

the circumstances of your upbringing were all make a significant difference in how well you do in the world. The question for the second part of *Outliers* is whether the traditions and attitudes we inherit from our forebears can play the same role. Can we learn something about why people succeed and how to make people better at what they do by taking cultural legacies seriously? I think we can.

The Ethnic Theory of Plane Crashes

"CAPTAIN, THE WEATHER RADAR
HAS HELPED US A LOT."

1.

On the morning of August 5, 1997, the captain of Korean Air flight 801 woke at six. His family would later tell investigators that he went to the gym for an hour, then came home and studied the flight plan for that evening's journey to Guam. He napped and ate lunch. At three in the afternoon, he left for Seoul, departing early enough, his wife said, to continue his preparations at Kimpo International Airport. He had been a pilot with Korean Air for almost four years after coming over from the Korean Air Force. He had eighty-nine hundred hours of flight time, including thirty-two hundred hours of experience in jumbo jets. A few months earlier, he had been given a flight safety award by his airline for successfully handling a jumbo-jet engine failure at low altitude. He was forty-two years old and in excellent health, with the exception of a bout of bronchitis that had been diagnosed ten days before.

At seven p.m., the captain, his first officer, and the flight engineer met and collected the trip's paperwork. They would be flying a Boeing 747—the model known in the aviation world as the “classic.” The aircraft was in perfect working order. It had once been the Korean presidential plane. Flight 801 departed the gate at ten-thirty in the evening and was airborne twenty minutes later. Takeoff was without incident. Just before one-thirty in the morning, the plane broke out of the clouds, and the flight crew glimpsed lights off in the distance.

“Is it Guam?” the flight engineer asked. Then, after a pause, he said, “It's Guam, Guam.”

The captain chuckled. “Good!”

The first officer reported to Air Traffic Control (ATC) that the airplane was “clear of Charlie Bravo [cumulonimbus clouds]” and requested “radar vectors for runway six left.”

The plane began its descent toward Guam airport. They would make a visual approach, the captain said. He had flown into Guam airport from Kimpo eight times previously, most recently a month ago, and he knew the airport and the surrounding terrain well. The landing gear went down. The flaps were extended ten degrees. At 01:41 and 48 seconds, the captain said, “Wiper on,” and the flight engineer turned them on. It was raining. The first officer then said, “Not in sight?” He was looking for the runway. He couldn't see it. One second later, the Ground Proximity Warning System called out in its electronic voice: “Five hundred [feet].” The plane was five hundred feet off the ground. But how could that be if they couldn't

see the runway? Two seconds passed. The flight engineer said, “Eh?” in an astonished tone of voice.

At 01:42 and 19 seconds, the first officer said, “Let's make a missed approach,” meaning, Let's pull up and make a large circle and try the landing again.

One second later, the flight engineer said, “Not in sight.” The first officer added, “Not in sight, missed approach.”

At 01:42 and 22 seconds, the flight engineer said again, “Go around.”

At 01:42 and 23 seconds, the captain repeated, “Go around,” but he was slow to pull the plane out of its descent.

At 01:42 and 26 seconds, the plane hit the side of Nimtitz Hill, a densely vegetated mountain three miles southwest of the airport—\$60 million and 212,000 kilograms of steel slamming into rocky ground at one hundred miles per hour. The plane skidded for two thousand feet, severing an oil pipeline and snapping pine trees, before falling into a ravine and bursting into flames. By the time rescue workers reached the crash site, 228 of the 254 people on board were dead.

2.

Twenty years before the crash of KAL 801, a Korean Air Boeing 707 wandered into Russian airspace and was shot down by a Soviet military jet over the Barents Sea. It was an accident, meaning the kind of rare and catastrophic event that, but for the grace of God, could happen to any airline. It was investigated and analyzed. Lessons were learned. Reports were filed.

Then, two years later, a Korean Air Boeing 747 crashed in Seoul. Two accidents in two years is not a good sign. Three years after that, the airline lost another 747 near Sakhalin Island, in Russia, followed by a Boeing 707 that went down over the Andaman Sea in 1987, two more crashes in 1989 in Tripoli and Seoul, and then another in 1994 in Cheju, South Korea.*

To put that record in perspective, the "loss" rate for an airline like the American carrier United Airlines in the period 1988 to 1998 was .27 per million departures, which means that they lost a plane in an accident about once in every four million flights. The loss rate for Korean Air, in the same period, was 4.79 per million departures—more than *seventeen* times higher.

