

Cockpit/Cabin Crew Performance: Recent Research

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Imagine, if you will, an island floating high, up above the clouds. . . On this island live two groups of people who barely know each other, have little in common, speak different languages, but are responsible for the welfare of the island.

On one tiny end of the island live the Technos. They are task-oriented, seldom leave their cramped quarters, and have few visitors. They speak a language that is largely unintelligible to outsiders, composed of words like: EICAS, VNAV, and stab trim. But they control the environment on the island (e.g. air, water, and temperature) and keep it afloat through many perils. They are revered by inhabitants and visitors alike.

On the rest of the island, separated by a wall, live the Dynamos. These people run all over the island and entertain constantly! Sometimes the visitors become unruly or weather problems create distress, but they usually manage the situations quite well.

Occasionally, there are dangers which threaten the island and it becomes important for the two peoples to pull together. However, they are so used to being independent, and have developed such different problem-solving strategies that sometimes it becomes difficult for them to remember to ask the others for help - much less to know how to work together.

Aboard an airliner, the flight-deck and the cabin crews are responsible for the same goals: the safety, efficiency, and productivity of the flight. In spite of these common goals, the two crews have evolved into two distinct cultures. The same cultural isolation felt by those island dwellers is experienced in the real world by crews on the commercial aircraft of today. This separation has resulted in communication and coordination problems between the two groups which can jeopardize flight safety (Chute & Wiener, 1994; 1995).

We shall cite some recent examples which illustrate that cockpit/cabin communication problems are still a reality. We shall also give an overview of our Five-Factor model of barriers that exist between the crews which inhibit information transfer. We report the findings of our recent analyses of open-ended data which we collected from pilots and flight attendants at two U.S. carriers. And finally, we recommend some starting points for crew training and end on a hopeful note of commonalty between the crews.

Safety Implications

In our previous research (Chute & Wiener 1994; 1995; in press), we discussed the catastrophic consequences of deficient crew communication. Accidents such as the Air Ontario F-28 at Dryden (Moshansky, 1992) and the British Midlands 737-400 at Kegworth (Air Accidents Investigation, 1990) represent tragic examples of opportunities lost for the exchange of critical safety information. There have been other more recent examples of communication failures between the flight-deck and cabin crew.

On July 9th of this year, an ATR aft passenger door separated after take-off at an altitude of 600 feet (NTSB, 1995b). The flight attendant at the door, stated that she did not think of calling the cockpit when she heard the sound of the door leak before it separated, because the aircraft was under sterile cockpit conditions (Code of Federal Regulations, 1994). When queried as to what conditions she would call the cockpit when sterile, she responded that she would in case of fire or a problem passenger. Confusion over and rigid interpretation of the sterile cockpit rule is not unusual as our studies have shown (Chute & Wiener, in press).

The power of PA (public address) announcements and importance of clear, unambiguous usage was demonstrated last year in an MD-82 evacuation at La Guardia. The captain made an announcement to the passengers that "we see no fire; be careful...go to the rear of the airplane... after you exit the aircraft." (NTSB, 1995a). Some passengers and flight attendants thought they heard that they should exit via the rear of the airplane. Consequently, a flight attendant inflated the slide in the tail cone which was pitched too high for the slide to reach the ground.

Most recently, in September, a DC-10 bound for Frankfurt inadvertently landed in Brussels despite the fact that both passengers and flight attendants were apparently aware of the error through cabin map displays (Phillips, 1995). According to this report, although the flight attendants were disturbed about the change of flight path, none of them contacted the pilots. Moreover, some of them speculated that they were being hijacked, but still did not attempt contact. When they finally began to seriously consider contact, they demurred because of their interpretation of the "sterile cockpit" rule which prohibits unnecessary conversation below 10,000 feet. The pilots were aided in making this mistake by a series of errors from air traffic control and their own expectation bias. Consequently, they were unaware of their error until they broke through the cloud cover at the outer marker. As in the Kegworth and Dryden accidents, the cabin crew had knowledge which

could have influenced pilot decision-making, but still deferred to the expertise of the pilots and the authority of federal regulations.

Cultural differences influence the perceptions and expectations of each crew. We shall briefly enumerate some of those differences before proceeding on to the methodology and results of this study.

Crew Differences

An analysis of the geography of the aircraft and demography of the crews reveal differences in the flight experience of the crews (see Table 1). In fact, if you look at almost any dimension, you can see differences, if not the polar opposite, in the other crew. One caveat: we are speaking here in *generalities* and in *relative* terms not absolutes. However, this table discloses striking differences which influence the flight experience and behavior of each crew.

Dimension	Cockpit	Cabin
Gender	mostly Male	mostly Female
Age	mostly 30-60	mostly 20-40
Workspace	Confined	Spacious
Physical Activity	Stationary	Active
Noise level	relatively Quiet	relatively Noisy
Terminal Workload	High	Low
Cruise Workload	Low	High
Cognitive Orientation	Technical	Social

Table 1. Relative crew differences by dimension.

Five-Factor Model

Chute and Wiener (1994, 1995) have described a Five-Factor Model of the barriers that exist which impede the flow of information between the cockpit and cabin (see Figure 1).



Figure 1. The Five-Factor Model of barriers to cockpit/cabin communication.

As can be seen, we are looking at the flow of information between the crews in both directions. Additionally, there can be overlap between these factors, thus they are not mutually exclusive. A brief description of each factor follows.

Historical.

