COMMUNICATION IN AIRCRAFT CABIN SAFETY: LESSONS LEARNED AND LESSONS REQUIRED

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On March 31, 1985, a young man boarded an Air New Zealand flight in London for his home in Oakland, California. The plane stopped in Los Angeles, where U.S. bound passengers were to deplane and board other flights for their domestic destinations, then boarded new passengers and reboarded transiting passengers for the onward flight to Auckland. He became convinced that the Air New Zealand crew was directing Oakland-bound passengers into a transit area, where he headed, then later reboarded with the rest of the New Zealand bound passengers. Airline personnel claim that he was asked twice if he was going to Auckland, and twice answered in the affirmative. His explanation was that the New Zealand-accented crew didn't say Auckland, but rather, they said Oakland. It was not until sometime after takeoff that he realized his error, but it was too late, and he found himself in New Zealand's largest city at the end of his flight. The next day the airline flew him home—to Oakland—from Auckland at no charge (Baker, 1985, April 11).

Communication has long been suggested as a critical issue in human interaction as can be seen in the above example. Communication is also essential for organizational and managerial performance and success. Chester Barnard, the father of management theory, stated that the primary function of a manager is to develop and maintain a system of communication (Barnard, 1938). Herbert Simon, a Nobel-prize winner in economics, feels that communication is essential to the functioning of an organization, especially with regard to effective decision-making (Simon, 1957). Indeed " . . . information flow is the 'lifeblood' of an organization. In order for decision makers to arrive at the best possible decisions from a set of alternative decisions, accurate information is a necessity" (Sussman & Krivonos, 1976, p. 1). Whetten and Cameron (2002), in their popular management textbook, outline the importance of communication in the organizational context in their review of the topic.

As in any human endeavor, communication plays an integral part in aviation and air travel, from the perspective of an individual passenger (as the above incident illustrates) from the perspective of airlines as organizations, from the perspective of the airplane crew as an organizational unit, and from a systems view of aviation safety in general. Consequently, communication is a crucial factor in aviation safety. Young (1994) made this connection when she indicated that: "The overall objective is to prevent accidents through improved communication in air carrier operations, and keep safety at the highest possible level" (p. 14). The importance of communication for cabin crew is emphasized by Chute and Wiener (1995), who feel that flight attendants can help prevent accidents by forwarding information about possible dangerous situations to the flight deck, and if an accident cannot be prevented, to use effective communication to maximize survivability.

Kanki and Palmer (1993) highlight the importance of communication in aviation safety when they state that " . . .we would like to underscore the importance of communication for efficiency and safety in aviation . . ." (p. 99). They further that note that: "By now it should be evident that communication at its simplest is a multi-faceted, slippery concept. It is clearly a means to an end; that is, communication is required in accomplishing the flying task" (Kanki & Palmer, 1993, p. 129). While communication, in its multi-faceted nature, can have myriad functions in a variety of settings and situations, Kanki and Palmer (1993) provide an excellent overview of the function communication plays in aviation and aviation safety, especially as it affects crew performance:

1. Communication provides information.
2. Communication establishes interpersonal relationships.
3. Communication establishes predictable behavior patterns.
4. Communication maintains attention to task and monitoring.
5. Communication is a management tool. (p. 112)

This paper will briefly explore the evidence regarding the role of communication from the flight deck in aircraft accidents and incidents, but will focus on how communication operates in the cabin with regard to safety, and the part that communication plays in cabin-cockpit operations, especially as communication functions to provide information, establish interpersonal relationships, and as a management tool. Lessons learned from these areas will be used to propose future communication-related research needed in cabin safety and possible topics and methods of communication training for improved cabin safety.

LESSONS LEARNED

LESSONS FROM THE COCKPIT

The Tenerife tragedy, the worst crash in aviation history, can be attributed to communication causes. Other high profile accidents, including the Avianca crash in Jamaica Bay near JFK and the American Airlines crash in Columbia in 1995, are also, at least in part, the results of communication problems. The evidence is not simply anecdotal—the effect of communication on safety in aviation has been firmly established (see, for example, Cushing, 1994; Federal Aviation Authority [FAA], 2004; Faith, 1996; Foushee, 1984; Foushee & Helmreich, 1988; Helmreich, 1997; Kanki & Palmer, 1993; Kayten, 1993; and Weiner & Nagel, 1988).

Helmreich and Foushee (1993) provide the often-cited figure of close to 70% of aircraft accidents involving human error, listing several specific accidents as examples. They go on to state that: "The theme of these cases is human error resulting from failures in interpersonal communication" (Helmreich and Foushee, 1993, p. 21). The FAA continues to estimate that human error is a contributing factor in 60-80% of all air carrier incidents and accidents, citing ineffective communication and other communication-related indicators as underlying causes of such human error (FAA, 2004).

Communication-related issues, since its inception have comprised a sizeable portion of NASA's Aviation Safety Reporting System [ASRS] (nearly 80% of aircraft mishaps and upwards of 70% of the reports to its database in the first decade were either directly or indirectly related to communication problems), and continue to make up a large part of ASRS reports (see for example, Callback, 2001, March; Callback, 2003, October; Callback, 2004, April; Monon, 1991, March). "Communication problems are mentioned in a high percentage of incidents reported to ASRS" (Callback, 2003, October).

The cockpit crew, however, is but one aspect of the aviation system. While critically important for the safety of any flight, they are not the only source of information and messages about aviation safety.

LESSONS FROM THE CABIN

One of the basic information functions of the cabin crew is sending messages to keep passengers informed about safety issues. Banks (1994) notes that "'cabin crew' work is extraordinarily challenging because flight attendants are solely, and personally responsible for preparing passengers for the experience of commercial flight and guiding them through it" (p. 253-254).

The messages that flight attendants convey to passengers may take the form of information about on-board services, connection gate data, required safety briefings, and information passengers need to cope with and survive emergency situations, including evacuations. Most important for safety are passenger briefings and emergency messages, especially about evacuation, both of which will be the focus of this section.

