

## Status and Cockpit Dynamics: A Review and Empirical Study

Dana M. Milanovich

Naval Air Warfare Center Training Systems Division

James E. Driskell

Florida Maxima Corporation

Renee J. Stout and Eduardo Salas

Naval Air Warfare Center Training Systems Division

One of the most troublesome dynamics evident in the airplane cockpit is related to patterns of authority relations between the captain and the first officer: Too often, captains fail to listen and first officers fail to speak. The authors propose that many instances of superordinate and subordinate behavior in the cockpit—the captain's tendency to reject input from other team members and the first officer's hesitancy to question the captain—represent cases of status generalization. First, the authors describe the theory of status generalization and show support for the operation of the theory by presenting examples of flightcrew behavior that the theory predicts. Second, an initial empirical test was conducted to instantiate the claim that captain–first officer differences can be seen as status differences. Finally, the significance and implications of this perspective are discussed.

Two fields of inquiry have been the focus of sustained research activity over the better part of this century. One field is aviation psychology. Psychological research on aviation had its foundation in the first World War and expanded greatly during World War II, with a primary emphasis on the selection and training of pilots. Another area that grew substantially as a result of applied needs during World War II was the field of small group research. In fact, the *American Soldier* studies (Stouffer et al., 1949), conducted during wartime to examine topics such as morale, leadership, and group dynamics, were the largest research project in the history of social psychology.

However, before the early 1980s, there was little evidence of any correspondence between these two fields. Aviation psychology maintained a predominant emphasis on the individual technical proficiency of pilots. Small group researchers rarely examined the dynamics of cockpit interaction. It was as if there was no realization from either side that a flightcrew was

in fact a small group. Two events served to change this perspective. The first was a shift in emphasis in the aviation community from single-pilot operations to multipiloted aircraft. Although the purpose of this change was to reduce pilot workload in modern aircraft, one unintended consequence was to direct attention from the pilot to the dynamics of the entire cockpit crew. A second trend that led to a greater emphasis on aircrew interaction was a dramatic reduction in aircraft accidents from the 1950s to the present, attributed to advances in training, procedures, and equipment (especially the introduction of the more reliable jet engine). As mechanical failures greatly decreased as a cause of aircraft accidents, accidents related to aircrew-related factors stood out in stark relief. Current statistics indicate that flightcrew errors are the primary causal factor in approximately 70% of commercial aircraft accidents (Boeing Commercial Airplane Group, 1997).

Therefore, attention has only recently been devoted to the dynamics of aircrew performance and to the examination of factors that affect crew interaction (e.g., Foushee, 1984; Foushee & Helmreich, 1988; Palmer, Lack, & Lynch, 1995; Prince & Salas, 1993). This emphasis reflects the realization that the aircrew is not immune from the operation of basic social psychological processes that affect other small groups, and that attention to how these group

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Dana M. Milanovich, Renee J. Stout, and Eduardo Salas, Naval Air Warfare Center Training Systems Division, Orlando, Florida; James E. Driskell, Florida Maxima Corporation, Winter Park, Florida.

Correspondence concerning this article should be addressed to Dana M. Milanovich, Naval Air Warfare Center Training Systems Division, 12350 Research Parkway, Orlando, Florida 32826-3224.

processes operate in the cockpit can decrease errors and save lives.

Perhaps the most vexing problems evident in the airplane cockpit are related to patterns of authority relations between the captain and the first officer: In the exacting and unforgiving atmosphere of the cockpit, captains often fail to listen and first officers often fail to speak. More specific, as Foushee (1984) described, "too often . . . captains have not heeded the warnings of other crewmembers" (p. 885) and "crewmembers who possessed adequate information have for some reason not provided it to others" (p. 885). Although the phenomenon itself is well-documented, the cause has been attributed to a number of factors, including deficiencies in personality (the "macho" captain) and in behavioral style (the nonassertive first officer). We propose that many of the behaviors observed in captain–first officer interactions reflect the typical behavior of any individuals who happen to find themselves in status-differentiated positions. In other words, patterns of behavior that some have viewed as determined by personality or lack of assertiveness may reflect the normal invariant consequence of status-based interaction.

In the following, we develop the argument that many instances of superordinate–subordinate behavior in the cockpit represent cases of status generalization. We first describe the theory of status generalization and show support for the operation of the theory by presenting examples of flightcrew behavior that are predicted by the theory. Second, we conducted an initial empirical test to instantiate the claim that captain–first officer differences can be seen as status differences. Finally, we outline the significance and implications of this perspective.

### Status Generalization Theory

Status generalization is one of the most pervasive social phenomena. A person's race, gender, age, or occupational status are readily evident in most social situations, and these distinctions can structure important features of interaction, including perceptions of competence and actual influence. In one of the earliest studies of the effects of status on influence in real-world task groups, Torrance (1955) examined U.S. Air Force bomber crews comprising a pilot (the highest ranking crew member in these

groups), navigator (middle rank), and gunner (lower rank). On a series of decision-making tasks, results indicated that pilots were more influential than navigators, and that navigators were more influential than gunners. Moreover, Torrance found that status determined influence both on military-relevant tasks as well as on decision-making tasks that had nothing to do with the crew's expertise.