In the nearly 70-year history of the commercial airline, traditions and roles have evolved which influence the crews of today. The original aviators were intrepid pilots who risked life and limb to deliver the mail for the U. S. Post Office. Despite primitive aircraft and the lack of radio guidance, those independent, self-reliant fliers persevered. In contrast, the original flight attendants were nurses and were selected to be compliant and subservient. Therefore, two very different types of people were called upon to work together in close proximity to one another. A rigid chain of command was adopted from the military and maritime traditions and the pilots and stewardesses were relegated to separate departments. Moreover, the early flight manuals instructed crews not to converse (Mahler, 1991; Chute & Wiener, 1994; 1995). Remnants of those guidelines are still in evidence today.

Physical.

The cockpit door separates two completely different physical environments which prevent direct contact unless one person enters the other's domain. On the one hand, the cockpit is a confined environment, is relatively quiet, and the personnel are stationary in the performance of their tasks. The cabin, on the other hand, is more spacious, relatively noisy, and the personnel there are active and socially interactive in the performance of their responsibilities. The differences in environments impact each crew's behavior and expectations and can contribute to clashes when an individual projects his or her own perspectives on that of the other crew. The physical barrier of the cockpit door also exacerbates an unawareness of the workloads, duties, and responsibilities of each crew.

Psychosocial.

The psychosocial factor incorporates such attributes as age, gender, attitudes such as territoriality and mistrust, cognitive orientations, and cultural influences. It also can be manifested as organizationally-induced cliques such as A-pay scale vs. B-pay scale personnel and even those, at one regional airline we visited, who prefer morning bids to evening bids. Additionally, CRM facilitators at America West found pilots to be task-

oriented while flight attendants were found to prefer an affective style of problem-solving (Vandermark, 1991).

Regulatory.

As we reported in a previous paper (Chute and Wiener, in press), the sterile cockpit regulation is one of the most misunderstood and misapplied of the FARs. This regulation results in another barrier which crews are loath to surmount and court a federal violation. Therefore, cabin crews err on the side of caution and do not contact the pilots even when they have legitimate cause for concern and reason for contact.

Organizational.

The most visible organizational obstacle is the separation of crew members into two departments at most carriers. The segregation has resulted in discrepancies in manuals, procedures, and training between flight-deck and cabin crews. Additionally, separate unions promote contractual differences (such as hotels, limo pick-ups, and crew meals) which engender resentment and inter-group conflict.

Method

In order to investigate the status of crew interactions, we conducted a survey of 302 crew members: 177 pilots and 125 flight attendants at two US airlines. The instrument utilized was a 30-item questionnaire composed of multiple choice, 5 point Likert-type scale responses, and open-ended questions. Many of the analyses of the objective items have been previously reported (Chute & Wiener, 1994; 1995; in press). Consequently, this paper will focus on the analyses of the open-ended items.

A total of 800 surveys were randomly distributed in employee mailboxes and stamped return envelopes were provided for direct return to the authors at NASA Ames Research Center. No names or identification numbers were collected to ensure subject anonymity and confidentiality. The data were collapsed across the airlines since we were not interested in the differences between the airlines. Two carriers were used only to increase the sample size.

The open-ended questions are listed in Table 2. The first step in the analysis of the open-ended comments was to read the comments for each question and establish response categories. Categories were taken from the actual responses with as little inference as possible in order to preserve the integrity of the data. Therefore, there may be some overlap in categories. However, since open-ended replies do not always fall into neat categories, some judgment of the data was needed in the analysis. With the categories established for each question, we next transformed each comment into one or more of the categories. For example, to question 1, a pilot or flight attendant might respond to two or more categories. The categorization was iterative until the raters agreed.

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1. Do you think it would be beneficial to have both flight-deck and cabin crew members under the same department? Why or why not?
 2. Do you notice any work-related differences when you are paired with the same flight-deck (or cabin) crew for several legs, as opposed to 1 or 2 legs, of a trip? If so what are they?
 3. Complete the following sentence: “I like it when pilots (or flight attendants)...”
 4. Complete the following sentence: “I don’t like it when pilots (or flight attendants)...”
 5. In your opinion, what could be done to improve cabin/cockpit communication?
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Table 2. Items for which open-ended responses were analyzed.

In the analyses of the open-ended questions, two independent raters were used to code the responses according to categories that were set up from the data. A third rater resolved any disagreements. Typically, we would look for an inter-rater reliability of 85% or greater, however due to the large number of categories for some items and the infinite number of possible answers, we shall report some results with lower reliability scores. Given the aforementioned conditions, we feel that those results are still quite compelling. We will be reporting a subset of the categories consisting of the top 80% of the responses.

Results and Discussion

Organizational Factor.

Two of the items which contained supplemental open-ended information concerned the organizational factor. The first addressed the departmental obstacle in which crews are administered by different departments with different emphases. The departmental separation also leads to discrepancies in training, manuals, and procedures. The second organizational factor addressed was crew scheduling and pairing practices. At most carriers flight deck and cabin crews are not paired together, frequently leading to crew changes every leg or so of a flight sequence.

Departmental Unification. In order to determine crew member experience with departmental segregation, we asked them the following question: “*Do you think it would be beneficial to have both flight-deck and cabin crew members under the same department? Why or why not?*” Sixty-eight percent of the flight attendants and 63% of the pilots agreed that a single department would be beneficial.