Korean Air's planes were crashing so often that when the National Transportation Safety Board (NTSB)—the US agency responsible for investigating plane crashes within American jurisdiction—did its report on the Guam crash, it was forced to include an addendum listing all the new Korean Air accidents that had happened just since its investigation began: the Korean Air 747 that crash-landed at Kimpo in Seoul, almost a year to the day after Guam; the jetliner that overran a runway at Korea's Ulsan Airport eight weeks after that; the Korean Air McDonnell Douglas 83 that rammed into an embankment at Pohang Airport the following March; and then, a month after

* Korean Air was called Korean Airlines before it changed its name after the Guam accident. And the Barents Sea incident was actually preceded by two other crashes, in 1971 and 1976.

that, the Korean Air passenger jet that crashed in a residential area of Shanghai. Had the NTSB waited just a few more months, it could have added another: the Korean Air cargo plane that crashed just after takeoff from London's Stansted airport, despite the fact that a warning bell went off in the cockpit no fewer than fourteen times.

In April 1999, Delta Air Lines and Air France suspended their flying partnership with Korean Air. In short order, the US Army, which maintains thousands of troops in South Korea, forbade its personnel from flying with the airline. South Korea's safety rating was downgraded by the US Federal Aviation Administration, and Canadian officials informed Korean Air's management that they were considering revoking the company's overflight and landing privileges in Canadian airspace.

In the midst of the controversy, an outside audit of Korean Air's operations was leaked to the public. The forty-page report was quickly denounced by Korean Air officials as sensationalized and unrepresentative, but by that point, it was too late to save the company's reputation. The audit detailed instances of flight crews smoking cigarettes on the tarmac during refueling and in the freight area; and when the plane was in the air. "Crew read newspapers throughout the flight," the audit stated, "often with newspapers held up in such a way that if a warning light came on, it would not be noticed." The report detailed bad morale, numerous procedural violations, and the alarming conclusion that training standards for the 747 "classic" were so poor that "there is some concern as to whether First Officers on the Classic fleet could land the aircraft if the Captain became totally incapacitated."

By the time of the Shanghai crash, the Korean president, Kim Dae-jung, felt compelled to speak up. "The issue of Korean Air is not a matter of an individual company but a matter of the whole country," he said. "Our country's credibility is at stake." Kim then switched the presidential plane from Korean Air to its newer rival, Asiana.

But then a small miracle happened. Korean Air turned itself around. Today, the airline is a member in good standing of the prestigious SkyTeam alliance. Its safety record since 1999 is spotless. In 2006, Korean Air was given the Phoenix Award by Air Transport World in recognition of its transformation. Aviation experts will tell you that Korean Air is now as safe as any airline in the world.

In this chapter, we're going to conduct a crash investigation: listen to the "black box" cockpit recorder; examine the flight records; look at the weather and the terrain and the airport conditions; and compare the Guam crash with other very similar plane crashes, all in an attempt to understand precisely how the company transformed itself from the worst kind of outlier into one of the world's best airlines. It is a complex and sometimes strange story. But it turns on a very simple fact, the same fact that runs through the tangled history of Harlan and the Michigan students. Korean Air did not succeed—it did not right itself—until it acknowledged the importance of its cultural legacy.

3.

Plane crashes rarely happen in real life the same way they happen in the movies. Some engine part does not explode in a fiery bang. The rudder doesn't suddenly snap under

the force of takeoff. The captain doesn't gasp, "Dear God," as he's thrown back against his seat. The typical commercial jetliner—at this point in its stage of development—is about as dependable as a toaster. Plane crashes are much more likely to be the result of an accumulation of minor difficulties and seemingly trivial malfunctions.*

* This is true not just of plane crashes. It's true of virtually all industrial accidents. One of the most famous accidents in history, for example, was the near meltdown at Pennsylvania's Three Mile Island nuclear station in 1979. Three Mile Island so traumatized the American public that it sent the US nuclear power industry into a tailspin from which it has never fully recovered. But what actually happened at that nuclear reactor began as something far from dramatic. As the sociologist Charles Perrow shows in his classic *Normal Accidents*, there was a relatively routine blockage in what is called the plant's "polisher"—a kind of giant water filter. The blockage caused moisture to leak into the plant's air system, inadvertently tripping two valves and shutting down the flow of cold water into the plant's steam generator. Like all nuclear reactors, Three Mile Island had a backup cooling system for precisely this situation. But on that particular day, for reasons that no one really understands, the valves for the backup system weren't open. Someone had closed them, and an indicator in the control room showing they were closed was blocked by a repair tag hanging from a switch above it. That left the reactor dependent on another backup system, a special sort of relief valve. But, as luck would have it, the relief valve wasn't working properly that day either. It stuck open when it was supposed to close, and, to make matters even worse, a gauge in the control room that should have told the operators that the relief valve wasn't working was itself not working. By the time Three Mile Island's engineers realized what was happening, the reactor had come dangerously close to a meltdown.

No single big thing went wrong at Three Mile Island. Rather, five completely unrelated events occurred in sequence, each of which, had it happened in isolation, would have caused no more than a hiccup in the plant's ordinary operation.