Since this early work, several decades of research conducted with mock juries, military teams, and problem-solving groups has revealed how status differences among group members structure the nature of group interaction. In groups in which existing status characteristics differentiate members (such as differences in race, gender, or occupation), some members attain a superordinate position in the group in terms of power and prestige; they talk more, have their ideas more readily accepted by others, and are more likely to receive votes as group leader. In brief, individuals who are perceived as having high status within the group command more of the group's resources—they dominate conversation, they are seen as more competent and leaderlike, and they are more influential in group deliberations. Conversely, low status individuals are less likely to offer suggestions or to interrupt higher status group members, and are more likely to defer to the actions of higher status group members (see Driskell & Mullen, 1990; Driskell, Olmstead, & Salas, 1993).

A number of authors have offered a status-based approach to account for differences in perceived competence and actual influence in task groups. According to the theory of status characteristics and expectation states (see Berger, Fisek, Norman, & Zelditch, 1977; Driskell & Webster, 1985; Wagner & Berger, 1993; Webster & Foschi, 1988), status characteristics that differentiate members of task-oriented groups serve as cues or indicators of members' performance capability. Consider a decision-making group that has gathered to perform a task. The group members are task-oriented, they want to achieve a successful outcome of the task, and they search for information as to each others' capabilities to help them achieve this goal. It is in each individual's self-interest to defer to others on the basis of the other's expected task contributions. In other words, it is

in Person A's best interest to defer to Person B (i.e., allow B to command more time speaking, agree with B's task inputs, accept B's influence attempts, etc.) if Person B seems to possess superior task ability.

Consider further that the members of this task group differ on some observable status characteristic, such as occupation or rank. Status characteristics such as occupation serve as cues to performance capability because they are culturally evaluated (i.e., it is considered preferable in our culture to be a white-collar rather than blue-collar professional) and carry performance connotations (i.e., white-collar professionals are thought to do better at most tasks). Thus, status generalization refers to the importing of status distinctions from the outside world into the immediate environment of the task group.

Figure 1 illustrates the status generalization process. The process starts with an initial distribution of resources: For example, individuals may notice differences between group members in occupational status. Unless these characteristics are clearly disassociated from the task (that is, they are demonstrated to be irrelevant), they then form the basis for differential performance expectations or perceptions of competence. The subsequent pattern of group interaction reflects these expectations: Those for whom high expectations are formed enact a more proactive role and command more of the group's resources, whereas those assigned lower expectations are generally more compliant and react in a more subordinate manner.

There are several implications of the status generalization perspective that are particularly relevant to our current interests. First, the aspects of interaction that are relevant to the status generalization approach all involve *superordination* and *subordination*. Those who possess high status in the group are more likely to be directive, are less likely to attend to input from other group members, and have a disproportionate impact on group decision making. Lower status group members are less likely to provide task input, are more likely to comply with the directives of higher status others, and are less likely to be influential when disagreements arise.

Second, a status characteristic that differentiates interactants need not be directly relevant to the task at hand in order to structure interaction. In fact, the status generalization process would

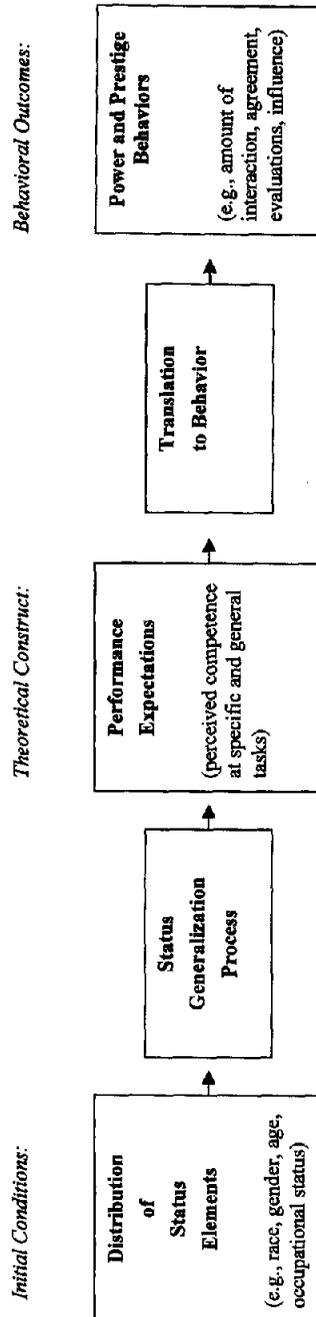


Figure 1. The status generalization process. Adapted from "Creating Status Characteristics," by M. Webster and J. Hysom, in press, *American Sociological Review*, 63(3), p. 354. Copyright 1998 by The American Sociological Association. Adapted with permission.

