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‘WE NEED PRIORITY PLEASE’
MITIGATED SPEECH IN THE CRASH OF AVIANCA FLIGHT 052

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On 25 January 1990, Avianca Flight 052 was flying from Columbia to the United States when it crashed after a missed approach to JFK Airport in New York. The direct cause of the accident was fuel exhaustion but the NTSB investigation identified multiple causal factors. The Avianca captain, who was flying the aircraft, repeatedly instructed the first officer to notify ATC about the fuel emergency. The first officer, however, did not use the word ‘emergency’ but instead requested ‘priority’ and told ATC that the airplane was ‘running out of fuel’. Why did the first officer mitigate the captain’s instructions? This paper hypothesizes that a range of factors relating to national culture, professional culture, organizational culture and stress may have contributed to the first officer’s use of mitigated speech. The implication is that the communication breakdown was not simply caused by inadequate English language proficiency.

This paper examines English language communication problems experienced by the flight crew of Avianca Flight 052, prior to its crash at Cove Neck, near New York, on 25 January 1990. The direct cause of the crash was fuel exhaustion, but the National Transportation and Safety Board (NTSB) investigation found that the accident occurred as a result of multiple causal factors. Two of the factors were directly related to communication: the crew’s failure to declare a fuel emergency, and the lack of standardized terminology for minimum and emergency fuel states. The accident is summarised in Table 1.

Table 1.
Summary of the Avianca 052 accident.

Date of accident	25 January 1990
Location	Cove Neck, Long Island, New York, USA
Aircraft type	Boeing B-707-321B
Operator & flight number	Avianca Flight 052
L1 of flight crew	Spanish
L1 of air traffic controllers	English
Type of accident	Fuel exhaustion
Number of fatalities	73

Note. L1 is an abbreviation of first language, or mother tongue.

Despite taking place more than 25 years ago, the Avianca 052 accident was cited in justification of the major English language program that ICAO brought into full effect in 2011 to improve the English proficiency of commercial pilots and air traffic controllers around the world. The official manual for the program, ICAO Doc 9835, refers to the Avianca crash as one of several major accidents in which ‘insufficient English language proficiency on the part of the flight crew or a controller had played a contributing role’ (ICAO, 2010, p. 1-1).

A few years after the accident, Helmreich (1994) provided a wide-ranging and thought-provoking analysis from a system perspective, using data uncovered in the litigation that followed the accident to try to explain the causal factors identified by the NTSB investigation. His paper examined organizational factors such as training, maintenance and dispatch operations at Avianca, as well as the group dynamics of the crew during the flight. This paper leans heavily on Helmreich’s analysis, but is more narrowly focused on the communication breakdown that occurred between the flight crew and air traffic controllers. It does not address group processes within the Avianca cockpit. The sources of data for this analysis are the cockpit voice recorder (CVR) and air traffic control (ATC) transcripts in the NTSB accident report. It is important to note that the CVR data covered only the final 40 minutes of the flight.

The Accident

On 25 January 1990, Avianca Flight 052 was scheduled to fly from Bogota to Medellin in Columbia, then – after a short stop for refuelling – on to John F. Kennedy International Airport (JFK) in New York. The weather was poor in the north-eastern part of the United States, which meant that the aircraft had to enter three separate holding patterns for a total of 77 minutes. During the third holding period, at 20:46 EST, the flight crew notified ATC that they could only hold for about five more minutes and could no longer reach their alternate in Boston because they were running out of fuel. As the aircraft finally descended towards JFK it encountered wind shear and the crew executed a missed approach at 21:23. While trying to return for a second approach, all four engines suffered a loss of power and the aircraft crashed at approximately 21:34 at Cove Neck, Long Island. Of 158 passengers and crew on board the plane, 73 died as a result of the crash. The fatalities included all the flight and cabin crew, with the exception of one flight attendant.

NTSB Investigation

The NTSB investigated the accident and published its report in April 1991. The conclusion of the report listed 24 findings, before stating one probable cause plus a number of contributory factors. The probable cause ‘was the failure of the flightcrew to adequately manage the airplane’s fuel load, and their failure to communicate an emergency fuel situation to air traffic control before fuel exhaustion occurred’ (NTSB, 1991, p. 76). Table 2 has a summary of the probable cause and contributory factors.

Table 2.
Causal factors for the Avianca 052 accident (NTSB, 1991).