In a typical crash, for example, the weather is poor—not terrible, necessarily, but bad enough that the pilot feels a little bit more stressed than usual. In an overwhelming number of crashes, the plane is behind schedule, so the pilots are hurrying. In 52 percent of crashes, the pilot at the time of the accident has been awake for twelve hours or more, meaning that he is tired and not thinking sharply. And 44 percent of the time, the two pilots have never flown together before, so they're not comfortable with each other. Then the errors start—and it's not just one error. The typical accident involves seven consecutive human errors. One of the pilots does something wrong that by itself is not a problem. Then one of them makes another error on top of that, which combined with the first error still does not amount to catastrophe. But then they make a third error on top of that, and then another and another and another *and another*, and it is the combination of all those errors that leads to disaster.

These seven errors, furthermore, are rarely problems of knowledge or flying skill. It's not that the pilot has to negotiate some critical technical maneuver and fails. The kinds of errors that cause plane crashes are invariably errors of teamwork and communication. One pilot knows something important and somehow doesn't tell the other pilot. One pilot does something wrong, and the other pilot doesn't catch the error. A tricky situation needs to be resolved through a complex series of steps—and somehow the pilots fail to coordinate and miss one of them.

"The whole flight-deck design is intended to be operated by two people, and that operation works best when you have one person checking the other, or both people

willing to participate," says Earl Weener, who was for many years chief engineer for safety at Boeing. "Airplanes are very unforgiving if you don't do things right. And for a long time it's been clear that if you have two people operating the airplane cooperatively, you will have a safer operation than if you have a single pilot flying the plane and another person who is simply there to take over if the pilot is incapacitated."

Consider, for example, the famous (in aviation circles, anyway) crash of the Colombian airliner Avianca flight 052 in January of 1990. The Avianca accident so perfectly illustrates the characteristics of the "modern" plane crash that it is studied in flight schools. In fact, what happened to that flight is so similar to what would happen seven years later in Guam that it's a good place to start our investigation into the mystery of Korean Air's plane crash problem.

The captain of the plane was Laureano Caviedes. His first officer was Mauricio Klotz. They were en route from Medellin, Colombia, to New York City's Kennedy Airport. The weather that evening was poor. There was a nor'easter up and down the East Coast, bringing with it dense fog and high winds. Two hundred and three flights were delayed at Newark Airport. Two hundred flights were delayed at LaGuardia Airport, 161 at Philadelphia, 53 at Boston's Logan Airport, and 99 at Kennedy. Because of the weather, Avianca was held up by Air Traffic Control three times on its way to New York. The plane circled over Norfolk, Virginia, for nineteen minutes, above Atlantic City for twenty-nine minutes, and forty miles south of Kennedy Airport for another twenty-nine minutes.

After an hour and a quarter of delay, Avianca was cleared for landing. As the plane came in on its final approach, the pilots encountered severe wind shear. One moment they were flying into a strong headwind, forcing them to add extra power to maintain their momentum on the glide down. The next moment, without warning, the headwind dropped dramatically, and they were traveling much too fast to make the runway. Typically, the plane would have been flying on autopilot in that situation, reacting immediately and appropriately to wind shear. But the autopilot on the plane was malfunctioning, and it had been switched off. At the last moment, the pilot pulled up, and executed a "go-around." The plane did a wide circle over Long Island, and reapproached Kennedy Airport. Suddenly, one of the plane's engines failed. Seconds later, a second engine failed. "Show me the runway!" the pilot cried out, hoping desperately that he was close enough to Kennedy to somehow glide his crippled plane to a safe landing. But Kennedy was sixteen miles away.

The 707 slammed into the estate owned by the father of the tennis champion John McEnroe, in the posh Long Island town of Oyster Bay. Seventy-three of the 158 passengers aboard died. It took less than a day for the cause of the crash to be determined: "fuel exhaustion." There was nothing wrong with the aircraft. There was nothing wrong with the airport. The pilots weren't drunk or high. The plane had run out of gas.

4.

"It's a classic case," said Suren Ratwatte, a veteran pilot who has been involved for years in "human factors" research, which is the analysis of how human beings interact with complex systems like nuclear power plants and airplanes. Ratwatte is Sri Lankan, a lively man in his forties who has been flying commercial jets his entire adult life. We were sitting in the lobby of the Sheraton Hotel in Manhattan. He'd just landed a jumbo jet at Kennedy Airport after a long flight from Dubai. Ratwatte knew the Avianca case well. He began to tick off the typical crash preconditions. The nor'easter. The delayed flight. The minor technical malfunction with the autopilot. The three long holding patterns—which meant not only eighty minutes of extra flying time but extra flying at low altitudes, where a plane burns far more fuel than it does in the thin air high above the clouds.

"They were flying a seven-oh-seven, which is an older airplane and is very challenging to fly," Ratwatte said. "That thing is a lot of work. The flight controls are not hydraulically powered. They are connected by a series of pulleys and pull rods to the physical metal surfaces of the airplane. You have to be quite strong to fly that airplane. You heave it around the sky. It's as much physical effort as rowing a boat. My current airplane I fly with my fingertips. I use a joystick. My instruments are huge. Theirs were the size of coffee cups. And his autopilot was gone. So the captain had to keep looking around these nine instruments, each the size of a coffee cup, while his

right hand was controlling the speed, and his left hand was flying the airplane. He was maxed out. He had no resources left to do anything else. That's what happens when you're tired. Your decision-making skills erode. You start missing things—things that you would pick up on any other day.”