be of less interest from a practical standpoint if we knew, for example, that the captain of an aircraft did in fact have all the answers. However, that is not the case: In a cockpit, a division of labor exists such that the captain possesses certain information and the first officer is responsible for other information. However, the status generalization process tends to operate such that the advantages conferred to the captain on the basis of differences in occupational or organizational prestige spread to most tasks or most decisions that are taken up by the group. Thus, unless a status characteristic is known to be irrelevant to the task, it tends to be treated as if it were relevant. This process underlies Torrance's (1955) findings that pilots were more influential than navigators both on aviation-related tasks and on general tasks. Therefore, the theory predicts that a captain is likely to act in a more superordinate manner (and a first officer is more likely to yield to the captain's influence) even on decisions that are not directly related to the captain's sphere of expertise.

Third, this process may have desirable and undesirable consequences on performance. Status generalization may have positive effects when it operates in accordance with organizational objectives (i.e., high ranking persons should exhibit greater authority). However, the status generalization process may also operate to suppress the contributions of other team members. For example, a lower status crew member may be less likely to question the captain or to challenge a poor decision, even if that crew member possesses valuable task information. In fact, a considerable amount of research has been conducted within this body of literature to examine interventions to overcome undesirable effects of status generalization.

In summary, status generalization is a process whereby external status differences determine the pattern of authority relations (who influences whom) within groups. The effects of status in structuring task behavior have been well documented in a wide range of laboratory and applied settings, and this perspective has received considerable empirical support (e.g., Driskell & Mullen, 1990; Jackson, Hunter, & Hodge, 1995; Wagner & Berger, 1993). This research includes the examination of the effects of gender on group interaction (Pugh & Wahrman, 1983; Wood & Karten, 1986), the

effects of race on expectations in classroom settings (Cohen, 1982; Cohen, Lotan, & Catanzarite, 1988), and the effects of status on perceptions of competence among police teams (Gerber, 1996). These results resonate to a central theme: High status translates into interaction advantages, both in perceptions of competence and actual influence. In brief, the pattern observed is that higher status persons behave in a superordinate manner and tend to reject input from others, whereas lower status persons behave in a more subordinate manner and defer to higher status others. In the following, we attempt to find evidence of these patterns in cockpit interaction.

### Status Effects in the Cockpit

The airplane cockpit is characterized by a rigid hierarchical status structure, with the occupants easily identified, even by outsiders, as to their relative status. In addition to their formal rank, captains typically have more flying hours and more years flying in the organization than first officers.<sup>1</sup> To be useful to understanding patterns of authority and influence in the cockpit, our theory should be relevant to behaviors that are of current professional interest. Accordingly, a first question to be addressed is whether the theory can provide a post hoc explanation for behaviors that are pertinent to current aviation concerns.

A recent National Transportation Safety Board (NTSB) report found that monitoring and challenging failures were pervasive in flightcrew-related accidents, occurring in over 80% of the accidents reviewed (National Transportation Safety Board, 1994). The pattern common to these failures was an error by the captain (e.g., descending below an established altitude), followed by the first officer's failure to challenge the captain's decision. The NTSB report implied that status processes may play a factor: "A first officer may be concerned that a

<sup>1</sup> One further complication is that captains can be in the pilot-not-flying role and the first officer can be in the pilot-flying role with authority for control of the airplane. In this case, there are two statuses salient, organizational position and flying role. To simplify our analysis, we focus solely on the captain-first officer distinction, although the topic of multiple status characteristics is one to which we will return in the Discussion.

challenge to a decision may be perceived as a direct challenge to the captain's authority" (p. 59). The authors concluded that these types of problems warrant special attention, and they optimistically noted that these problems can be addressed by appropriate training.

The starting point for our analysis of captain–first officer relations is to note that most of the interaction patterns reported in the literature represent cases of superordination–subordination. In the following, we derive two broad principles drawn from the theory and present real-world events illustrating these principles.

*Principle 1: Higher Status Individuals Are More Likely to Exhibit Superordinate Behavior, Including a Tendency to Reject Input From Lower Status Group Members*

Foushee (1982, p. 1063) described the following report that was submitted to the Aviation Safety Reporting System (ASRS) by a first officer illustrating a captain's reticence to accept input:

I was the first officer on an airlines flight into Chicago. . . . Approach Control told us to slow to 180 knots . . . [After the captain did not respond] . . . I repeated, "Approach said slow to 180," and his reply was something to the effect of, "I'll do what I want." I told him at least twice more and received the same kind of answer. [After almost colliding with another aircraft, the plane was given a new clearance, which was also disregarded by the captain. The first officer issued several further advisories.] I told him our altitude was 3000 ft. His comment was, "You just look out the damn window."