In discussing their reasons for feeling that unification would be positive, the flight attendants cited improved group cohesion as the primary benefit (see Figure 2). This included comments that stated there would be a better relationship, better interaction, and

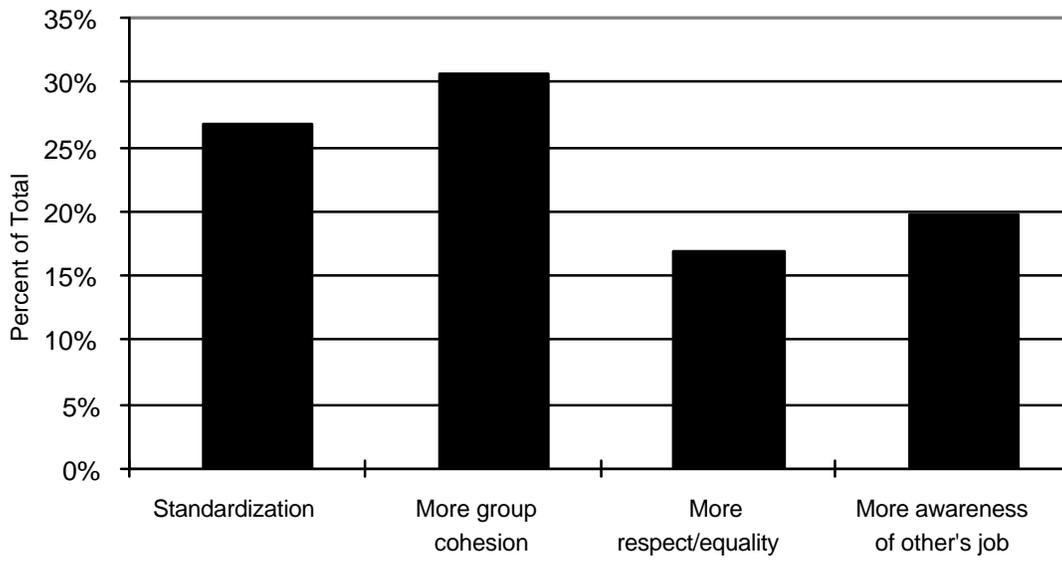


Figure 2. Perceived benefits of departmental unification according to flight attendants.

more unity. Running a close second was the standardization of information, rules, procedures and manuals for both crews. Flight attendants also felt that working under the same department would lead to a better understanding of each other's jobs and responsibilities and that there would be more respect for each other and a more egalitarian atmosphere would be achieved.). The reliability estimate for the twelve topic categories was 71%.

The pilots cited standardization of manuals, procedures, and information as the primary benefit of unification (see Figure 3). They foresaw improved crew interactions as an advantage of such an arrangement. Both pilots and flight attendants who were not in favor of consolidation of the departmental structure reasoned that the jobs are too different. They also mentioned that the two jobs incorporate different responsibilities, roles, and issues. The reliability estimate for the twelve categories was 78%.

Clearly, the crew members perceive that the two separate departments are not communicating well concerning training and procedural changes. In fact, the third most prevalent outcome that the pilots saw in favor of integration was better communication between department heads and other internal communication.

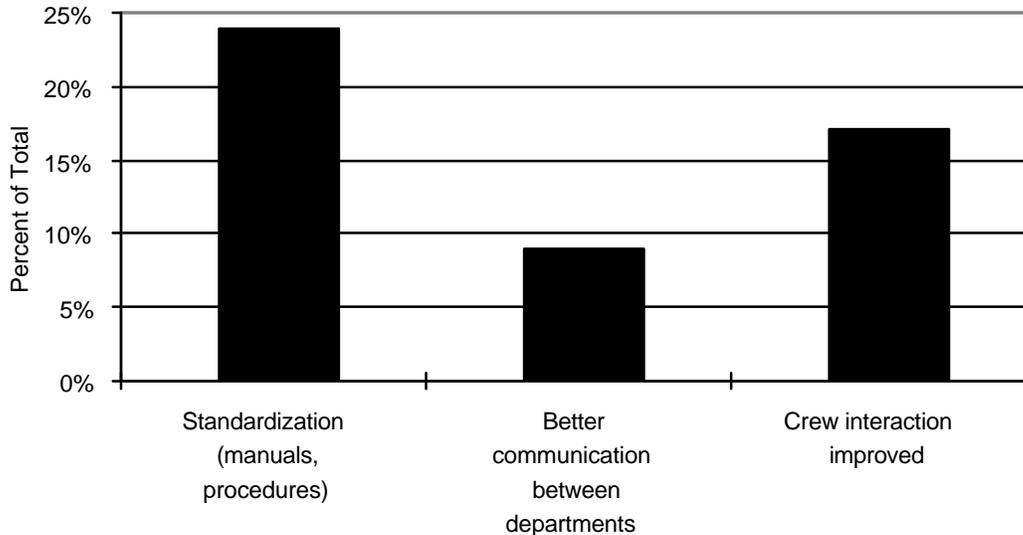


Figure 3. Perceived benefits of departmental unification according to pilots.

Traditionally, pilots and flight attendants have been assigned to separate departments within an airline. The pilots are usually under a vice-president for flight; safety and technical flying are emphasized. Flight attendants are typically under a vice-president for marketing or public relations; passenger service and public image are emphasized. This can result in conflicting goals, inconsistent instructions and manuals, and lack of communication. We have argued in previous papers (Chute and Wiener, 1994, 1995, in press) that such organizational segregation also de-emphasizes the safety function of the cabin crew. If safety is truly the primary responsibility of the cabin crew, then they should probably be in the same department as the pilots. As an example, we pointed out one airline's inconsistent manuals in a most critical area, preparation for cabin evacuation (Chute and Wiener, 1994).