In the black box recovered from the crash site, Captain Caviedes in the final hour of the flight is heard to repeatedly ask for the directions from ATC to be translated into Spanish, as if he no longer had the energy to make use of his English. On nine occasions, he also asked for directions to be repeated. “Tell me things louder,” he said right near the end. “I’m not hearing them.” When the plane was circling for forty minutes just southeast of Kennedy—when everyone on the flight deck clearly knew they were running out of fuel—the pilot could easily have asked to land at Philadelphia, which was just sixty-five miles away. But he didn’t: it was as if he had locked in on New York. On the aborted landing, the plane’s Ground Proximity Warning System went off no fewer than fifteen times, telling the captain that he was bringing in the plane too low. He seemed oblivious. When he aborted the landing, he should have circled back around immediately, and he didn’t. He was exhausted.

Through it all, the cockpit was filled with a heavy silence. Sitting next to Caviedes was his first officer, Mauricio Klotz, and in the flight recorder, there are long stretches of nothing but rustling and engine noise. It was Klotz’s responsibility to conduct all communication with ATC, which meant that his role that night was absolutely critical. But his behavior was oddly passive. It wasn’t until the

third holding pattern southwest of Kennedy Airport that Klotz told ATC that he didn’t think the plane had enough fuel to reach an alternative airport. The next thing the crew heard from ATC was “Just stand by” and, following that, “Cleared to the Kennedy airport.” Investigators later surmised that the Avianca pilots must have assumed that ATC was jumping them to the head of the queue, in front of the dozens of other planes circling Kennedy. In fact, they weren’t. They were just being added to the end of the line. It was a crucial misunderstanding, upon which the fate of the plane would ultimately rest. But did the pilots raise the issue again, looking for clarification? No. Nor did they bring up the issue of fuel again for another thirty-eight minutes.

5.

To Ratwatte, the silence in the cockpit made no sense. And as a way of explaining why, Ratwatte began to talk about what had happened to him that morning on the way over from Dubai. “We had this lady in the back,” he said. “We reckon she was having a stroke. Seizing. Vomiting. In bad shape. She was an Indian lady whose daughter lives in the States. Her husband spoke no English, no Hindi, only Punjabi. No one could communicate with him. He looked like he had just walked off a village in the Punjab, and they had absolutely no money. I was actually over Moscow when it happened, but I knew we couldn’t go to Moscow. I didn’t know what would happen to these people if we did. I said to the first officer, ‘You fly the plane. We have to go to Helsinki.’”

The immediate problem Ratwatte faced was that they were less than halfway through a very long flight, which meant that they had far more fuel in their tanks than they usually do when it comes time to land. "We were sixty tons over maximum landing weight," he said. "So now I had to make a choice. I could dump the fuel. But countries hate it when you dump fuel. It's messy stuff and they would have routed me somewhere over the Baltic Sea, and it would have taken me forty minutes and the lady probably would have died. So I decided to land anyway. My choice."

That meant the plane was "landing heavy." They couldn't use the automated landing system because it wasn't set up to handle a plane with that much weight.

"At that stage, I took over the controls," he went on. "I had to ensure that the airplane touched down very softly; otherwise, there would have been the risk of structural damage. It could have been a real mess. There are also performance issues with being heavy. If you clear the runway and have to go around, you may not have enough thrust to climb back up.

"It was a lot of work. You're juggling a lot of balls. You've got to get it right. Because it was a long flight, there were two other pilots. So I got them up, and they got involved in doing everything as well. We had four people up there, which really helped in coordinating everything. I'd never been to Helsinki before. I had no idea how the airport was, no idea whether the runways were long enough. I had to find an approach, figure out if we could land there, figure out the performance parameters, and tell the company what we were doing. At one point I was talking to three different people—talking to Dubai, talking to MedLink, which is

a service in Arizona where they put a doctor on call, and I was talking to the two doctors who were attending to the lady in the back. It was nonstop for forty minutes.

"We were lucky the weather was very good in Helsinki," he said. "Trying to do an approach in bad weather, plus a heavy plane, plus an unfamiliar airport, that's not good. Because it was Finland, a first-world country, they were well set up, very flexible. I said to them, 'I'm heavy. I would like to land into the wind.' You want to slow yourself down in that situation. They said, No problem. They landed us in the opposite direction than they normally use. We came in over the city, which they usually avoid for noise reasons."

Think about what was required of Ratwatte. He had to be a good pilot. That much goes without saying: he had to have the technical skill to land heavy. But almost everything else Ratwatte did that made that emergency landing a success fell outside the strict definition of piloting skills.