Although this example is somewhat extreme, it is not without precedent. Foushee and Helmreich (1988) described an aircraft accident in which a DC-8 ran out of fuel and crashed short of the Portland airport. The captain was preoccupied with another task. As Foushee and Helmreich noted, "The cockpit voice recording indicates that the flight engineer was concerned with the amount of time this was taking and the increasingly critical fuel situation, making several observations to the captain that were repeatedly ignored" (p. 195).

Another accident report illustrated the captain's tendency to disregard input from lower status team members. In this case, an Air Florida Boeing 737 crashed on takeoff from Washing-

ton's National Airport. Foushee and Helmreich (1988) described the events captured from the cockpit voice recorder: "The copilot made repeated subtle advisories that something did not appear right . . . and these advisories were, for whatever reasons, not attended to by the captain" (p. 195).

Finally, Torrance's (1955) study of U.S. Air Force crews clearly demonstrates this phenomenon in a laboratory setting. Three-person crews comprising a pilot, navigator, and gunner performed a dot estimation task. This task required that each person view a card containing a large number of dots and make an initial private estimate of the number of dots present. The crew then discussed their estimates, and then each member again gave a final estimate. Results indicated that pilots were less likely to change their estimates as a result of group input than were navigators or gunners. In other words, pilots were more likely to disregard the input of the subordinate crew members than vice versa. A second task presented the crew members with the classic "horse-trading problem": A man bought a horse for \$60 and sold it back for \$70; then bought it back for \$80 and sold it for \$90. How much money did he make? The crew members wrote down an initial individual answer, discussed their answers, and then reached a group decision. Although the percentage of pilots and gunners that gave the correct initial answer (\$20) was approximately the same, the correct answer was more likely to be accepted when it was provided by a pilot than by a gunner. Thus, even when the subordinate crew member had the correct answer, there was a tendency for pilots to disregard that input.

The examples presented all describe instances in which pilots or captains failed to heed the input or advice of subordinate crew members. They illustrate the phenomenon that on some occasions, pilots tend to act, in Hackman's (1993) words, as the "King of their Domain, where that domain was defined as the aircraft, its crew, the passengers, and anyone else encountered along the way" (p. 58). Before turning to an explanation of the superordinate behavior of captains in the aircrew context, we first examine a related phenomenon: the subordinate behavior of copilots or first officers.

*Principle 2: Lower Status Individuals Are More Likely to Exhibit Subordinate Behavior, Including the Hesitancy to Question or Challenge the Actions of Higher Status Team Members*

The Air Florida accident noted above further illustrates the hesitancy of first officers to exercise authority and exert influence in interacting with captains. In the following transcript, the first officer was apparently concerned with the state of the aircraft as ice and snow were accumulating while the airplane sat on the runway (National Transportation Safety Board, 1982, pp. 114–131).

First Officer: Look how the ice is just hanging on his, ah, back, back there, see that?  
 First Officer: See all those icicles on the back there and everything?  
 Captain: Yeah.  
 [After a long wait following de-icing of the airplane, the first officer continued.]  
 First Officer: Boy, this is a, this is a losing battle here on trying to de-ice those things, it [gives] you a false feeling of security, that's all that it does.  
 [Shortly after receiving clearance to takeoff the first officer continued.]  
 First Officer: Let's check those tops again since we've been sitting here awhile.  
 Captain: I think we get to go here in a minute.  
 [They begin takeoff.]  
 First Officer: That don't seem right, does it? Ah, that's not right.  
 Captain: Yes it is . . .  
 First Officer: Naw, I don't think that is right. Ah, maybe it is.  
 Captain: Hundred and twenty.  
 First Officer: I don't know.

Most apparent in this interaction is the first officer's seeming hesitancy to forward his concern to the captain in a clear and timely manner. Also evident is the first officer's use of mitigated statements, statements that are attenuated in power through the use of hedges and other variations on a direct command (e.g., "That don't seem right, does it?"). In a recent examination of captain–first officer communication during simulated flight, Palmer et al. (1995) found that first officers were less likely to initiate commands than captains. Moreover, when first officers did issue commands, a greater proportion of these were mitigated commands. Palmer et al. concluded that first officers tend to use less direct command forms than captains, indicating their lower status in the aircraft.

A report from the ASRS provides further

documentation of a first officer's hesitancy to speak up in interactions with the captain. In this incident, the first officer noticed that the captain had climbed through his assigned altitude. Although the first officer brought this to the captain's attention, his insight into this incident clearly illustrates his hesitancy to speak up, even though he notes that the captain was not seen as domineering.