Federal regulations in the United States require a preflight briefing regarding safety (FAR 14 CFR 121.571). However, safety briefings to passengers inherently suffer from a communication environment that is often very poor:

> Noise levels, when engines are running, are very loud and vary over time and over the cabin space. The goodness of views of information on monitors likewise can vary, ranging from poor to terrible as a result of inadequacies of the equipment, ill-informed choices of media format and presentation of the material, geometry and viewing distances between the viewer and the monitor, and various kinds of interference from glare and interposed people and objects. Aside from the great variations on individual sensory powers, the state of mind of individuals may be unreceptive to the briefing content. And all of these obstacles to minimal effective communications are a simple and largely self-evident reality which those responsible for preserving lives need to recognize (Barkow & Rutenberg, 2002, p. 9).

Barkow and Rutenberg (2002) cite other challenges to effective communication in safety briefings, including the emotional context regarding information about potential life-

threatening situations, varied flying experience and motivation of passengers, and language differences that may exist among them. Though related to language differences, cultural differences among passengers can also have an affect on their comprehension of safety briefings.

In addition, the nature of the briefing itself may be one of the barriers to effective communication. Barkow and Rutenberg (2002) report noted that "some safety messages are presented in a manner that leaves the passenger puzzled and perhaps unmotivated to follow the instructions" (p. 24). In addition, such safety information like safety-briefing cards are often poorly executed such that "passengers either cannot understand the intent of the materials or do not seem obliged to read and follow the instructions" (Flight Safety Foundation [FSF], 2001, p. 2).

As the above alludes to, passengers themselves provide a major barrier to the communication of safety briefing information. Anecdotally, anyone who has observed the behavior of passengers during safety briefings understands the difficulty of getting passengers to pay attention to safety briefings. Banks (1994) expands upon this idea by noting that most pre-flight briefings from flight attendants come over the public address system as a disembodied voice acting as a substitute for an absent authority.

The National Transportation Safety Board [NTSB] recently conducted a questionnaire survey of passengers concerning their attention to safety briefings (NTSB, 2000). Results from the 457 passengers who returned the survey found that 15 percent did not watch the briefing at all, 54 percent reported that they did no watch the whole briefing because they had seen it before. Of those who wanted more than half of the briefing, about half felt that they were helpful and about half felt they were not helpful. Those who felt the briefings were helpful were more aware of the locations of the exits. Many respondents felt that the information in the briefing is common knowledge. "Despite efforts and various techniques over the years to improve passenger attention to safety briefings, a large percentage of passengers continue to ignore preflight safety briefings" (NTSB, 2000, p. 78).

A study by Barkow and Rutenberg (2002) illustrates how changing the nature of preflight briefing messages can improve their effectiveness. Their recommendations for improving the communication of messages in preflight briefings are as follows:

- Choose messages that are needed and avoid non-essential messages.
- Use terms that are meaningful to the listener and take care to avoid the specialized language of the air travel professional.
- Use short and simple sentences.
- Establish favourable attitudes in listeners.
- Ensure that sight and sound variables are addressed. (Barkow & Rutenberg, 2002, p. 11)

National Transportation Board of Canada [TSBC] (1995) suggests pre-landing briefings to prepare passengers for an unplanned emergency evacuation as one further recommendation needed to improve safety information given to passengers.

> Over the years, various organizations and cabin safety specialists have advocated pre-landing safety briefings as an effective means of enhancing passenger preparedness and, ultimately, passenger performance during an evacuation. There is a general consensus that passengers should be reminded to relocate their primary and alternative exits, review the safety card, and when appropriate, be advised of an overwater approach (TSBC, 1995, p. 24).

Another method to improve the effectiveness of preflight briefings is to focus on specific passengers in addition to making the required group preflight briefings. Many U.S. airlines now have cabin crew conduct personal briefings beyond the Part 121.585 requirement (NTSB, 2000). Such briefings are meant to expedite evacuation by ensuring that passengers who are in exit seats can hear and understand and that they speak the same language as the crew (FSF, 2001). There is evidence of positive effects of such individual briefings given to exit row passengers about their responsibilities, including proper exit operations (NTSB, 2000).

Still, it is imperative that passengers understand the proper time to open the emergency door. The NTSB (2000) has reported several cases of doors being opened at inopportune times. Indeed, one report to the ASRS shows what can happen when passengers initiate emergency door procedures on their own (Callback, 1995, October):

> Although it's nice to know that passengers are listening to the emergency procedures briefings, flight crews must ensure that passengers do not react inappropriately to a perceived emergency. In the following report, better communication could have nipped the passengers' misperceptions in the bud:
>
> > While parked on the ramp after a lengthy delay, exhaust smoke from the aircart being used to run our air conditioning was ingested into the airplane. The flight attendant called to say that passengers had smelled the exhaust and yelled "fire." A passenger next to the overwing exit immediately opened the exit. I used the PA [system] to reassure the passengers and request that they not deplane. Since we now brief passengers in the exit rows to be ready to open the exits, we must be quick to explain any activity which might not be understood [by those passengers].

The second major area of focus for communication in the cabin revolves around emergency evacuations. Effective communication is absolutely mandatory for the safe evacuation of passengers during an emergency. The cabin crew needs to alert passengers about the evacuation that is timely and accurate. They also need to communicate well among themselves for effective coordination during any emergency situation. “Timely and accurate information communicated from one crew member to another is necessary

under normal circumstances, and absolutely vital during abnormal conditions" (Martin, 2000, January-February, p. 43). While this is a noteworthy and necessary task, it is not always an easy one to carry out given the conditions of crew composition. "There are few industries where a team responsible for the safety of the public (and each other) is brought together sometimes only minutes before duty, and then expected to work effectively together" (Martin, January-February, 2000, p. 43).