Probable cause	flight crew failed to adequately manage fuel load
	flight crew failed to communicate emergency fuel situation to ATC
Contributory factors	flight crew failed to make use of airline operational control dispatch system
	FAA traffic flow management was inadequate
	lack of standardized, understandable terminology for minimum / emergency fuel states
	first approach to JFK hindered by windshear
	first approach hindered by flight crew fatigue
	first approach hindered by flight crew stress

The accident was clearly caused by the co-occurrence of multiple factors, and might have been averted if any of these factors had been absent. The NTSB report notes, for example, that the accident would not have occurred if the crew had not been prevented from successfully completing the first approach by a combination of wind shear, stress and fatigue. Two of the causal factors relate directly to English language communication: the flight crew’s failure to communicate an emergency fuel situation to ATC; and the lack of standardized, understandable terminology for minimum and emergency fuel states.

Flight Crew

The flight crew of Avianca 052 consisted of the captain, first officer and flight engineer. The 51-year-old captain was a very experienced pilot, with no record of previous accidents, and was also a pilot in the Columbian Air Force Reserve. The 45-year-old flight engineer was likewise very experienced, and had more than 3,000 flight hours in the Boeing 707. By contrast, the young first officer was, as Helmreich (1994, p. 280) notes, ‘inexperienced overall and particularly in the B-707’, with just 64 hours in this aircraft type and a total flight time of 1,837 hours. Table 3 gives details of the crew’s flight experience.

The Avianca captain had previously flown on international flights with the first officer, and also with the flight engineer, but this was the first time that all three flew together as a crew (NTSB, 1991). Citing NTSB research, Helmreich and Merritt (1998, p. 12) note that ‘a disproportionate percentage of accidents happen to crews who are flying together for the first time’.

Table 3.

Flight experience of the Avianca 052 crew (NTSB, 1991).

	Age	Flight hours		Flight hours in B707		Flights to NY 1989-90	
		Total	Night flying	Total	Night flying	Total	B707
Captain	51	16,787	2,435	1,534	478	14	14
First officer	28	1,837	408	64	13	13	5
Flight engineer	45	10,134	2,986	3,077	1,062	7	5

Communication with ATC

During the final stages of the flight, the Avianca first officer was communicating with controllers in the New York Air Route Traffic Control Center (ARTCC) and Terminal Radar Approach Control (TRACON). While Flight 052 was still in the third holding period, at 20:44, an ARTCC controller informed the crew they could expect further clearance information at 21:05. The first officer read back the time and said, 'I think we need priority we're passing [unintelligible].' This exchange is recorded in the ATC transcript (NTSB, 1991, pp. 177-179) but not in the CVR data because the latter covered only the last 40 minutes of the flight. At 20:46 the first officer reported to ATC that they could only hold for about five more minutes and, when asked to repeat the alternate, he said, 'It was Boston but we we can't do it now we, we, don't, we run out of fuel now.'

Thus the first officer informed ARTCC about the fuel problem more than 45 minutes before the crash occurred. Crucially, though, neither then nor later did he declare a fuel emergency. His message about the fuel problem and being unable to reach the alternate was not passed on to New York approach control because the handoff controller was on the phone when the transmission was made and so he did not hear it. The aircraft subsequently received routine vectors including a 360° turn for spacing.

The Avianca crew did not contact ATC again about their fuel situation until after the first landing attempt failed at 21:23. Then, during the final eleven minutes of the flight, there were several exchanges about the fuel problem. The CVR transcript indicates that the captain three times declared in Spanish 'we don't have fuel'. In terms of communicative functions, at 21:23:43 the captain gave information ('we don't have fuel'); at 21:25:08 he gave an order to the first officer ('advise him we don't have fuel'); and at 21:25:28 he requested confirmation ('did you already advise that we don't have fuel'). In response to these instructions and other prompts by the captain, the first officer three times said to the controller in English 'we're running out of fuel'. The captain also twice instructed the first officer to declare an emergency: at 21:24:06 ('tell them we are in emergency') and at 21:24:22 ('advise him we are in emergency'). The first officer did not do so. Finally, after two engines had flamed out, the first officer made a request at 21:32:49: 'we need priority please'.

Mitigated Speech

A mitigated form of speech may be defined as 'one which expresses a given propositional content in such a way as to avoid giving offense' (Linde, 1985). During the final section of the flight the captain repeatedly instructed the first officer to notify ATC about the fuel emergency. However, the first officer used mitigated speech in his messages to ATC: he did not use the word 'emergency' but instead requested 'priority', and he told controllers that the airplane was 'running out of fuel'. Cushing (1994, p. 2) observes that the accident was in part due to the first officer using 'the formal English phrase *running out of fuel* rather than the technical aviation term *emergency*, thereby failing to convey to the controller the intended degree of urgency.' Why did the first officer use mitigated speech, when he could have simply translated the Spanish word 'emergencia' into its English equivalent?

Cultural Factors

Helmreich (1994) hypothesises that the behavior of the Columbian flight crew can be attributed at least partly to national culture, and makes use of the cultural dimensions identified by Hofstede (1980) in his analysis of the accident. Two of these cultural dimensions are relevant to the communication between the flight crew and ATC: collectivism-individualism and power distance. In addition to national culture, both the professional culture and organizational culture of the flight crew may also have contributed to the communication breakdown.