I mentioned it to the captain, but not forcefully enough, and he did not hear me. . . . I believe the main factor involved here was my reluctance to correct the captain. This captain is very approachable and I had no real reason to hold back. It is just a bad habit that I think a lot of copilots have of double-checking everything before we say anything to the captain. (Foushee, 1982, p. 1063)

Finally, an NTSB report (National Transportation Safety Board, 1980) provides a vivid illustration of the tendency of first officers to defer to the captain. In this situation, the flight crew of a commuter aircraft included a captain (who was also the company vice president) and a recently hired first officer. Although the aircraft was coming in well below the required approach for landing, the report suggests that the first officer failed to take control of the aircraft, even after the captain had apparently passed out at the controls. Because of the cockpit dynamics of this particular accident, the NTSB noted that the likelihood of the first officer exerting control was "remote." The reluctance of first officers to question captains and to exert control has been documented in other more controlled studies. Harper, Kidera, and Cullen (1971) conducted a simulator study in which captains feigned incapacitation during a final approach. Approximately 25% of these simulated flights crashed because the first officers failed to take control. Ginnett (1993) provided a revealing comment from one incident involving a poor landing: The first officer admitted that he had never seen an approach like that, but assumed "the captain must know what he's doing" (p. 89).

The examples presented in this brief review have several common elements. First, the interaction excerpts described all illustrate instances of superordination and subordination. As expected, the typical pattern of influence reflects the status structure of the cockpit, with captains enacting a predominant role and first officers enacting a subordinate role. Second, the effects of captain–first officer status include both

cognition of performance capability (the captain is seen as generally more competent than the first officer; e.g., "the captain must know what he's doing") and actual behaviors (the captain is more likely to disregard task input from the first officer, whereas the first officer is more likely to defer to the captain; e.g., "I believe the main factor involved here was my reluctance to correct the captain"). Finally, the pattern of superordinate-subordinate behavior observed in these examples is similar to patterns of influence behavior observed between men and women, Whites and minorities, and officers and enlisted personnel. Thus, we propose that many of the differences in captain-first officer interaction observed in the cockpit are a direct function of differences in status. In the following, we conducted an initial test to support this claim.

#### Are Captain-First Officer Differences Status Differences?

The first step required in extending this theoretical perspective to examine patterns of influence in the cockpit is to provide evidence that cockpit status (the captain-first officer distinction) meets the definition of a status characteristic as it is used in the theory. Three properties define whether an attribute of an individual functions as a status characteristic. First, a status characteristic is *differentially evaluated*: There are at least two distinct states of the characteristic that differ in social desirability. Second, there are *specific performance expectations* associated with each state, such that persons in one category are expected to be more competent at certain well-defined tasks. Third, there are *general expectations* associated with each state, such that persons in one category are thought to be more skilled at most tasks or more competent in situations in general. (Note that the general expectations that comprise a status characteristic imply competence of almost unlimited scope; thus we may often see physicians asked for their opinions on world affairs, and so on.)

The first part of this definition, that it is deemed to be more advantageous or desirable to be a captain rather than a first officer, is generally acknowledged, and is well documented in reviews by Foushee and Helmreich (1988) and others. However, the extent to which there exist specific and general expectations of

competence associated with differences in cockpit status has not been established. To address this question, we adapted a questionnaire that had been used in previous research (Webster & Driskell, 1983), and shown to be sensitive to general and specific performance expectations. We administered this questionnaire to a group of aviators to gauge the effects of cockpit status in producing task-specific and general expectations.

#### *Participants and Procedure*

Thirty-one undergraduate U.S. Navy aviators from Whiting Field in Pensacola, Florida, served as volunteer participants in this study. All participants were recently winged aviators with approximately 200 hr of primary and secondary flight training.

Participants were told that the study examined how people formed impressions of others on the basis of limited information. They were asked to complete a questionnaire that presented descriptive information on two aviators. Their task was to read this information and then provide their impressions of the focal persons on a series of questions. The questionnaire was administered in a classroom setting to a total of 31 participants. One questionnaire was discarded due to incomplete information, resulting in 30 usable questionnaires that were included in the analysis.

#### *Measures*

The questionnaire presented a brief biological sketch of two Naval aviators, described as person A and person B. Most of the information presented about the two aviators was quite similar: Both were described as similar in age and experience, both graduated from a large midwestern university with a bachelor's degree, and both were single and in good health. The only information that differentiated the aviators was that one was described as the pilot (the higher status position) and the other was described as the copilot (the lower status position). A series of questions followed that asked for the participants' impressions on the basis of this information. Questions 1 through 5 measured general expectations by asking participants to assess: (a) who was more competent, (b) who they expected to do better at situations in general, (c) who had higher verbal ability, (d)

who they believed to be more intelligent, and (e) who had more leadership ability. Questions 6 through 8 measured specific performance expectations. Two items were related to specific aviation performance, asking the participants who they expected to have the higher rating on the last instrument check and who had the better score on the annual flight evaluation. The theory predicts that status differences will determine performance expectations whether or not that characteristic is directly relevant to the task at hand. Therefore, we expected differences in cockpit status to structure expectations even for a task that is not aviation related. To test this notion, we referenced Holland's (1985) task typology, which places six task types at the vertices of a hexagon. Tasks that are polar opposites in this model are the most dissimilar—thus, according to the model, a realistic task (requiring the operation of things) is most dissimilar to a social task (that requires assisting or training others). Therefore, to test whether cockpit status would generalize to a dissimilar nonaviation task, we asked participants to assess who would be the better teacher of the two aviators.