It is not surprising then that good communication is not always the case during emergency situations. FSF (2003) indicates that poor communication can contribute to problems during evacuation procedures. TSBC (1995) reports several evacuations in which the cabin crew or passengers were unable to hear the evacuation command or subsequent directions. The report also indicates that ineffective crew communication jeopardized the chances of successful evacuations in several incidents:

> Effective crew coordination is crucial to a successful evacuation, but ineffective crew communication leads to ineffective crew coordination. As evidenced by the occurrence data, poor crew communication may result in unnecessary injuries or fatalities and unnecessary exposure to risk for passengers and aircrew alike (TSBC, 1995, p. 20).

Passenger behavior can also be inappropriate during evacuations with people reacting in panic or by freezing in inaction, trying to retrieve carry-on baggage—even though they were told not to do so by the cabin crew—or by insisting on exiting the plane through the same door through which they entered (TSBC, 1995). FSF (2000) provide several examples of where passenger behavior has created problems during emergency situations.

Passengers can behave in inappropriate ways at other times during a flight, not only during emergency situations. Disruptive passenger behavior, the most extreme form of which is air rage, has been the subject of abundant media reports over the past few years. ASRS also reports numerous incidents of such improper passenger behavior from relatively mild to explicit air rage (see for example, ASRS 2000, April; 2001, May; 2003, March; 2003, June).

One necessary aspect of communication that will allow cabin crew to deal with such passenger behavior is assertive communication: " . . .assertive cabin crew are not only preferable, but necessary in carrying out a successful evacuation. Assertive behavior is also useful following the evacuation, in controlling the passengers outside until emergency services arrive" (Martin, 1999, p 41). Because passengers can exhibit inappropriate behavior at any time during a flight, whether during an emergency or during normal flight operations, when called for, the use of assertive communication is essential. The European Transport Safety Council [ETSC] (1996) reports research by Muir and Cobbett concerning cabin crew behavior during emergency evacuations in a simulator study. Results indicate that assertive behavior on the part of the cabin crew significantly increased the speed at which the volunteer "passengers" were able to evacuate the aircraft compared to non-assertive cabin crew.

Much of this need for assertiveness lies in some of the basic tensions that exit in the aircraft cabin. While safety is the most important function of the cabin crew, there is a clear perception on the part of the flying public that comfort is also an important aspect of the cabin crew function. Murphy (2001) highlights this tension when she talks about the tension between comfort and safety and the fear of airline accidents: "In short, flight attendants are major players in an on-going travel drama that emphasizes normalcy to distract passengers from the risks of flight (p. 31). She goes on to say that this performance stresses accommodation over authority and reassurance over safety in a way that might influence flight attendant's action during an emergency.

This tension can create ambiguity for the flight attendant in dealing with the disruptive or rowdy passenger. As noted above, Martin (1999) argues that assertiveness is the appropriate method for dealing with such situations. Murphy (2001) on the other hand, argues that the default behavior for role of the flight attendant is to accommodate. "Today, a new category of unruly passengers or air rage causes much instability in the air travel performance. The flight attendants' first response is to calm an unruly passenger by using 'good customer service' as a method of crowd control" (Murphy, 2001, p. 42).

Communication interactions, however, are by their very nature situational and call for communication behavior that is appropriate for that situation, rather than one way of acting in all situations. Behavior and messages need to be constructed to meet the needs of that situation with that particular audience. That is not to say that a communicator should tell her or his audience what they want to hear. Rather, it means choosing communication behavior appropriate for that situation and thus, sending messages that will best be understood and accepted. For the flight attendant it means quickly assessing the situation to decide the best way to behave and the most effective messages to send. Even Murphy (2001) sees the need for more assertive behavior in certain air rage situations. This need for a situational communication perspective has major implications for cabin attendant training regarding safety. Such training needs will be discussed later in the paper.

The tension between passenger comfort and passenger safety also leads to another important tension in the cabin: how much information to give passengers; that is, whether to give passengers too much information or too little information, especially about potential emergency situations such as evacuations. Murphy (2001) argues that it is best not to give too much information as it will heighten their fears and create panic among passengers: "To maintain the dominant performance of reassurance and accommodation, passengers are kept out of the communication loop, as long as possible, concerning potential emergency situations" (p. 41). Martin (2000, January-February) on the other hand, feels that it is important to provide passengers with adequate information. She quotes Benjamin Disraeli who said that: "The more extensive a man's knowledge of what has been done, the greater will be his power of knowing what to do." In an analysis of a particularly turbulent flight, Martin (2000, January-February) states that: "Well informed, well prepared passengers will be less likely to panic should the situation worsen, and if it doesn't, they understand why precautionary measures were taken" (p. 43). TSBC (1995)

recommendation for pre-landing briefings during emergencies reinforces the argument for the need for giving passengers more information at these times.

LESSONS FROM CABIN-COCKPIT COMMUNICATION

Effective coordination between cabin crew and flight deck crew is essential for the safe operation of an aircraft. Since 9/11, effective communication from the cabin crew to the flight crew is even more important. "The 'sealed' cockpit environment has increased the reliance on Flight Attendants for the transfer of vital information" (ASRS, 2003, March). The FAA clearly states that effective communication between all crewmembers is a prerequisite for such coordination (FAA, 1988). ASRS reinforces this point: "Flight attendants are an integral part of the aircraft crew and their primary responsibilities are safety related" (ASRS, 2003). Rice (2001, May-June) suggests that better communication between cabin crew and flight crew have resulted in fewer fatalities. Chute and Wiener (1995) make the tie between communication and safety even more explicit:

> There are two critical safety obligations for the flight attendant. The first is to prevent accidents, primarily by means of conveyance of information regarding hazardous conditions to the flight deck. If the accident cannot be prevented, the second is to maximize survivability. Both roles require effective communication between the two cultures (p. 15).

There are a large number of reports that confirm the success with regard to safety of effective communication in the cabin-cockpit interaction (see, for example, ASRS 1999, August; 2003, March; 2004, February). Yet, the working and communication relationship between cabin crew and flight crew continues to be a vexing one. "Communication and coordination problems between cockpit crewmembers and flight attendants continue to challenge air carriers and the FAA" (FAA, 2004, p. 15).