Crew Pairings. Crew scheduling is another barrier which serves to exacerbate the isolation of the crews. Crews often spend only one or two legs together, leading to several crew changes a day in some systems. Under a dual scheduling system, there is little opportunity to develop a rapport and to become familiar with expectations and preferences.

Crew members were asked the following: *Do you notice any work-related differences when you are paired with the same flight-deck (or cabin) crew for several legs, as opposed to 1 or 2 legs, of a trip? If so, what are they?* The response to the first question was "Yes" by both groups (78% flight attendants; 72% pilots). The five coding categories used for the reasons were the same for both groups: better communication, familiarity (expectations, habits), social relationships (friendliness, rapport), improved work relationship (teamwork, support), and generally better overall (see Figure 4). Interrater reliability estimates for the coding categories were 89% for the cabin crew responses and 85% for the pilot responses.

Over 35% of the flight attendants and over 25% of the pilots stated that communication is improved and that there are fewer misunderstandings. However, the primary benefit of extended crew pairings, as perceived by the pilots, is a friendlier interface with the cabin crew and an improved rapport. Both groups found that familiarity with each other's expectations and work habits was an additional major benefit.

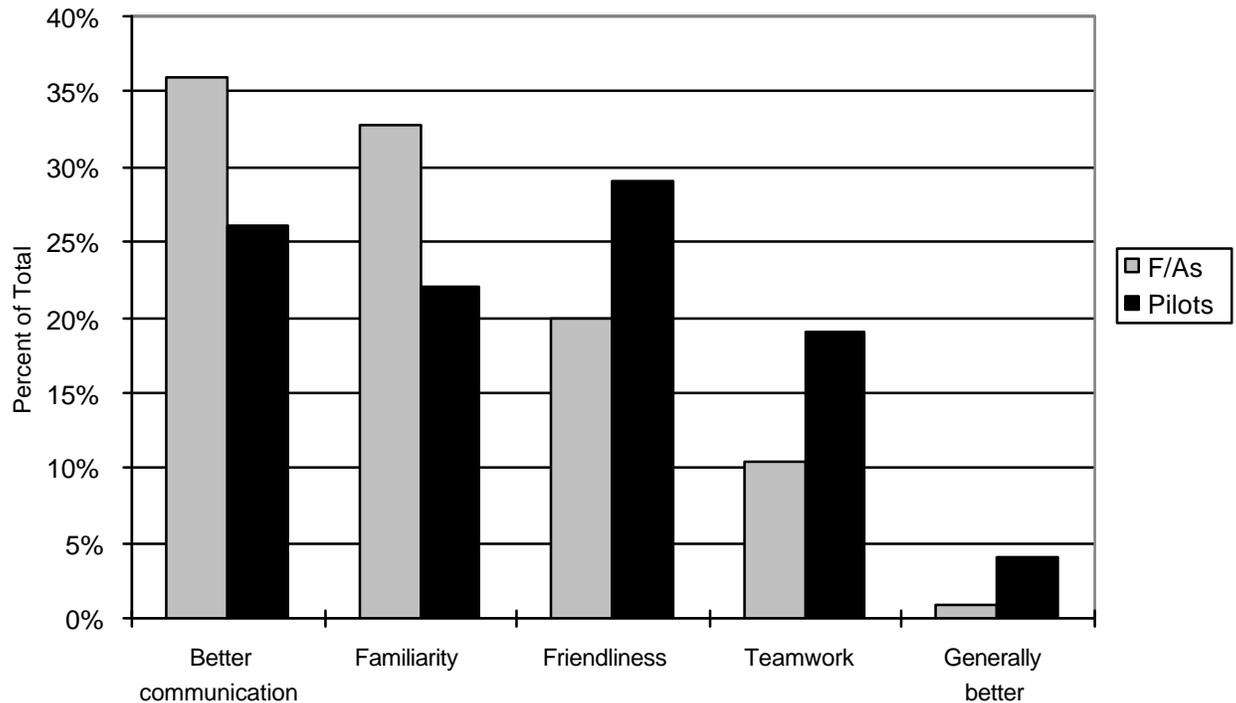


Figure 4. Perceived benefits of prolonged crew pairings by flight attendants and pilots.

Likes and Dislikes

Information transfer and the lack of information exchanged was a recurring theme voiced by both groups. Crew members were asked to complete the following sentence: "I like it when pilots/flight attendants...". Inter-rater reliability estimates for the 15 flight attendant-response categories were 91% (see Figure 5). The reliability estimate for the 16 pilot response categories was 90% (see Figure 6).

Flight attendants' first preference (19%) was for pre-flight briefings in order to be aware of pilots' expectations and preferences regarding sterile cockpit, emergency procedures and any anomalies during flight. Pilots preferred to be kept informed of any and all important information during the flight and asked for open communication (25%). While the next priority for pilots (19%) was that the flight attendants exhibit a friendly, positive attitude, surprisingly, it was more important to the flight attendants that the pilots keep the passengers informed (18%) than themselves (12%)! Both crews agreed that the

third priority was for the others to introduce themselves (15% F/As; 15% pilots). The next most frequent problem (12%) encountered by the flight attendants was that they are not receiving enough information from the pilots including a lack of noise-abatement or turbulence warnings and reasons for operational deviations such as delays or go-arounds. And finally, the pilots said that they like it when (10%) flight attendants come up to the cockpit to check on them and bring them food and beverages during flight.