The items were presented on a 6-point scale,

and the requested ratings were comparative. Thus, participants were asked to assess whether person A would have greater verbal ability, etc., relative to person B. Two forms of the questionnaire were created. In half of the questionnaires, person A was described as the pilot and person B was described as the copilot (and participants rated person A relative to person B). In the remaining questionnaires, the description was reversed so that person A was depicted as the copilot with person B depicted as the pilot (and participants again rated person A relative to person B).

## Results

One-tailed *t* tests were computed for each of the questionnaire items. The results indicated that participants reported higher general expectations for the pilot than for the copilot, as shown in Figure 2. Specifically, pilots were seen as more competent,  $t(28) = 7.05, p < .01$ , better at situations in general,  $t(28) = 5.84, p < .01$ , having higher verbal ability,  $t(28) = 1.83, p < .05$ , more intelligent,  $t(28) = 3.71, p < .01$ , and having greater leadership ability,  $t(28) = 5.79, p < .01$ , than copilots.

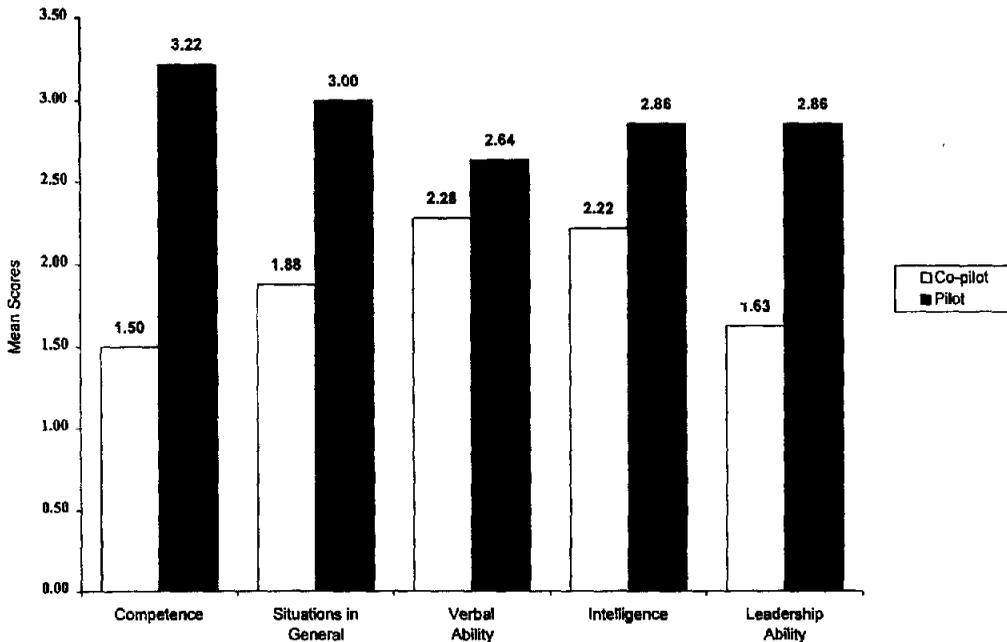


Figure 2. Means of general expectations held for the pilot and copilot.

The results also indicate that participants formed higher specific performance expectations for the pilot than for the copilot, as shown in Figure 3. Pilots were expected to have a higher instrument check rating,  $t(28) = 4.10$ ,  $p < .01$ , and to receive a higher score on the flight performance evaluation,  $t(28) = 4.12$ ,  $p < .01$ , than copilots. Furthermore, this same pattern was evident for the nonaviation task: Pilots were expected to perform better as teachers than were copilots,  $t(28) = 1.59$ ,  $p = .06$ . Overall, the results from this analysis clearly indicate that cockpit status indeed is a status characteristic for these respondents.

### Discussion

The examination of influence, or "who influences whom," in groups is a central question addressed in the early works of Simmel (1950) and Park (1928), and more recently in the works of Cialdini (1993) and others. The

primary purpose of the present analysis was to offer a theoretical context for documented differences in patterns of influence and authority between captains and first officers. We proposed that many of the behaviors that have been deemed to be problematic in the airplane cockpit—a captain's tendency to reject input from other team members and a first officer's hesitancy to question the captain—can be explained by recognizing that cockpit status is a status characteristic. Consequently, the theory of status characteristics and expectation states (Berger et al., 1977; Wagner & Berger, 1993) can be applied to explain observed differences in cognitions and behavior.