Just as with examples of poor communication in the cockpit and between the cockpit and the Air Traffic Controller (ATC), poor communication between the cabin and the cockpit have been cited as contributing to a number of airplane crashes, incidents, and ineffective evacuations. The FAA reports the results of a 1986 survey that found that only 37% or flight attendants and 60% of pilots thought the communication between cabin and cockpit is adequate (FAA, 1988).

Helmreich, Wiener, and Kanki (1993) and Kayten (1993) cite numerous examples where crew coordination problems and poor communication were contributing factors in several accident reports. Murphy (2001) conveys stories from flight attendants who felt that vital information they tried to pass along to the cockpit was ignored. In their study of flight attendants and pilots, Chute & Wiener (1996) found that cabin-cockpit communication is ineffective. Chute (2001) also maintains that cabin-cockpit communication is not always necessarily effective.

In a report on evacuation procedures, the TSBC (1995) indicated that poor communication between flight and cabin crew possibly jeopardized safe evacuations in several instances. Regarding one specific incident, the report states that:

> Inadequate communication between the cabin and the flight deck resulted in a significant delay before the flight crew was aware of the existence and seriousness of the fire and contributed to the fact that the evacuation was not initiated until one minute 55 seconds following the rejected take-off (TSBC, 1995, p. 19).

Perhaps the two most dramatic examples, however, of safety problems due to poor cabin-cockpit communication are the crash of the Air Ontario flight while taking off from Dryden, Canada on March 10, 1989 (Baker & Frost, 1994; Chute & Wiener, 1996; Merritt, 1995; Moshansky, 1992; Murphy, 2001) and the crash of the British Midlands flight on January 8, 1989 at Kegworth after taking off from London's Heathrow Airport (Baker & Frost, 1994; Department for Transport, 1990).

In the Dryden crash, the pilots of a Fokker F-28 tried to take off, even though the upper surface of the wings were covered with snow; the plane clipped the treetops and came to rest in a heavily wooded area, with the loss of twenty-four lives (Baker & Frost, 1994). A flight attendant, one of the few (and only crew member) to survive, saw that the wings were not properly de-iced, but did not convey that information to the pilots:

> Moments before takeoff, the F28 was taking out for the final takeoff with significant amounts of snow visible on the wings, and while a flight attendant and two airline captains traveling as passengers notices, this was never communicated to the pilots. The flight attendant, who was the only crew member to survive, testified later that she had concerns over the snow, but because she had been rebuffed by company pilots over a similar situation in the past, it influenced her decision no [sic] to go to the cockpit (Aviation Safety Letter, 2004, p. 2).

Similarly, the Kegworth crash provides another example of cabin crew not providing crucial information to the flight crew. The British Midlands Boeing 737-400 experienced an engine fire in the left engine, a fact that several cabin staff and passengers noticed, but this information was not conveyed to the flight crew, who reduced power to one engine, then when vibrations and smoke ceased, mistakenly shut down the wrong engine and crashed into an embankment of the M1 Motorway, with the loss of forty-seven lives (Department for Transport, 1990).

Just as there are tensions within the cabin, that can lead to ineffective communication, there are tensions between the cabin and the cockpit that, too, can lead to problems with communication between these two critical areas of aviation and, as the Dryden, Kegworth, and other incidents illustrate, can have major implications for safety. Edwards (1992) noted that there in many airlines there are actually two separate and distinct crews, "cooperating only under rare circumstances" (p. 3). Skogstad, Dyregrov, and Hellesoy (1995) report the results of a survey where half of aircrew members were dissatisfied with communication and cooperation between the cabin and the cockpit. Chute and

Wiener (1995, 1996) posit that that there is a distinct cultural separation between the cabin and the cockpit that leads to poor communication between the two groups, a notion that was raised by David Adams, an Australian accident investigator with regard to the Dryden crash:

> If you look at almost any company, you will usually find that the cabin attendants and the flight crew are clearly separated. They work for different branches of the company in most cases. The culture is one of 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. 1086-1087).

Chute and Wiener (1995) list several of the barriers that exacerbate these cultural differences, including: organizational, physical, and regulatory (the Sterile Cockpit Rule). Chute (2001) also explicates the numerous dimensions along which these cultural differences exist, including gender, workload at different points in a flight, organizational unit to which each crew belongs, and the cognitive orientation of each. While all of these barriers and differences impact communication between the cabin and the cockpit, perhaps the most important for the purpose of this paper are physical barriers, gender differences, and regulatory reasons (the Sterile Cockpit rule).

One important barrier to communication between the cabin and the cockpit is the physical separation between those two spaces. "The cockpit door provides a physical barrier that exacerbates psychosocial differences and isolation" (Chute & Wiener, 1995, p. 5). This physical distance as a barrier to communication has been amplified by reactions to 9/11 where doors have been reinforced for security reasons. Baron (2004) notes that now "all communication is conducted through an interphone, and of course these types of communications are subject to interference from noise, vibrations, etc. While it is absolutely necessary to be closed and locked throughout the flight, the cockpit door still presents itself as a physical barrier to two groups that must have open communication" (p. 8).

Even though there has been a great deal of change in the last few years, there is still gender inequity (and even stereotyping) in the jobs of flight crew and cabin crew. The pilot's job is seen as male dominated, while the flight attendants job is seen as female dominated (Baron, 2004; Chute & Wiener, 1996; Edwards, 1992; Murphy, 1998, 2001). This perceived difference is particularly important in that gender has a profound effect on communication (for a general review of the literature on gender and communication, see Wood, 2005). Specifically, gender differences have a tremendous impact on how males and females communicate, what they communicate about, their linguistic styles in communicating, the nature of the relational information they convey in their messages, and how they listen to others (Tannen, 1995).