He had to weigh the risk of damaging his plane against the risk to the woman's life, and then, once that choice was made, he had to think through the implications of Helsinki versus Moscow for the sick passenger in the back. He had to educate himself, quickly, on the parameters of an airport he had never seen before: could it handle one of the biggest jets in the sky, at *sixty tons* over its normal landing weight? But most of all, he had to talk—to the passengers, to the doctors, to his copilot, to the second crew he woke up from their nap, to his superiors back home in Dubai, to ATC at Helsinki. It is safe to say that in the forty minutes that passed between the passenger's stroke and the landing in Helsinki, there were no more

than a handful of seconds of silence in the cockpit. What was required of Ratwatte was that he *communicate*, and communicate not just in the sense of issuing commands but also in the sense of encouraging and cajoling and calming and negotiating and sharing information in the clearest and most transparent manner possible.

6.

Here, by contrast, is the transcript from Avianca 052, as the plane is going in for its abortive first landing. The issue is the weather. The fog is so thick that Klotz and Caviedes cannot figure out where they are. Pay close attention, though, not to the content of their conversation but to the *form*. In particular, note the length of the silences between utterances and to the tone of Klotz's remarks.

CAVIEDES: The runway, where is it? I don't see it. I don't see it.

They take up the landing gear. The captain tells Klotz to ask for another traffic pattern. Ten seconds pass.

CAVIEDES [SEEMINGLY TO HIMSELF]: We don't have fuel...

Seventeen seconds pass as the pilots give technical instructions to each other.

CAVIEDES: I don't know what happened with the runway. I didn't see it.

KLOTZ: I didn't see it.

Air Traffic Control comes in and tells them to make a left turn.

CAVIEDES: Tell them we are in an emergency!

KLOTZ [TO ATC]: That's right to one-eight-zero on the heading and, ah, we'll try once again. We're running out of fuel.

Imagine the scene in the cockpit. The plane is dangerously low on fuel. They have just blown their first shot at a landing. They have no idea how much longer the plane is capable of flying. The captain is desperate: "Tell them we are in an emergency!" And what does Klotz say? *That's right to one-eight-zero on the heading and, ah, we'll try once again. We're running out of fuel.*

To begin with, the phrase "running out of fuel" has no meaning in Air Traffic Control terminology. All planes, as they approach their destination, are by definition running out of fuel. Did Klotz mean that 052 no longer had enough fuel to make it to another, alternative airport? Did he mean that they were beginning to get worried about their fuel? Next, consider the structure of the critical sentence. Klotz begins with a routine acknowledgment of the instructions from ATC and doesn't mention his concern about fuel until the second half of the sentence. It's as if he were to say in a restaurant, "Yes, I'll have some more coffee and, ah, I'm choking on a chicken bone." How seriously would the waiter take him? The air traffic controller with whom Klotz was speaking testified later that he "just took it as a passing comment." On stormy nights, air traffic controllers hear pilots talking about running out of fuel all the time.

Even the “ah” that Klotz inserts between the two halves of his sentence serves to undercut the importance of what he is saying. According to another of the controllers who handled 052 that night, Klotz spoke “in a very nonchalant manner. . . . There was no urgency in the voice.”

7.

The term used by linguists to describe what Klotz was engaging in in that moment is “mitigated speech,” which refers to any attempt to downplay or sugarcoat the meaning of what is being said. We mitigate when we’re being polite, or when we’re ashamed or embarrassed, or when we’re being deferential to authority. If you want your boss to do you a favor, you don’t say, “I’ll need this by Monday.” You mitigate. You say, “Don’t bother, if it’s too much trouble, but if you have a chance to look at this over the weekend, that would be wonderful.” In a situation like that, mitigation is entirely appropriate. In other situations, however—like a cockpit on a stormy night—it’s a problem.

The linguists Ute Fischer and Judith Orasanu once gave the following hypothetical scenario to a group of captains and first officers and asked them how they would respond:

You notice on the weather radar an area of heavy precipitation 25 miles ahead. [The pilot] is maintaining his present course at Mach .73, even though embedded thunderstorms have been reported in your area and you encounter moderate turbulence. You want to ensure that your aircraft will not penetrate this area.

Question: what do you say to the pilot?

In Fischer’s and Orasanu’s minds, there were at least six ways to try to persuade the pilot to change course and avoid the bad weather, each with a different level of mitigation.

1. *Command*: “Turn thirty degrees right.” That’s the most direct and explicit way of making a point imaginable. It’s zero mitigation.
2. *Crew Obligation Statement*: “I think we need to deviate right about now.” Notice the use of “we” and the fact that the request is now much less specific. That’s a little softer.
3. *Crew Suggestion*: “Let’s go around the weather.” Implicit in that statement is “we’re in this together.”
4. *Query*: “Which direction would you like to deviate?” That’s even softer than a crew suggestion, because the speaker is conceding that he’s not in charge.
5. *Preference*: “I think it would be wise to turn left or right.”
6. *Hint*: “That return at twenty-five miles looks mean.” This is the most mitigated statement of all.