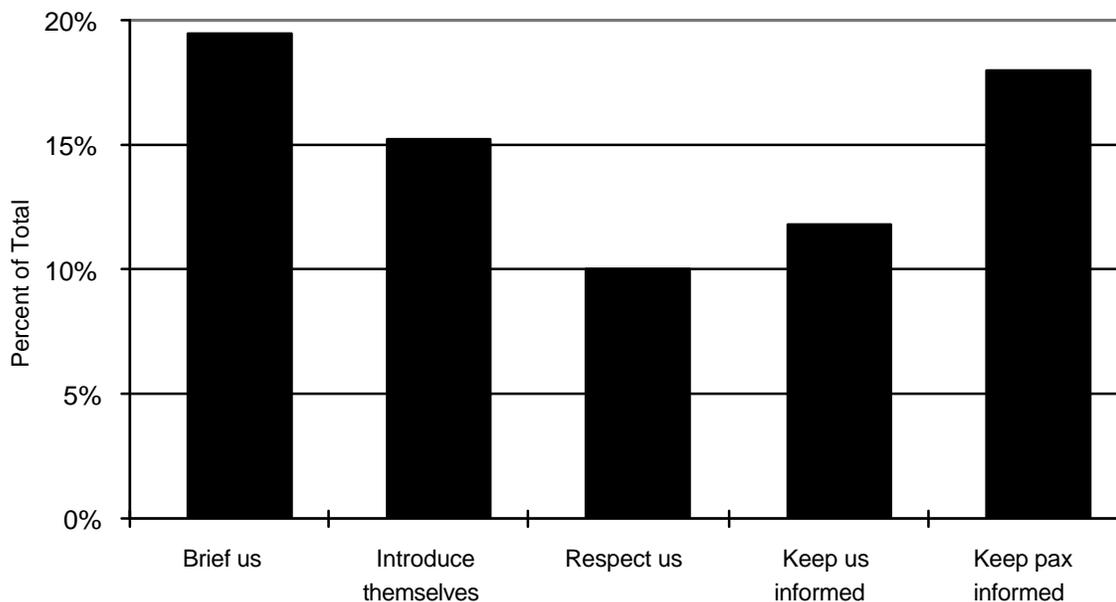


Figure 5 . Flight attendant responses when completing the phrase “I like it when pilots...”

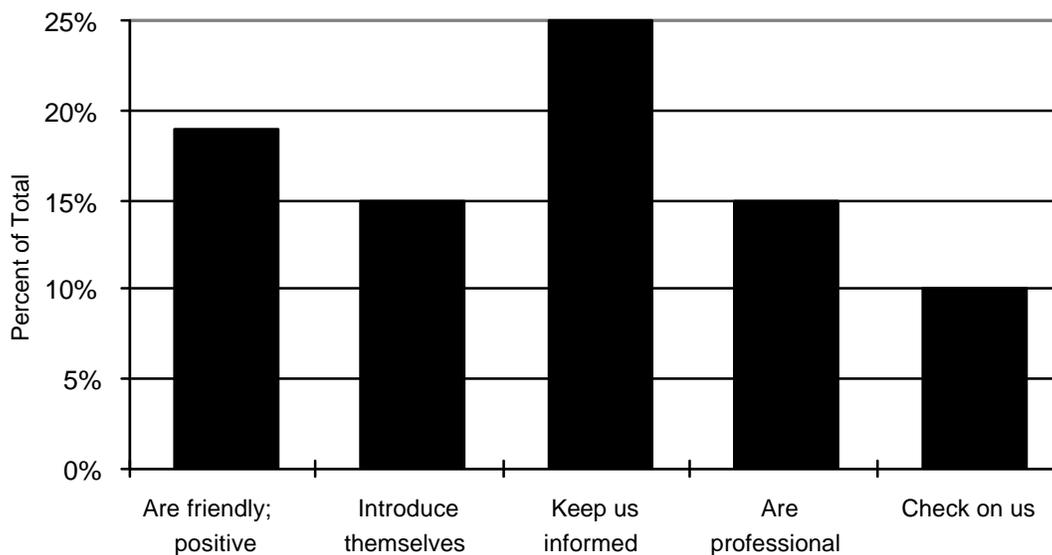


Figure 6. Pilot responses when completing the phrase “I like it when flight attendants...”.

Crewmembers then completed the sentence “I don’t like it when pilots/flight attendants...” (see Figure 7). Over one-third (36%) of the flight attendant responses included complaints about the treatment of flight attendants by pilots as disrespectful. This encompassed comments that they don’t like it when pilots are rude, aloof, non-responsive, demanding, and board the aircraft late. Twelve percent of the responses included statements that they don’t like it when the pilots ignore them, treat them as two separate crews, brief only the lead flight attendant, or do not brief at all. And ten percent said that they don’t appreciate it when pilots seem unaware of cabin crew workloads and priorities (e.g. calling for beverages during the passenger service). Reliability estimates for 15 categories of flight attendant responses were 85%.