National Culture

The cultural dimension of collectivism-individualism is a measure of the degree to which people act as members of cohesive groups rather than as individuals. Coming from a strongly collectivist culture in Columbia, Helmreich (1994) suggests that the Avianca flight crew may have been reluctant to declare an emergency and push themselves ahead of other crews that they perceived to be in a similar situation. In other words, a strong sense of collectivism may have made the first officer reluctant to use the word 'emergency'. Other aircraft were indeed running low on fuel that night. At 21:02 an American Airlines crew transmitted the following: 'American six ninety two I want to advise you we're at minimum fuel uh we're uh about uh twelve or fourteen minutes from declaring an emergency' (NTSB, 1991, p. 219).

Helmreich (1994) also observes that power distance, or the degree to which people accept unequal power relationships, is typically high in Columbia. In a lengthy discussion of the Avianca accident, Gladwell (2008, pp. 192-209) develops this idea, noting that authority is highly respected in Columbian society, and explaining that the first officer – only 28 years old and lacking flight experience – would have seen himself as subordinate to both the captain and the 'domineering Kennedy Airport air traffic controllers'. Gladwell (2008, p. 194) suggests that the first officer, in deference to the authority of the captain and controllers, used mitigated speech 'to downplay or sugarcoat the meaning' of his communications.

Professional Culture

The use of mitigated speech within the pilot community was studied by researchers in the 1980s and 1990s. Using data from eight airline accidents that occurred between 1972 and 1982, Linde (1985) reports that requests made by subordinates to superiors were more mitigated than those made by superiors, and requests were less mitigated during emergency situations. Linde goes on to discuss politeness theory and the concepts of negative face and positive face. Requests are speech acts that threaten the negative face of hearers by pressuring them to act and restricting their freedom of action. Speakers may lessen the damage to hearers by using indirect requests. Applying this reasoning to the case of Avianca 052, it is possible that the first officer, rather than declaring an emergency, instead used an indirect request ('we need priority please') as a strategy to lessen the imposition on ATC.

In another study involving several hundred pilots from the United States and Europe, Fischer and Orasanu (1999) report that first officers were more likely than captains to use indirect communication strategies such as hints, and communications were more direct in emergency situations than in normal flight. This and the previous research involved intra-cockpit communications between native-speaker pilots. By contrast, the Avianca accident featured native speaker air traffic controllers communicating with a first officer who was a non-native speaker of English. Nevertheless, both studies highlight a tendency for first officers to use mitigated speech, and they also suggest that native speaker controllers may expect pilots to use direct communications in emergency situations.

Organizational Culture

Training at Avianca, the airline for which the pilots worked, may have led the first officer to believe that the terms 'emergency' and 'priority' were interchangeable. The NTSB (1991, p. 63) report includes the testimony of another Avianca captain who stated that training provided by Boeing gave the impression that 'the words priority and emergency conveyed the same meaning to air traffic control'. Indeed, Boeing issued a bulletin to all B-707 operators in 1980 advising that during operations with very low fuel quantities 'priority handling from ATC should be requested' (NTSB 1991, p. 28). This terminology was critical but the correct usage was ambiguous. The Avianca crew may have believed that 'priority' conveyed the same meaning as 'emergency', but air traffic controllers questioned during the investigation stated that only the terms 'Mayday', 'Pan-pan-pan' or 'Emergency' should be used to declare a fuel emergency (NTSB 1991, p. 63). In a human factors analysis, Krause (2003 pp. 90-107), noting that the first officer twice asked for 'priority' and four times advised ATC the plane was low on fuel, states that 'it would seem reasonable and logical' for the controllers to have asked for clarification.

Effects of Stress

Earlier in the day the Avianca crew had flown a 54-minute leg in Columbia from Bogota to Medellin. Following that, the actual flight time from Medellin to JFK was 6 hours 26 minutes, much longer than the planned time of 4 hours 40 minutes. The aircraft was in three separate holding patterns for a total of 77 minutes. By contrast, another Avianca captain interviewed after the crash stated that holding delays for JFK were normally 'a maximum

of 20 to 30 minutes' (Cushman, 1990). The unexpectedly long delays, mechanical problems with the aircraft's autopilot and flight director, the worsening fuel problem, adverse weather including reports of windshear, and the missed first approach would all have increased the stress on the flight crew.

Furthermore, the first officer was probably suffering additional stress due to his lack of flight experience. With only 13 hours of night flying experience in the Boeing 707, it was unlikely that he had ever faced a situation like this before. The cognitive processing demands of having to cope with a novel and difficult situation would have been considerable, compounded by the need to continually code switch between Spanish (to talk with the other crew members) and English (for the ATC communications).