Fischer and Orasanu found that captains overwhelmingly said they would issue a command in that situation: “Turn thirty degrees right.” They were talking to a subordinate. They had no fear of being blunt. The first officers, on the other hand, were talking to their boss, and so they overwhelmingly chose the most mitigated alternative. They hinted.

It’s hard to read Fischer and Orasanu’s study and not be just a little bit alarmed, because a hint is the hardest kind of request to decode and the easiest to refuse. In the 1982 Air Florida crash outside Washington, DC, the first officer tried three times to tell the captain that the plane

had a dangerous amount of ice on its wings. But listen to how he says it. It's all hints:

FIRST OFFICER: Look how the ice is just hanging on his, ah, back, back there, see that?

Then:

FIRST OFFICER: See all those icicles on the back there and everything?

And then:

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 does.

Finally, as they get clearance for takeoff, the first officer upgrades two notches to a crew suggestion:

FIRST OFFICER: Let's check those [wing] tops again, since we've been setting here awhile.

CAPTAIN: I think we get to go here in a minute.

The last thing the first officer says to the captain, just before the plane plunges into the Potomac River, is not a hint, a suggestion, or a command. It's a simple statement of fact—and this time the captain agrees with him.

FIRST OFFICER: Larry, we're going down, Larry.

CAPTAIN: I know it.

Mitigation explains one of the great anomalies of plane crashes. In commercial airlines, captains and first officers split the flying duties equally. But historically, crashes have been far more likely to happen when the captain is in the "flying seat." At first that seems to make no sense, since the captain is almost always the pilot with the most experience. But think about the Air Florida crash. If the first officer had been the captain, would he have hinted three times? No, he would have commanded—and the plane wouldn't have crashed. Planes are safer when the least experienced pilot is flying, because it means the second pilot isn't going to be afraid to speak up.

Combating mitigation has become one of the great crusades in commercial aviation in the past fifteen years. Every major airline now has what is called "Crew Resource Management" training, which is designed to teach junior crew members how to communicate clearly and assertively. For example, many airlines teach a standardized procedure for copilots to challenge the pilot if he or she thinks something has gone terribly awry. ("Captain, I'm concerned about..." Then, "Captain, I'm uncomfortable with..." And if the captain still doesn't respond, "Captain, I believe the situation is unsafe." And if that fails, the first officer is required to take over the airplane.) Aviation experts will tell you that it is the success of this war on mitigation as much as anything else that accounts for the extraordinary decline in airline accidents in recent years.

"On a very simple level, one of the things we insist upon at my airline is that the first officer and the captain call each other by their first names," Ratwatte said. "We think that helps. It's just harder to say, 'Captain, you're doing something

wrong,' than to use a name." Ratwatte took mitigation very seriously. You couldn't be a student of the Avianca crash and not feel that way. He went on: "One thing I personally try to do is, I try to put myself a little down. I say to my copilots, 'I don't fly very often. Three or four times a month. You fly a lot more. If you see me doing something stupid, it's because I don't fly very often. So tell me. Help me out.' Hopefully, that helps them speak up."

8.

Back to the cockpit of Avianca 052. The plane is now turning away from Kennedy, after the aborted first attempt at landing. Klotz has just been on the radio with ATC, trying to figure out when they can try to land again. Caviedes turns to him.

CAVIEDES: What did he say?

KLOTZ: I already advise him that we are going to attempt again because we now we can't..."

Four seconds of silence pass.

CAVIEDES: Advise him we are in emergency.

Four more seconds of silence pass. The captain tries again.

CAVIEDES: Did you tell him?

KLOTZ: Yes, sir. I already advise him.

Klotz starts talking to ATC—going over routine details.

KLOTZ: One-five-zero maintaining two thousand Avianca zero-five-two heavy.

The captain is clearly at the edge of panic.

CAVIEDES: Advise him we don't have fuel.

Klotz gets back on the radio with ATC.

KLOTZ: Climb and maintain three thousand and, ah, we're running out of fuel, sir.

There it is again. No mention of the magic word "emergency," which is what air traffic controllers are trained to listen for. Just "running out of fuel, sir" at the end of a sentence, preceded by the mitigating "ah." If you're counting errors, the Avianca crew is now in double digits.

CAVIEDES: Did you already advise that we don't have fuel?

KLOTZ: Yes, sir. I already advise him...

CAVIEDES: Bueno.

If it were not the prelude to a tragedy, their back-and-forth would resemble an Abbott and Costello comedy routine. A little over a minute passes.

ATC: And Avianca zero-five-two heavy, ah, I'm gonna bring you about fifteen miles northeast and then turn you back onto the approach. Is that okay with you and your fuel?

KLOTZ: I guess so. Thank you very much.