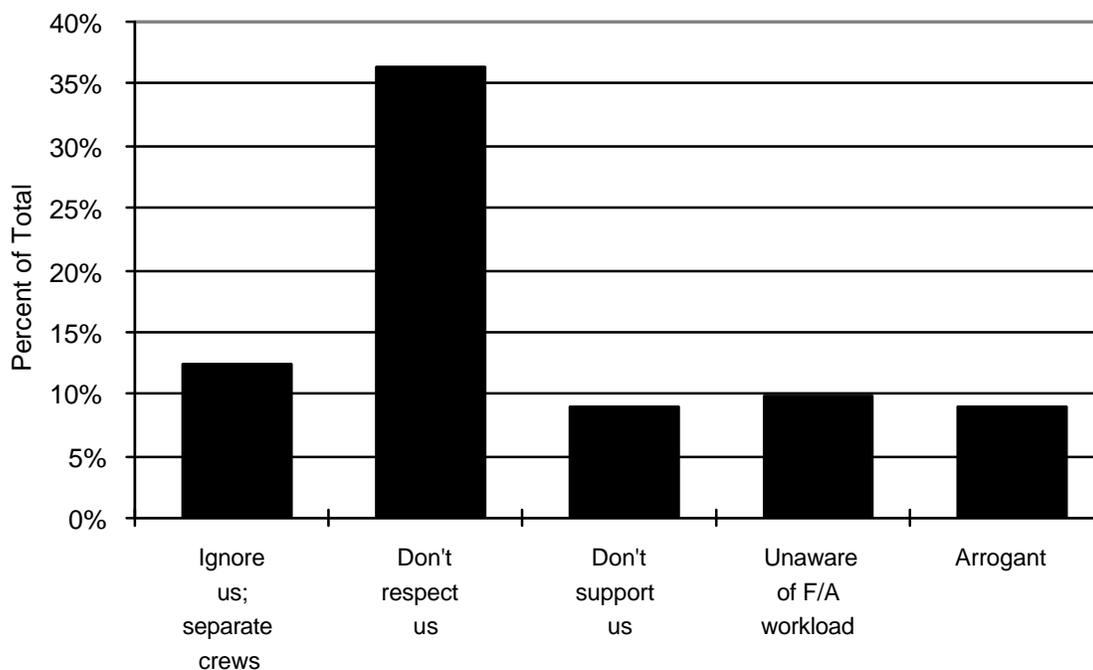


Figure 7. Flight attendant responses when completing the sentence “I don’t like it when pilots ...”.

The most frequent complaint from pilots was that they don’t like it when flight attendants ignore them (see Figure 8). This was defined as hiding in the back of the airplane, snubbing them, not checking on them, not visiting the cockpit, and not bringing them food or beverages. The next most frequent complaint (12%) was that they don’t like it when flight attendants exhibit negative attitudes or are bitter or in bad moods. And tied for second place (12%) was that the pilots don’t like it when they are not kept informed, when flight attendants don’t communicate, and when they wait until the end of a trip to tell the pilots about a problem. The third most frequent complaint (11%) was that they don’t like it when flight attendants do not show the pilots respect. Included in that category were comments that they don’t like it when the flight attendants are rude, unfriendly, hate pilots, are stuck up, aloof, arrogant, and treat the pilots with disdain. Coding reliability estimates for the 18 categories of pilot responses were 86%.

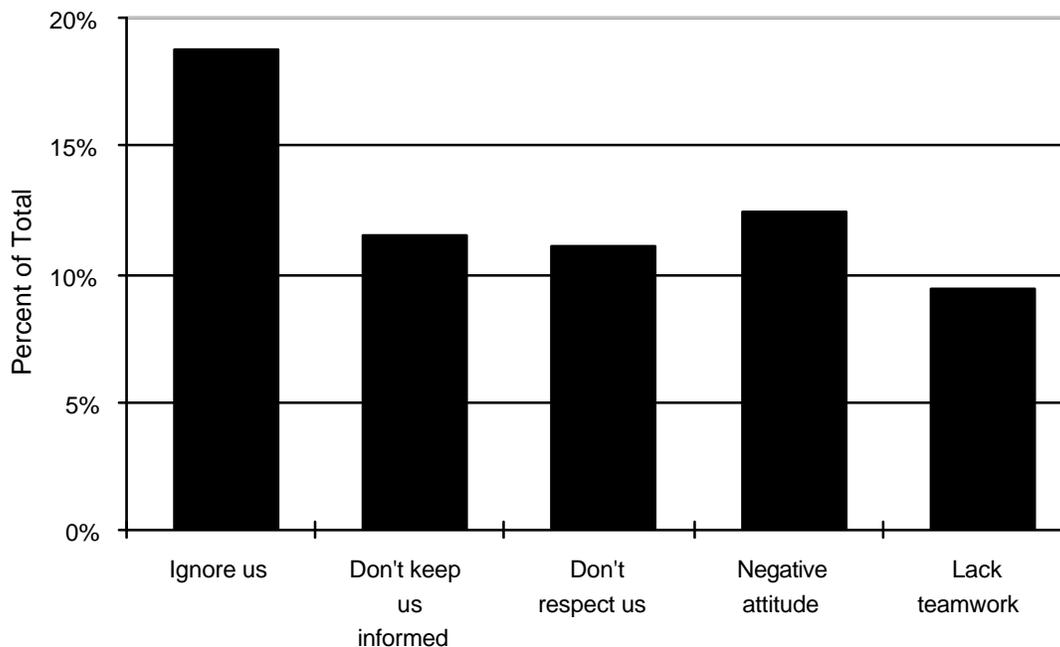


Figure 8. Pilot responses when completing the sentence “ I don’t like it when flight attendants...”.