Murphy (2001) maintains that the role of flight attendant is not simply female, but rather feminized so that even the introduction of male flight attendants "has done little to challenge the dominant feminine identification of the occupation" (p. 39). She sees this

feminization of the flight attendant's position as a way to ease the tension between safety and comfort and create an illusion that there is no risk in flying:

> There are important reasons for maintaining the public performance of the historically female flight attendant role. The ritual of air travel requires flight attendants to constantly manage the tension between seemingly mutually exclusive roles: reassurance and safety, accommodation and authority. In other words, flight attendants much perform the visible role of feminine accommodation and deference to maintain the denial of death (Murphy, 2001, p. 38-39).

There are several implications for cabin-cockpit communication with respect to gender difference. One consequence may be the skepticism on the part of pilots to trust information from cabin crew, as occurred in the American Airlines flight into Nashville in 1988 where a flight attendant reported smoke in the cabin, but the flight crew took no action (Chute & Wiener, 1966).

Merritt (1995) provides a power-orientation basis for the interaction between pilots and flight attendants: "The pilots, though not directly flight attendants' bosses, are nonetheless perceived to be of a high status in the company, hence the power distance between cockpit and cabin is generally perceived to be higher than between captain and co-pilot" (p.4). Murphy (1998) bolsters this argument with her social, power-orientation explanation and rationale as to why cabin crew Merritt (1995) bolsters the power-oriented interaction between pilots and flight attendants: "The pilots, though not directly flight attendants' bosses, are nonetheless perceived to be of a high status in the company, hence the power distance between cockpit and cabin is generally perceived to be higher than between captain and co-pilot" (p.4).
reticence may take place:

> The roles of flight attendant and pilot are deeply rooted in the traditional female and male roles, positioned in a hierarchy: male over female, man over girl, pilot over flight attendant. The pilot as male is in complete control (p. 511).

Chute and Wiener (1996) have termed this reticence of cabin crew to bring critical safety information to the flight crew's attention as "the flight attendant's dilemma." In an earlier study they note that: "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 my jeopardize their safety and that of their passengers (Chute & Wiener, 1995, p. 15). In other words, a flight attendant must decide—often in a stressful, crisis situation—whether to convey what might be (though might also not be) important safety information or to risk violating the social, status, power, and even potentially the regulatory norms that contribute to this reticence to speak up.

Murphy (2001) reports anecdotal evidence in her study that: "Most of the flight attendants I spoke with expressed a reticence in speaking with pilots. This was particularly evident with the younger (less that 5 years of seniority) crew members.

Many shared a common negative experience when communicating what they thought was safety related information to the pilots" (p. 48). Commenting on the reticence to convey information from the cabin to the cockpit, Merritt notes that: "The risk of making a fool of oneself (or being yelled at) is much higher if one speaks than if one stays silent. Under these circumstances, it is not surprising that flight attendants are less assertive, more afraid to disagree, and less likely to challenge senior crewmembers decisions (p. 4). Baron (2004) also speaks of the flight attendant's dilemma when he states that:

> The problem manifests in the cabin crew not wanting to 'bother' the pilots during a critical portion of the flight; even if he or she feels that the matter is critical. The flight attendant must use discretion in deciding what is critical and what is not. The obvious dichotomy is that if the flight attendant calls the cockpit and he or she is wrong, there may be repercussions from the pilots, management, or both. On the other hand, if there is a serious issue and it is not communicated to the pilots the same results may ensue (Baron, 2004, p. 7).

The regulatory norm that exacerbates the flight attendant's dilemma is the FAA's Federal Aviation Regulation (FAR) Part 121.542, generally called the Sterile Cockpit Rule, initiated in 1981 as a means to help curtail the number of accidents that had been occurring due to distractions, unrelated to flying, in the cockpit during critical phases of a flight, which include taxiing, takeoff, landing, and other flight operations conducted below 10,000 feet (Sumwalt, 1993).

The flight attendant's dilemma—the reticence to convey crucial information to the cockpit—for whatever reason, is compounded by the distortion effect and exacerbated by the MUM effect. The distortion effect stems from two key causes. One is that the very nature of the coding process by humans causes distorted messages. Since no two people can have the same physical, psychosocial, or experiential makeup, then no two people can create identical meanings for the same symbol. "There is probably no such thing as an instruction that can't be misinterpreted by somebody" (Lee & Lee, 1956, p. 54). Chute and Wiener (1995) allude to the distortion effect in cabin-cockpit communication, when they state that: "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" (p. 8). Secondly, the power, authority, and status relationships inherent in organizational hierarchies also lead to distortion (Athanassiades, 1973, 1974; Campbell, 1958; Cohen, 1958; Downs, 1967; Fulk & Mani, 1986; Krivonos, 1982; Mellinger, 1956; O'Reilley & Roberts, 1974; Read, 1962).

One factor that affects message distortion is the gender of the sender. Females tend to distort information upward more than do males (Athanassiades, 1974; Sussman, Pickett, Berzinski, & Pearce, 1980). Given that the role of the flight attendant is feminized, and that there is a hierarchical dimension to the flight attendant as Murphy (1988) points out, there may be some impact on how messages may be distorted as they are sent from the cabin to the cockpit.

It has been firmly established that people are reluctant to transmit bad news or unfavorable information to others (Rosen & Tesser, 1970, 1972; Tesser & Rosen, 1972; Tesser, Rosen, & Batchelor, 1972; Tesser, Rosen, & Tesser, 1971; Tesser, Rosen, & Waranch, 1973), a concept called the MUM effect. The MUM effect is directly related to the flight attendants' dilemma. If flight attendants are predisposed to be reticent about conveying important information about a possible crisis, then the MUM effect will intensify their unwillingness to pass such information along to the cockpit.

Importantly, trust is the one factor that most ameliorates and lessens the distortion effect (Mellinger, 1956; O'Reilly & Roberts, 1976; Read, 1962). Trust is essential for building a positive communication climate where open, accurate communication is encouraged. "The high-quality environment is one in which trust is high" (Gibb, 1978, p. 50). Because the flight attendant-pilot interaction is one in which the open, accurate flow of information is critical to safety, trust is a required between the two groups in general, and individuals on any particular flight.