As noted in Table 2, the investigation found that flight crew stress and fatigue contributed to the missed first approach. The NTSB report briefly mentions laboratory experiments which show that demanding flight conditions cause communication performance to be significantly degraded, but does not examine the effects of stress in detail. Since the Avianca accident a lot more research has been carried out into the impact of stress and fatigue on flight operations, and it is now evident that the effects are complex and multi-faceted. Two stress-related effects may have impacted upon the first officer's communications: attentional tunneling and regression to earlier behavior.

Attentional Tunneling

Stokes and Kite (1994, pp. 112-116) describe a number of ways in which communication can be degraded by stress, and they observe that the degradation may manifest itself in a 'decreased ability to receive and interpret messages'. They note that stress can cause pilots to 'miss advice, information, or instructions from ATC or flight deck colleagues' due to working memory limitations and attentional tunnelling, or a narrowing of the field of attention. The CVR data indicates that the first officer was having problems processing information accurately: five times between 21:25 and 21:26 he incorrectly reported a new heading of 'zero eight zero' (=080°) as 'ciento ochenta' (=180°). Under these stressful conditions, it is possible that attentional tunneling prevented the first officer from understanding the significance of the word 'emergency' in the captain's instructions. His subsequent use of the word 'priority' as a synonym for 'emergency' might have been the result of him reducing the criteria for accuracy, which is one way that individuals deal with the demands of multiple concurrent tasks (Loukopoulos et al., 2009).

Regression to Earlier Behavior

The first officer lacked flight experience but according to Helmreich (1994, p. 272) he spoke 'excellent, unaccented English'. Well-learned tasks can be carried out automatically with little cognitive effort, but new or recently-learned tasks may require considerable controlled processing (Loukopoulos et al., 2009). When speaking English, the first officer could probably produce well-learned conversational structures automatically, but he may have needed considerable cognitive effort to produce recently-learned standard phraseology. Under conditions of high stress and workload, the difference between these two types of speech, and the mental workload they require, becomes critical. Stokes and Kite (1994, p. 65) observe that 'individuals under stress are prone to revert to behaviours, strategies, and schemata learned earlier'. Such regression to earlier behavior may have led the young first officer to use conversational structures (such as mitigated speech) instead of phraseology. This tendency could have been reinforced by the first officer hearing plain language being used by other flight crews and controllers, a number of instances of which are recorded in the ATC transcripts. For example, the NTSB (1991, p. 222) report shows that at 21:06 the following exchange took place:

TRACON controller: 'American six ninety two how are we making out'
AAL 692: 'We got enough fuel for the approach and landing and that's it'
TRACON controller: 'Ok understand'

Hypothesis

Why did the first officer use mitigated speech to communicate with ATC? The hypothesis put forward in this paper is that a combination of factors created conditions conducive to his use of mitigated speech. First, a strong sense of collectivism may have made the first officer reluctant to declare an emergency when other flight crews were also in difficulty. High power distance made it more likely for him to use mitigated speech with the controllers. Being a first officer, not a captain, he was more likely to use mitigated speech and may have used it as a strategy to lessen the imposition on ATC. Training in his organization may have led him to think that the word 'priority' carried the same meaning as the word 'emergency'. A high level of stress may have caused attentional tunneling making it difficult for the first officer to interpret the captain's instructions accurately and to comprehend the distinction

between 'emergency' and 'priority'. Finally, stress-related regression may have led him to use conversational speech forms including mitigated speech rather than standardized phraseology in his communication with controllers.

Helmreich (1994, pp. 271-272) stresses that ATC did not realize how serious the Avianca fuel situation was, and he lists several ways in which the first officer's transmissions misled the controllers: he did not declare an emergency; he communicated about the fuel problem 'in an offhand manner'; his English was excellent; and he spoke in a 'monotone voice'. It is now possible to add one more factor that may have misled ATC: the first officer's use of mitigated speech signalled to the controllers that the fuel problem was not severe since research indicates that communications are *more direct* in emergency situations (Linde, 1985; Fischer & Orasanu, 1999).

Conclusion

Research conducted since the crash of Avianca 052 allows a new hypothesis to be put forward to explain why the first officer used mitigated speech to communicate with ATC. This paper suggests that a combination of factors relating to national culture, professional culture, organizational culture and stress led him to use mitigated speech forms. The implication is that the communication breakdown between this flight crew and ATC was not simply due to inadequate English proficiency. Indeed, as noted above, the first officer's English proficiency was high. This was a system accident involving numerous causal factors ranging from mechanical problems to adverse weather and fatigue. A combination of factors coincided to leave an inexperienced pilot, who was simply trying to do his job, critically exposed. The Avianca 052 crash was a tragic accident, and this paper highlights the need for continued research into the effects of stress and culture on communication.

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