Improving Cockpit/Cabin Communication

Finally, the crew members were asked what they thought could be done to improve cockpit/cabin communication (see Figure 9). The primary (28%) request that the cabin crew made was for mandatory briefings and introductions. Secondly, they asked for more respect (16%) which included less arrogance on the part of pilots and a more egalitarian atmosphere throughout the company. The third most frequent recommendation (13%) was for more understanding and awareness of each other’s duties, responsibilities, and workloads. They also requested joint training (11%), to teach both pilots and flight attendants communication skills (11%), and to emphasize communication and leadership in training as safety issues. The reliability estimate for the flight attendant responses was 80% with 14 coding categories.

Some examples follow:

- Make cockpit to cabin briefings more important. By that, I mean insist that pilots conduct them and not think of them as a chore but tell them that it helps make us more comfortable approaching them in situations when we think approaching them might piss them off.
- I would say that cabin/cockpit crew briefings should be made mandatory; but I think they already are mandatory, and briefings are rarely conducted!

- **COMMUNICATION!!!** That is the key! No egos, no “you’re better than me”, we’re in this together. I don’t fly the plane, however, I’m as responsible for every passenger as they are. Respect for my career would be nice.

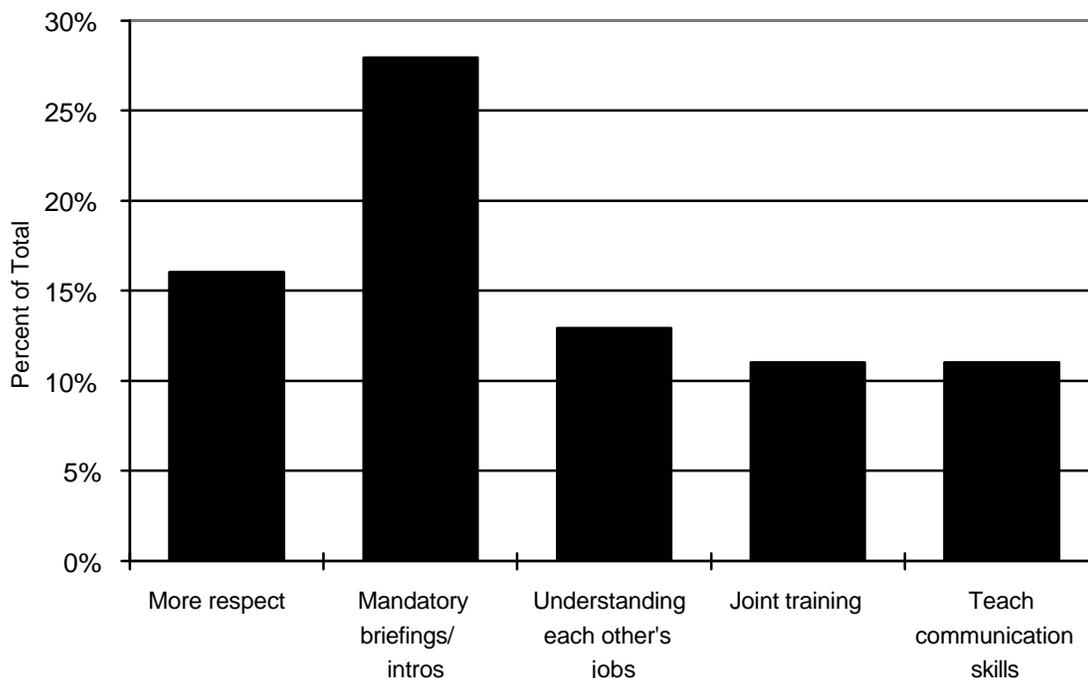


Figure 9. Flight attendant perceptions of what could be done to improve cockpit/cabin communication.

- Basically, if we had the same work rules and benefits that the pilots have, there would be less friction between the two groups. The company tends to treat pilots with respect and the flight attendants more like school children.

The primary recommendation of the pilots was for joint CRM training with the flight attendants (17%; see Figure 10). The second most frequent request (14%) was that the flight attendants be educated as to the duties, responsibilities, procedures, and workload of the pilots. The third recommendation (12%) from pilots was to mandate pre-flight briefings and introductions. It was their feeling that without briefings being mandated and supported by corporate policies that they just do not and will not occur. The inter-rater reliability estimate for the 16 categories of pilot responses was 82%

The following are examples of the pilot replies:

- I personally have never witnessed a flight crew briefing with the flight attendants. In the Air Force, this was mandatory (I flew a transport C-141)

and was very detailed. They showed us NASA films (in the Air Force) that left the impression this was an integral feature of airline flying but it's not. If the briefings are done, which I have never witnessed, they must be done informally when the captain arrives at the airplane. My father flies for another airline and noticed the same problem with a more pronounced lack of crew communication during trips (he flies the 747). There was also some animosity directed towards