The results of an initial study conducted to instantiate this claim indicate that cockpit status meets the theoretical definition of a status characteristic. Using real-world aviators as respondents, we found that (a) higher general expectations were formed for pilots than for copilots, such that pilots were perceived to be

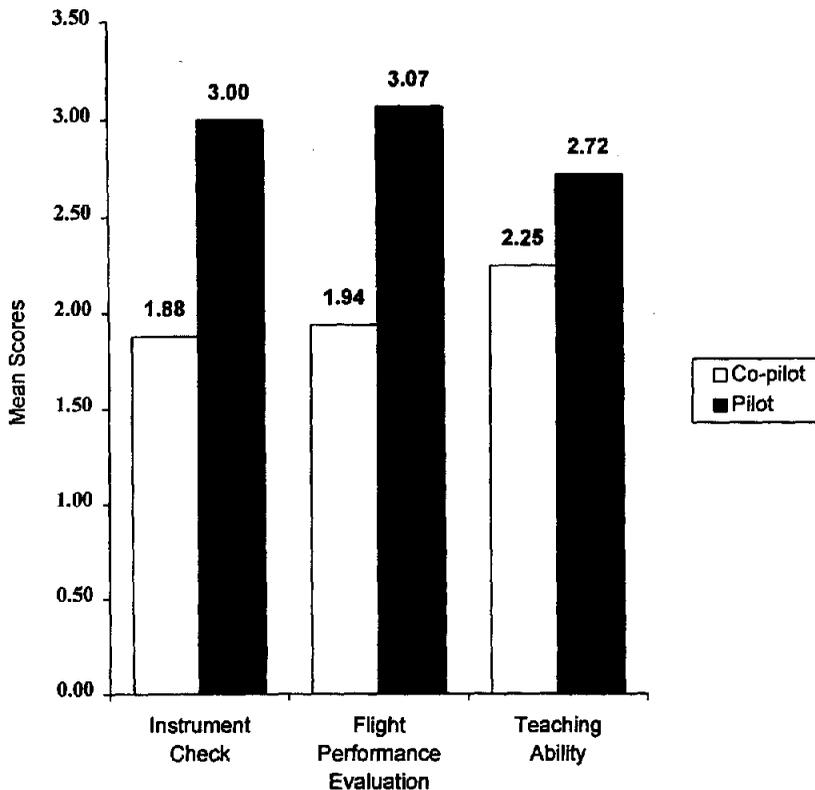


Figure 3. Means of specific expectations held for the pilot and copilot.

more competent, intelligent, and leaderlike than copilots, and (b) higher specific expectations were formed for pilots than for copilots, such that pilots were expected to perform better on specific aviation-related tasks as well as on tasks that were unrelated to aviation.

A number of explanations have been offered in the literature to account for the superordinate-subordinate nature of captain-first officer interaction. We contrast three such explanations. The *personality* approach implies that this behavior is primarily a function of the captain's personality—the macho pilot, who through strength of ego or deficiency of psychological make-up monopolizes crew interaction. This perspective would suggest that interventions focus on improving the selection of pilots to eliminate undesirable traits and choose desirable ones (Chidester, Helmreich, Gregorich, & Geis, 1991; Driskell, Hogan, & Salas, 1987). The *behavioral styles* approach implies that cockpit behavior is a function of the different behavioral styles of the captain and first officer. Of specific concern is that first officers exhibit a nonassertive or submissive pattern of behavior (Smith-Jentsch, Salas, & Baker, 1996). Although the origin of nonassertive behavior is unclear, one implication is that because of specific background and work experiences, first officers do not possess the set of assertive behaviors required for effective group performance. Thus, the type of intervention indicated in this case is assertiveness training for junior flight crew members to enhance the use of more assertive behaviors. The *status* approach implies that superordinate-subordinate behavior is a function of the status and authority structure in the cockpit. This approach holds that social or group processes form the basis for and sustain these behaviors. Interventions focus on altering the underlying processes that structure cockpit interaction. Each of these explanations offers a different theoretical rationale, and each is likely to be to some extent correct in that multiple factors contribute to determining crew interaction.

However, these approaches do differ in their implications. The status generalization explanation is a decidedly situational one, and differs in significant ways from those that invoke explanations such as assertiveness. The assertiveness approach argues that nonassertiveness stems from a lack of skills, that is, some people do not possess a repertoire of assertive behaviors. By

contrast, the status approach argues that most people possess both superordinate and subordinate behaviors, but that when a person is in a position of relative low status in a social situation he or she activates more passive, deferential behaviors, and when in a position of relative high status he or she activates more active, dominant behaviors. Thus, we may see the same first officer who acts in a deferential manner to a captain act in a more superordinate manner with the cabin crew (who are lower status relative to the first officer).

Moreover, the status approach suggests that there is a limited payoff from the emphasis on training subordinate team members to act more assertively. In a study of mixed race interaction, Katz (1970) found that assertiveness training provided to minority children did increase their participation somewhat, but that it also resulted in increased hostility from the higher status group members (who perceived the other group members as acting inappropriately). Thus, attempts to change the behavior of lower status persons without addressing the expectations of the higher status persons in that social context can lead to status conflicts. In fact, this type of status conflict may have been implicated in a 1994 accident involving a Korean Air jetliner. According to transcript reports, the copilot, fearful that there was not enough runway to land, stated that he shouted twice to the pilot to abort the landing but the pilot ignored him. The pilot noted that he refused the copilot's directives and repeatedly ordered the copilot to stop what he was doing. In the struggle to control the airplane, it skidded off the runway and rammed a safety barrier (Mecham, 1994). Thus, attempts to increase assertive behavior on the part of junior crewmembers must be mindful of the social context in which the behavior occurs.