Trust, however, is but one aspect of a positive communication climate that needs to be established for open communication to take place. Gibb (1961) suggest several behaviors that exhibit supportive communication, including messages that are problem-oriented, lack an evaluative or judgmental tone, and minimize hierarchical differences between communicators, and active listening.

While trust and positive communication climate are an important part of the relationship between flight attendants and pilots, they are not easy to accomplish. This difficulty may at times have less to do with the nature or the roles and differences or each group (though those do have a profound impact) and more to do with the transitory character of their working conditions and circumstances. Chute and Wiener (1995) note that typical crew pairing actually acts against establishing rapport between cabin and cockpit crews. Chute (2001) comments on the impact of such crew scheduling on communication:

> Effective communication and coordination between pilots and flight attendants should not be taken for granted. In air carrier operations, establishment of a smooth operating relationship may be hindered by the fact that the crews may never have seen one another before boarding the aircraft and schedule constraints may limit the interaction possible before a flight. The stress of an emergency complicates human interaction and reactions. Compounding those obstacles are misconceptions, assumptions, and stereotypes that discourage and distort communication. Given these impediments, it is easy to see that in a quickly onboard situation, on has a recipe for disaster (p. 1).

Martin (2000, January-February) notes, however, that the short period of time between sign-on and departure might be the only opportunity for the entire crew (both cabin and cockpit) to get to know one. It is during this very brief moment when crews meet for the first time that a positive communication climate and collaborative relationships must be formed. Edwards (1990) indicates that for an airplane crew, such positive relationships are essential for successful teamwork and an efficient flight. Helmreich and Foushee

(1993) argue that for aircrews "briefings are one of the demonstrated means of forming effective teams and establishing a positive group climate" (p. 21). "The best way to establish a clear and effective channel for communication between crewmembers is the team building phase of a flight sequence, when the captain briefs the crew, setting the tone for subsequent interaction on the trip" (Young, 1994, p. 13). It is in the momentary briefing process, then, that a positive communication climate needs to be established.

While a greater amount of time for the briefing would be advisable (Chute & Wiener, 1995; Murphy, 2001), this is no always possible. With appropriate behaviors and communication, even a short period of time can help to establish positive relationships between the cabin crew and flight crew. Zunin and Zunin (1974) feel that the first four minutes of any relationship are critical in establishing rapport. The FAA has suggested a number of simple behaviors that can enhance the working relation ship between flight attendants and flight crewmembers to establish a positive climate for good communication; seemingly, one of the easiest ways to do so is through courteous mutual introductions (FAA, 1988). Chute and Wiener (1994), however, found that flight attendants were almost universal in their complaint that pilots, especially captains, failed to introduce themselves. Pilots also expressed a desire that flight attendants take the initiative to introduce themselves (Chute & Wiener, 1995).

Surprisingly, pilot-to-cabin briefings themselves seem to be the exception rather than the rule. Pilots perceived that such briefings occurred at a much higher frequency than did flight attendants (Chute & Wiener, 1995) and both pilots and flight attendants complain about how often such briefings are omitted and disregarded (Chidester & Vaugn, 1994). Thus, even "before the crew board the aircraft, the stage is set for poor communication" (Chute & Wiener, 1996, p. 3).

LESSONS REQUIRED

This paper has outlined several areas where lessons have been learned with regard to communication in aircraft cabin safety. A number of suggestions for possible future research and proposals for training for improving cabin safety will be offered. While there are certainly a large number of important subjects that would provide valuable insight into cabin safety, this paper will focus only on communication-related issues in the cabin and between the cabin and the cockpit.

NEED FOR FUTURE RESEARCH

Three areas of potential study stand out as needing future research to find their impact on cabin safety: public address announcements/preflight passenger safety briefings (and concomitant passenger attention to them), communication during emergency and evacuation situations, and interpersonal variables that affect communication in an aircraft, particularly communication between cabin and flight crews.

As noted above, research and anecdotal evidence clearly indicates that passengers tend to be inattentive toward preflight safety briefings (ASRS, 2003, March; FSF, 2000; NTSB, 2000; Barkow & Rutenberg, 2002; TBSC, 1995). Many of these reports include suggestions that seem reasonable from a common sense perspective. Each of the recommendations, however, offers a rich resource for future research into the effectiveness of preflight safety briefings.

For example, among its several recommendations to improve safety briefing communication, Barkow and Rutenberg (2002) suggest choosing messages that are necessary and avoid non-essential messages, using short and simple sentences, and avoid air travel jargon. Each of these variables could be used in an experimental research design to test each individually as well as their interaction. Such an experiment could assess recall, propensity to act, and perhaps even actual behavioral responses. Barkow and Rutenberg (2002) also suggests testing various media for presenting preflight briefings such as video, audio, and live means to assess their effectiveness. NTSB (2000) recommendations imply that future research is needed to test safety briefing card comprehension and perhaps messages that can be used to minimize the problems associated with carry-on baggage during evacuations.

Other research is needed to assess the effect of safety messages in more realistic conditions. These might include the noise of an airplane, the more cramped and uncomfortable feeling of an aircraft seat, and distractions from others nearby who are talking. While such study might be difficult in a "real-life" environment, a simulated environment could provide valuable initial insight.

As a matter of interest regarding research into preflight briefings and emergency evacuation messages, there are several research projects that have been funded or undertaken that merit scrutiny. The Australian government has recently funded two pertinent aviation safety research grants (Australian Transport Safety Bureau [ATSB], 2004). One will measure the public's attitudes, perception, and behaviors toward cabin safety and safety communication. The other will explore the effectiveness of different commands and procedures that can be used in evacuations. The Joint Aviation Authorities of Europe [JAA] Cabin Safety has undertaken a study of the effectiveness of symbols for conveying information to passengers concerning the location of exits (ETSC, 1996).

