend that airlines institute some form of joint pilot/flight attendant training. If this is not possible, cockpit/cabin communication issues should be addressed in CRM classes.
2. The reorganization of pilots and flight attendants under the same administrative structure should be examined thoroughly.

3. Recurrent training should emphasize the criticality of crew briefings for pilots and flight attendants and specify that the briefings include those elements identified as important by the crews studied in this paper. Crew briefings should be emphasized in the training given to new captains.
4. Crew check-in facilities and procedures should provide for briefing of the two crews prior to passenger boarding.
5. Crews should observe the courtesy of a mutual introduction. We found that complaints regarding lack of introductions came up time and again and this problem has a remedy that costs nothing.
6. Cockpit jumpseat familiarization programs should be instituted for flight attendants. The emphasis should be on the opportunity for flight attendants to observe the great variation in cockpit workload.
7. While it is true that most pilots have spent time as passengers in the cabin, very few have ever systematically observed the work of the cabin crew. For this reason, we recommend as well that pilots observe or, even better, participate in cabin procedures as a part of training.
8. A concerted effort should be made by government agencies, air carriers, and unions to encourage flight attendant participation in the NASA Aviation Safety Reporting System. Cabin crews are an untapped source of safety data regarding issues such as cockpit/cabin interactions, turbulence injuries, evacuations, emergency equipment functionality, and passenger disruptions.

CONCLUSION

Our investigations have shown that a first step has been taken in confronting the problem of less-than-optimal communications between the two crews that operate an airliner. The CRM movement, which was born of the need to improve crew performance within the cockpit, has been easily extended to communication and crew coordination between pilots and flight attendants. Those who have received joint CRM training have been enthusiastic about its success; in fact, the refrain that we heard repeatedly as we visited airline training centers was the complaint that not enough time was devoted to the program.

Yes, many of the joint sessions turned into "gripe sessions." But that is instructive in itself, in that it revealed that just below the surface of at least well-mannered, if not friendly, relationships lurked a considerable hostility. Flight safety demands that this be brought above the surface and dealt with in a professional manner.

We have discussed in this paper numerous intervention strategies which may relieve some of the problems created by the distance between the two crews. Some may be expensive; joint training with pilots and flight attendants, and cockpit familiarization for cabin personnel carry a non-negligible price tag. Others are virtually cost-free: the common courtesy of an introduction to one's fellow workers, an adequate briefing in both directions, and an effort to familiarize one's self with the demands of the other person's job.

There are two critical safety obligations of the flight attendant. The first is to prevent accidents, primarily by means of the conveyance of information regarding hazardous conditions to

the flight deck. If the accident cannot be prevented, the second is to maximize its survivability. Both roles require effective communication between the two cultures.

REFERENCES

- Cardosi, K. M., & Huntley, M. S. (1988). *Cockpit and cabin crew coordination* (DOT/FAA Report No. DOT-TSC-FAA-87-4). Washington, DC: U.S. Department of Transportation. (NTIS No. DOT/FAA/FS-88/1).
- Chute, R. D., & Wiener, E. L. (1994). Cockpit/cabin communication: A tale of two cultures. In *Proceedings of the Eleventh Annual Aircraft Cabin Safety Symposium*. Long Beach, CA: Southern California Safety Institute, Inc.
- Chute, R. D., & Wiener, E. L. (in preparation). Cockpit/cabin communication: II. Shall we tell the pilots?
- Federal Aviation Administration. (1993). Turbulence injuries: U.S. air carrier Part 121 scheduled and Part 135 commuter operations for the period 1982-1991. Office of Integrated Safety Analysis: Washington, D.C.
- Foushee, H. C., Lauber, J. K., Baetge, M. M., Acomb, D. B.. (1986). *Crew performance as a function of exposure to high density, short-haul duty cycles*. (NASA Technical Memorandum 88322). Moffett Field, CA: NASA Ames Research Center.
- Kayten, P. (1993). The accident investigator's perspective. In E. Wiener, B. Kanki, & R. Helmreich (Eds.), *Cockpit resource management* (pp. 283-314). San Diego, CA: Academic Press.
- Mahler, G. (1991). *Legacy of the friendly skies*. Marceline, MO: Walsworth.
- Merritt, A. (1993). Human factors on the flight deck: The influence of national culture. Presented at the Seventh International Symposium of Aviation Psychology, Columbus, Ohio, April, 1993.
- Moshansky, V. P. (1992). *Commission of inquiry into the Air Ontario crash at Dryden, Ontario*. Toronto, Canada.
- National Transportation Safety Board. (1992). *Special Investigation Report: Flight Attendant Training and Performance During Emergency Situations* (NTSB/SIR-92/02). Washington, DC: Author.
- Vandermark, M. J.. (1991). Should flight attendants be included in CRM training? A discussion of a major air carrier's approach to total crew training. *International Journal of Aviation Psychology*, 1, 87-94.
- Wiener, E. L. (1988). Cockpit automation. In E. L. Wiener and D. C.. Nagel, *Human factors in aviation* (pp. 433-459). San Diego: Academic Press.
- Wiener, E. L., Kanki, B. G., & Helmreich, R. L. (Eds.). (1993). *Cockpit resource management* . San Diego: Academic Press.

Wiener, E. L., and Nagel, D. C. (Eds.). (1988). *Human factors in aviation*. San Diego: Academic Press.

AUTHOR NOTES

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FOOTNOTES

¹ Comments which follow that are not otherwise attributed are from questionnaire data collected by Chute and Wiener, 1994.