I guess so. Thank you very much. They are about to crash! One of the flight attendants enters the cockpit to find out how serious the situation is. The flight engineer points to the empty fuel gauge, and makes a throat-cutting gesture with his finger.* But he says nothing. Nor does anyone else for the next five minutes. There's radio chatter and routine business, and then the flight engineer cries out, "Flameout on engine number four!"

Caviedes says, "Show me the runway," but the runway is sixteen miles away.

Thirty-six seconds of silence pass. The plane's air traffic controller calls out one last time.

ATC: You have, ah, you have enough fuel to make it to the airport?

The transcript ends.

9.

"The thing you have to understand about that crash," Ratwatte said, "is that New York air traffic controllers are famous for being rude, aggressive, and bullying. They are also very good. They handle a phenomenal amount of traffic in a very constrained environment. There is a famous story about a pilot who got lost trafficking around JFK. You have no idea how easy that is to do at JFK once you're on the ground. It's a maze. Anyway, a female con-

* We know this because the flight attendant survived the crash and testified at the inquest.

troller got mad at him, and said, 'Stop. Don't do anything. Do not talk to me until I talk to you.' And she just left him there. Finally the pilot picks up the microphone and says, 'Madam. Was I married to you in a former life?'

"They are unbelievable. The way they look at it, it's 'I'm in control. Shut up and do what I say.' They will snap at you. And if you don't like what they tell you to do, you have to snap back. And then they'll say, 'All right, then.' But if you don't, they'll railroad you. I remember a British Airways flight was going into New York. They were being stuffed around by New York Air Traffic Control. The British pilots said, 'You people should go to Heathrow and learn how to control an airplane.' It's all in the spirit. If you are not used to that sort of give-and-take, New York ATC can be very, very intimidating. And those Avianca guys were just intimidated by the rapid fire."

It is impossible to imagine Ratwatte not making his case to Kennedy ATC—not because he is obnoxious or pushy or has an enormous ego, but because he sees the world differently. If he needed help in the cockpit, he would wake up the second crew. If he thought Moscow was wrong, well, he would just go to Helsinki, and if Helsinki was going to bring him in with the wind, well, he was going to talk them into bringing him in against the wind. That morning, when they were leaving Helsinki, he had lined up the plane on the wrong runway—and his first officer had quickly pointed out the error. The memory made Ratwatte laugh. "Masa is Swiss. He was very happy to correct me. He was giving me shit the whole way back."

Ratwatte continued: "All the guys had to do was tell the controller, 'We don't have the fuel to comply with what

you are trying to do.' All they had to do was say, 'We can't do that. We have to land in the next ten minutes.' They weren't able to put that across to the controller."

It was at this point that Ratwatte began to speak carefully, because he was about to make the kind of cultural generalization that often leaves us uncomfortable. But what happened with Avianca was just so strange—so seemingly inexplicable—that it demanded a more complete explanation than simply that Klotz was incompetent and the captain was tired. There was something more profound—more structural—going on in that cockpit. What if there was something about the pilots' being Colombian that led to that crash? "Look, no American pilot would put up with that. That's the thing," Ratwatte said. "They would say, 'Listen, buddy. I have to land.'"

10.

In the 1960s and 1970s, the Dutch psychologist Geert Hofstede was working for the human resources department of IBM's European headquarters. Hofstede's job was to travel the globe and interview employees, asking about such things as how people solved problems and how they worked together and what their attitudes were to authority. The questionnaires were long and involved, and over time Hofstede was able to develop an enormous database for analyzing the ways in which cultures differ from one another. Today "Hofstede's Dimensions" are among the most widely used paradigms in crosscultural psychology.

Hofstede argued, for example, that cultures can be usefully distinguished according to how much they expect

individuals to look after themselves. He called that measurement the "individualism-collectivism scale." The country that scores highest on the individualism end of that scale is the United States. Not surprisingly, the United States is also the only industrialized country in the world that does not provide its citizens with universal health care. At the opposite end of the scale is Guatemala.

Another of Hofstede's dimensions is "uncertainty avoidance." How well does a culture tolerate ambiguity? Here are the top five "uncertainty avoidance" countries, according to Hofstede's database—that is, the countries most reliant on rules and plans and most likely to stick to procedure regardless of circumstances:

1. Greece
2. Portugal
3. Guatemala
4. Uruguay
5. Belgium

The bottom five—that is, the cultures best able to tolerate ambiguity—are:

49. Hong Kong
50. Sweden
51. Denmark
52. Jamaica
53. Singapore

It is important to note that Hofstede wasn't suggesting that there was a right place or a wrong place to be on any one of these scales. Nor was he saying that a culture's

position on one of his dimensions was an ironclad predictor of how someone from that country behaves: it's not impossible, for example, for someone from Guatemala to be highly individualistic.