Research into interpersonal communication variables in the cabin and in cabin-flight crew interaction is a much more difficult proposition. The transitory nature of the relationships that are established—and then quickly broken—among aircraft crews make for challenging communication and communication research. It is probably most fruitful to research the types of communication that flight attendants and pilots perceive as establishing rapport, trust, and credibility in such teams. A survey of pilot and flight attendant preferences for certain types of communication, particularly during briefings, might be a first step in discovering how a positive, supportive communication climate can be established in the momentary aircraft crew relationship. Chute and Wiener (1995)

allude to the need for this type of research when they note that: "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 (p. 13).

Given the need for assertive communication behavior on the part of cabin crew members in an emergency, either directed toward passengers or to overcome the reticence inherent in the flight attendant's dilemma (to not convey needed information to the flight deck), research into the effects of such assertive behavior on the part of flight attendants and how that behavior is perceived by passengers and pilots would prove to be worthwhile.

THE NEED FOR TRAINING

There have been numerous calls for communication training, both as an independent effort and as part of Crew Resource Management (CRM) training for flight attendants (Baker & Frost; 1994; Butler, 1993; Chidester & Vaughn, 1994; Chute & Wiener, 1996; Edwards, 1992; FAA, 1988, 2004; Young, 1994). Perhaps, more important have been the calls for joint pilot-flight attendant training (Baker & Frost, 1994; Butler, 1993; Chidester & Vaughn, 1994; Chute & Wiener, 1995, 1996; ETSC, 1996; FAA, 2004; Helmreich, Wiener, & Kanki, 1993; Kayten, 1993; Murphy, 2001; Moshansky, 1994, NTSB, 2000). "We must teach crews that communication and cooperation are safety issues" (Chute, Wiener, Dunbar, & Hoang, 1996, p. 17).

However, such calls for training generally do not often include, in detail, which communication topics are needed, especially when it comes to interpersonal communication training, nor are the specific subtopics needed to help increase communication effectiveness explicated. The FAA (2004) did offer some specific areas where joint cabin-cockpit communication training can focus, including pre-flight briefings, post incident and accident procedures, sterile cockpit procedures, notifications and pre-flight, pre-landing, and turbulence) passenger-handling issues). Though not specifically a training issue, there have also been frequent appeals for scheduling pilots and flight attendants on a longer-term basis (FAA, 2004; Chute & Wiener, 1995, 1996; Murphy, 2001).

The FAA (2004) offers some general communication topics, which this paper will expand upon with regard to communication training for cabin crew (and joint cabin-flight deck crew), including interpersonal communication, listening skills, decision-making skills, and conflict management, though they did indicate, as noted above that cockpit-cabin crew communication coordination continues to challenge the aviation system (FAA, 2004).

In addition, the FAA (2004) notes that the "importance of clear and unambiguous communication must be stressed in all training activities involving pilots, flight attendants, and aircraft dispatchers" (p. 10). Because communication is a two-way transaction, not a one-way transfer, the concepts of perception and meaning are important to include in any communication training. We communicate about the world in the way

we perceive it, therefore, flight attendants (and pilots) need to understand how perception operates and how people differ, sometimes radically, in the ways they perceive a situation. Layered upon differing perceptions is the concept that when we communicate about the world, we do so in symbolically, so that we give meaning to our perceptions. People will interpret messages in such a way that makes sense to them and makes sense of the world around them.

The following examples from the cabin provide ample confirmation of that process. ASRS (1995, October) reports an incident about passengers authorized to carry firearms onboard the aircraft where the captain was apparently the last to know:

> Before boarding, I was told that a government VIP was traveling. After the flight, I discovered the VIP was accompanied by . . . two armed individuals, and that we had no notification to the Flight Attendant [FA] of to the PIC.
>
> Later . . . I found out that the armed personnel were briefed to tell the FA that they were armed; they did not do so. The Ram Supervisor knew the escorts were armed, and he told our FA that we had "two leg passengers in Row 4" ("leg" being the code word for armed passenger). Needless to say, no one old us that was the code, code, so the FA thought he meant, "Two passengers with hurt legs." The armed individuals did not display their special boarding passes to the FA. Not only that, they did not sit in their assigned Row 4 seats.
>
> The FA solicitously asked the two passengers in Row 4 if their legs were OK. They were.

This example (pre-9/11) demonstrates, not just how meanings can be different from person to person, but also the implications of jargon in our communication interactions. This report is an example of the COIK principle: something is Clear Only If Known. It is almost as if someone is speaking to you in a foreign language that you do not know—it is utterly incomprehensible. However, if you do know the "language," then the message is much more clear. Another report (post-9/11) to ASRS (2004, April) illustrates how sometimes even simple words or phrases can be misinterpreted:

> Clear, concise communications are usually preferred over lengthy conversations. In the case of this flight attendant's request, however, a few additional words could have prevented the Captain's misunderstanding.
>
> - Prior to engine start, company procedure requires securing the cockpit door. This procedure was followed and the door indicated "locked." During climb out, the flight attendant called the flight deck. The Captain answered and after a brief conversation, he instructed me to level the aircraft and prepare to return to [departure airport] due to a disturbance in the cabin. During the descent, the Captain assumed control of the aircraft.

> As we were nearing [destination], the flight attendant called the flight deck to ask if we were landing. I replied that we were. The Captain took this opportunity to get additional information regarding the situation in the cabin. She advised him that the only problem was that the cockpit door was open. The door was then secured and the flight continued to its original destination. Apparently in her initial report to the Captain, the flight attendant simply stated, "Turn around." Her intent was for the Captain to see that the door was open, the Captain perceived her comment to mean that they flight was in jeopardy and the aircraft should be turned around and return to [departure airport].

This example also illustrates the two-way transactional nature of communication. While a more elaborated message might have helped the captain understand the flight attendant's intent, effective use of feedback and asking questions by the captain or other flight crew members might have easily cleared up the meaning. It is just this type of understanding—and practicing—of communication skills in a training session that will, hopefully, lead to greater accuracy and understanding. As Redding and Sincoff (1984) note, communication is not like a conveyor belt where the meaning is transferred from person to another, arriving—and being interpreted—exactly same way that it was sent.

The impact of misinterpretation of meaning on safety can also be seen in the following example from TSBC (1995).