Others have noted problems that may arise when multiple, conflicting status characteristics are salient in task environments. Ginnett (1993) observed that in some cases, formerly senior captains employed by one airline may be hired by a new employer as a first officer, which may lead to ambiguities in authority relations in the cockpit. Palmer et al. (1995) examined how cockpit status (captain and first officer) interacted with flying role (pilot-flying and pilot-not-flying) to determine cockpit interaction. In this research there were two status characteristics salient: the formal captain-first officer distinc-

tion and the flying role in which the pilot-flying is the high authority position and the pilot-not-flying is the lower authority position. Palmer et al. found that the effects of multiple status characteristics are cumulative, as predicted by the theory: Captains in the pilot-flying role initiated the greatest number of commands and first officers in the nonflying role initiated the least. However, they also found that captains in the nonflying role tended to initiate more commands than first officers whether or not the first officer was in the pilot-flying role or the pilot-not-flying role. In fact, the captain-pilot-not-flying initiated more total commands than the first officer-pilot-flying by an almost 3-to-1 ratio. These results suggest the strength of the captain-first officer status distinction. Further, they point to one source of potential conflict in authority relations when multiple, contradictory status characteristics operate in the cockpit.

Finally, of what practical use is the status approach in overcoming problems related to authority and influence in the cockpit? First, it is important to note that the goal is not to *eliminate* the advantages conferred by status in the cockpit. That is, the legitimate organizational structure in the cockpit is hierarchical, with the captain generally in authority and the first officer subordinate. The problem lies in the captain acting too superordinate (and ignoring input from other crewmembers) and the first officer acting too subordinate (and failing to offer input when appropriate). Therefore, given that the goal of intervention is to reduce the harmful effects of status generalization, the status approach offers several implications. First, status generalization is viewed as a cooperative social process in which high status group members exhibit more proactive task activities, *and* lower status group members exhibit more subordinate behaviors. That is, both the high status and the low status group members believe and act as if the higher status person is more competent and the lower status is less competent. Thus, training interventions must target both high status and low status parties. Second, research indicates that expectations for competence are based on external status characteristics (such as rank or occupation), documented skills and competencies, and actual behavior in the task situation. Driskell et al. (1993) demonstrated that individuals were seen as more

competent and gained greater influence in task groups by enacting high status task behaviors such as fluid, well-moderated speech, confident gestures, and eye contact. Thus, training interventions that focus on presentation of these high status behaviors may allow those with lower formal status to be more successful in influence attempts.<sup>2</sup> Third, interventions that attempt to alter rigid status-typed relations may lead to more flexible cockpit behavior. Research conducted by Cohen and colleagues in educational settings (Cohen et al., 1988) suggests that task situations in which higher status individuals interact with lower status persons who also demonstrate task competence can lead to less inequality of interaction. Moreover, the theory predicts that expectations formed in one setting tend to carry over to the next interaction, even with different partners (Driskell & Webster, 1997). Thus, interacting with a highly competent first officer should lead to more positive performance expectations for first officers, and these expectations should transfer to the next interaction setting.

The purpose of this article is to provide a context for observable (and sometimes problematic) patterns of interaction that occur between captains and first officers in the aviation cockpit. We have reviewed instances of superordinate and subordinate behavior in the cockpit that are consistent with the predictions of status generalization theory. Finally, we have presented initial data gathered in a laboratory setting that supports this perspective. However, it is important to note that these empirical results are only suggestive. Applying this theory to the aircrew environment requires that further work be done in a setting that more closely approximates aircrew interaction. Aviation simulations, in which crew members "fly" a simulated yet realistic mission, can provide a more rigorous test of the predictions of the theory, and can provide a behavioral setting in which interventions can be examined. Further research is currently underway to assess the extent to which

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<sup>2</sup> An interesting sidelight is that, according to Jentsch, Bowers, Martin, Barnett, and Prince (1997), one consistent criterion that aviators use to describe a good first officer is a clean, professional appearance. The emphasis on sartorial elegance is understandable given the recognition that clothing provides a cue to status and the perceived competence of the wearer.

status determines reactions to errors in simulated flight interaction.

Regardless of the difficulty entailed in studying group dynamics in applied settings, the payoff can be significant. For example, the NTSB found that monitoring and challenging errors were present in 31 of the 37 airline accidents that were reviewed (National Transportation Safety Board, 1994). By offering a theory of status in cockpit dynamics, we hope to sensitize observers to look for the operation of status processes in captain–first officer relations and to more fully understand the consequences of status-typed behavior when it occurs.

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