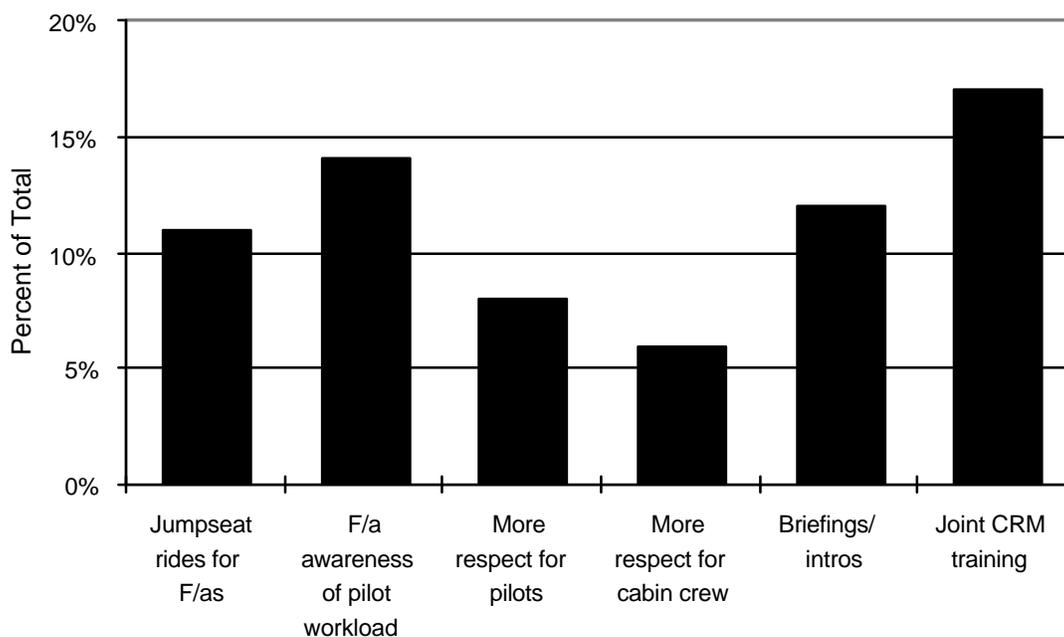


Figure 10. Pilot perceptions of what could be done to improve cockpit/cabin communication

the pilots. He decided to start each trip by meeting all the flight attendants when they had their F/A briefing. He would listen in on theirs and then he would give his. Many were skeptical at first but later it began to be very much appreciated. But he sees the same thing at his airline as I see at my airline. There are no briefings and the pilots and F/As do their jobs in isolation. I believe this limits the captain's authority and his ability to command in an emergency situation. I think this is a **BIG PROBLEM!**

- The majority of F/A's feel that pilots have little, or no, respect for their jobs, (F/A) and if the pilots are not very good (or interested) at actively dispelling that belief (it needs to be done before every pairing or every crew change). The F/As show little interest in true communication. "They're just going to

poo-poo us anyway, so to hell with 'em." When my cabin crews realize that I really consider them part of "the team", that I want lots of communication and that when it comes to operation of the flight, there's no such thing as a "sterile cockpit" on my planes, they're overjoyed to join us. We all want to do a good job - it ain't that tough.

Conclusions

We have identified many barriers which isolate and alienate the cabin and flight-deck crews. Some of the barriers are manifested in situations which can jeopardize flight safety. We have summarized some of the dimensions on which the crews differ which impact their experience and behavior during flight. The Five-Factor Model describes pervasive and dominant influences which have shaped the two cultures. Some of these factors, such as historical and psychosocial, are resistant (if not impossible) to change. But other factors, such as regulatory and organizational, are more easily ameliorated. Technology may lend a hand in the future to diminish the effect of the physical barriers. Compensation devices may be on the horizon which would enhance situation awareness without the necessity of intrusion into the other crew's domain.

While the examination of the data has focused on the differences and division between the crews, these recent analyses have illuminated some common ground which the crews share. We call it "The Three I's". In the responses to the "I like it..." and "I don't like it..." items as well as recommendations for improving crew communication, both crews stated emphatically that they want the following:

1. To be kept **I**nformed,
2. **I**ntroduce yourself,
3. Don't **I**gnore us.

We see this as a starting point for training departments to begin to build a bridge between the crews. After the groups understand how they are different and why (e.g. that the other crew is busy - not rude), they can begin to appreciate that they actually want some of the same things! If a crew member will initiate an introduction, he or she can be reasonably certain that the other individual will appreciate the effort. If a flight attendant brings information to the cockpit, or a pilot calls the back with information, the recipient probably wants her/him to do so and will welcome the interruption. And if an attempt is made to acknowledge the other as a team member, the endeavor will, in all likelihood, be reciprocated.

One of our previous recommendations (Chute & Wiener, 1994, 1995) was that the reorganization of pilots and flight attendants under the same administrative structure should be thoroughly examined. Admittedly, unification would be an ambitious undertaking. Failing implementation of departmental integration, we recommend a systems approach: The creation of a position, possibly in the Safety Office, as liaison between the flight operations and inflight departments. It would be the responsibility of

this person to review manuals, training, and pending procedural changes to ensure consistency and standardization. Additionally, this person would add reinforcement to the team-building philosophy, between recurrent training sessions, by the issuance of bulletins and other educational instruments to the crew members designed to minimize the friction, facilitate understanding, establish links, and enhance communication between the two groups.

We are pleased to report that one of our previous recommendations, a user-friendly Aviation Safety Reporting System form for cabin crews, is nearly a reality. We hope that carriers will encourage its use by flight attendants and anticipate that a wealth of safety information will be obtained concerning incidents such as turbulence injuries, inadvertent slide deployments, unruly passengers, and cockpit/cabin crew communication problems.

To train crews, either explicitly or implicitly, to avoid each other is an obsolete concept. We can no longer afford the separation mandated in early crew manuals and tolerated by the two cultures today. We must teach crews that communication and cooperation are safety issues. If “zero accidents” is truly the goal of the aviation community, we must encourage professional, mature, unambiguous, and open communication between pilots and flight attendants. Anything less is a compromise with flight safety.

Acknowledgments

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