> Following the double engine flame-out due to fuel exhaustion on a B-767, at least two cabin attendants were under the impression they we about to crash, partially as a result of the use of improper terminology by the cabin attendant in-charge. They were briefed by the cabin attendant in-charge that "they were going in." The accepted terminology would be a "forced landing," which implies some element of control by the flight crew. In this sense, inappropriate communication may have contributed to the stress and anxiety felt by the cabin crew, and could have adversely affected their judegment [sic] and decision-making ability.

Again, jargon confounded the meaning that was interpreted in this instance. When everyone knows the jargon and uses it correctly, it can be a quick and easy way to get a message across accurately. Otherwise it might again become a just another case of the COIK principle: Clear Only If Known.

In addition to the exploration of the effects of meaning and jargon on communication, two other related concepts need to be included: message distortion and information overload—and how to minimize them. As much as we understand and desire to have clear and unambiguous communication, especially regarding aviation safety issues, given the nature of language and human interaction, we can only hope to minimize message distortion and information overload. Understanding these important communication barriers and how to deal with them effectively are needed in cabin safety training.

As far as interpersonal communication training is concerned, more in depth treatment of such areas as establishing a positive, supportive communication climate, understanding how trust and credibility are achieved, conflict management and assertiveness skills, and active listening are required.

The process of conflict, underlying reasons for conflict, and effective communication behaviors during conflict are also crucial topics in this area of cabin safety training. Cabin crew assertiveness—with respect to evacuations, poor passenger behavior and air rage, and reticence to convey important safety information to the cockpit—are integral aspects of the conflict management portion of communication training. Like any other communication behavior, conflict management requires a situational perspective. The conflict management and assertiveness portions of the training will take this concept into account, for example, when to be assertive, when to be accommodative, and when other communication behaviors might be appropriate.

Training with regard to establishing a positive supportive climate needs to explore such topics as defensive communication and disconfirming messages. Gibb (1961) notes that a defensive communication climate is extremely disruptive to the communication process. In fact, a negative climate can make effective communication impossible. Communication training for cabin crew should include the understanding of defensive communication disconfirming messages and the practice of supportive and confirming messages. Defensive and disconfirming messages are basically ones that ignore others and treats them as if thy do not exist or do not matter. Supportive and confirming messages let others know that they—and their ideas—are worthwhile and valuable. Trust, too, is an important aspect of a positive, supportive climate, one that can lead to much greater rapport, cohesion, and team coordination for the flight crew as a whole unit. Thus, understanding trust behaviors and messages needs to be an integral part of this aspect of training.

The briefing process offers an ideal opportunity for joint cabin-cockpit communication training to integrate the concepts of trust, supportiveness, teamwork, and a positive communication climate in training. It is in this aspect of communication between cabin and cockpit crews that many problems occur, potentially setting a negative tone for the rest of the flight. Likewise, understanding and utilizing communication that engenders a positive climate during the briefing process can create a collaborative and productive atmosphere for the flight.

Active listening comprises the final part of communication in cabin safety training. This aspect of the training could cover the importance of listening, the cost of poor listening, the process of listening, barriers to effective listening, and steps to better listening. Barriers to effective listening covers such topics as lack of concentration, prejudging messages, making unchecked assumptions, rehearsing a response, focusing on style and delivery, unconscious projection, and a win/lose perspective on listening. Steps to better listening covers such topics as a win/win perspective to listening, focus, patience, and asking questions. The training would include practice in such important listening skills as paraphrasing, responding, and feedback. Active, effective listening skills are crucial in

creating the best possible communication environment for the exchange of accurate, unambiguous messages that minimize distortion and overload. Such a communication environment also contributes to a positive, supportive climate where rapport and trust can develop and thrive.

As important as specific topics needed for training for effective cabin safety communication are, the methodologies required for delivering such training are also critical. As with most communication training, there should be limited didactic presentation. Rather, there needs to be a great deal of interaction, practice, and introspection. The best methods for this type of training would include experiential exercises, practicing communication skills, role playing, small group and team building exercises and discussion (especially between cabin and cockpit personnel), case study scenarios, and self-assessment tools (for example, the Thomas-Kilman Conflict Mode Instrument)—all centered around communication in aviation safety, with particular emphasis on communication in the cabin and communication between cabin and flight deck crews.

Young (1994) and FSF (1994) an abundance of ASRA reports provide incidents in which flight attendants were willing to use their good sense and report emergency situations to the flight crew that prevented possible tragedies. While examples of poor communication can provide excellent examples for scenarios that would be useful for training, so too could such examples of good communication. The ASRS publications, especially *Callback* and *Directline*, afford ample examples of both poor and good communication in the cabin and between the cabin and the cockpit to use in creating case studies and scenarios and to practice and gain insight into effective communication skills. These actual occurrences of communication in the cabin and between the cabin and the cockpit need to be integrated into cabin safety communication training.

CONCLUSION

This paper examined the status of communication as a crucial aspect of aviation safety, with particular emphasis on communication in the cabin and communication between cabin and flight deck crews. Effective communication is essential for aviation safety, whether among the cabin crew themselves, between flight attendants and passengers or, especially, between flight attendants and pilots. Effective crew coordination is fundamentally dependent upon effective communication. Teaching effective communication is an essential requirement for cabin crew training and for joint flight attendant-pilot training.

An article in the ASRA *Directline* perhaps said it best with regard to communication in aviation safety by noting that communication errors are the most frequently cited problems in the incidents that are reported to ASRS:

> Communication problems take a variety of forms. Equipment deficiencies, phraseology, similar call signs, speech rated, blocked transmission, and failure of

the readback/hearback process are just a few types of communication problems. The subject is too broad to be covered by any degree in this article, but I do want to make the point that communication problems often lead to a "Flawed Information Transfer" (FIT), and if the flawed information transfer is not corrected soon enough, the result may be an "Occasional Semi-Hysterical Information Transfer" (acronym unknown) (George, 1993, June, p. 16).

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