What he was saying, instead, was something very similar to what Nisbett and Cohen argued after their hallway studies at the University of Michigan. Each of us has his or her own distinct personality. But overlaid on top of that are tendencies and assumptions and reflexes handed down to us by the history of the community we grew up in, and those differences are extraordinarily specific.

Belgium and Denmark are only an hour or so apart by airplane, for example. Danes look a lot like Belgians, and if you were dropped on a street corner in Copenhagen, you wouldn't find it all that different from a street corner in Brussels. But when it comes to uncertainty avoidance, the two nations could not be further apart. In fact, Danes have more in common with Jamaicans when it comes to tolerating ambiguity than they do with some of their European peers. Denmark and Belgium may share in a kind of broad European liberal-democratic tradition, but they have different histories, different political structures, different religious traditions, and different languages and food and architecture and literature—going back hundreds and hundreds of years. And the sum total of all those differences is that in certain kinds of situations that require dealing with risk and uncertainty, Danes tend to react in a very different way from Belgians.

Of all of Hofstede's Dimensions, though, perhaps the most interesting is what he called the "Power Distance Index" (PDI). Power distance is concerned with attitudes

toward hierarchy, specifically with how much a particular culture values and respects authority. To measure it, Hofstede asked questions like "How frequently, in your experience, does the following problem occur: employees being afraid to express disagreement with their managers?" To what extent do the "less powerful members of organizations and institutions accept and expect that power is distributed unequally?" How much are older people respected and feared? Are power holders entitled to special privileges?

"In low-power distance index countries," Hofstede wrote in his classic text *Culture's Consequences*:

power is something of which power holders are almost ashamed and they will try to underplay. I once heard a Swedish (low PDI) university official state that in order to exercise power he tried not to look powerful. Leaders may enhance their informal status by renouncing formal symbols. In (low PDI) Austria, Prime Minister Bruno Kreisky was known to sometimes take the streetcar to work. In 1974, I actually saw the Dutch (low PDI) prime minister, Joop den Uyl, on vacation with his motor home at a camping site in Portugal. Such behavior of the powerful would be very unlikely in high-PDI Belgium or France.*

* Hofstede, similarly, references a study done a few years ago that compared German and French manufacturing plants that were in the same industry and were roughly the same size. The French plants had, on average, 26 percent of their employees in management and specialist positions; the Germans, 16 percent. The French, furthermore, paid their top management substantially more than the Germans did. What

You can imagine the effect that Hofstede's findings had on people in the aviation industry. What was their great battle over mitigated speech and teamwork all about, after all? It was an attempt to reduce power distance in the cockpit. Hofstede's question about power distance—"How frequently, in your experience, does the following problem occur: employees being afraid to express disagreement with their managers?"—was the very question aviation experts were asking first officers in their dealings with captains. And Hofstede's work suggested something that had not occurred to anyone in the aviation world: that the task of convincing first officers to assert themselves was going to depend an awful lot on their culture's power distance rating.

That's what Ratwatte meant when he said that no American would have been so fatally intimidated by the controllers at Kennedy Airport. America is a classic low-power distance culture. When push comes to shove, Americans fall back on their *American-ness*, and that American-ness means that the air traffic controller is thought of as an equal. But what country is at the other end of the power distance scale? Colombia.

In the wake of the Avianca crash, the psychologist Robert Helmreich, who has done more than anyone to argue for the role of culture in explaining pilot behavior, wrote a brilliant analysis of the accident in which he argued that

we are seeing in that comparison, Hofstede argued, is a difference in cultural attitudes toward hierarchy. The French have a power distance index twice that of the Germans. They require and support hierarchy in a way the Germans simply don't.

you couldn't understand Klotz's behavior without taking into account his nationality, that his predicament that day was uniquely the predicament of someone who had a deep and abiding respect for authority. Helmreich wrote:

The high-power distance of Colombians could have created frustration on the part of the first officer because the captain failed to show the kind of clear (if not autocratic) decision making expected in high-power distance cultures. The first and second officers may have been waiting for the captain to make decisions, but still may have been unwilling to pose alternatives.

Klotz sees himself as a subordinate. It's not his job to solve the crisis. It's the captain's—and the captain is exhausted and isn't saying anything. Then there's the domineering Kennedy Airport air traffic controllers ordering the planes around. Klotz is trying to tell them he's in trouble. But he's using his own cultural language, speaking as a subordinate would to a superior. The controllers, though, aren't Colombian. They're low-power distance New Yorkers. They don't see any hierarchical gap between themselves and the pilots in the air, and to them, mitigated speech from a pilot doesn't mean the speaker is being appropriately deferential to a superior. *It means the pilot doesn't have a problem.*

There is a point in the transcript where the cultural miscommunication between the controllers and Klotz becomes so evident that it is almost painful to read. It's the last exchange between Avianca and the control tower, just minutes before the crash. Klotz has just said, "I guess

so. Thank you very much” in response to the controller’s question about their fuel state. Captain Caviedes then turns to Klotz.

CAVIEDES: What did he say?

KLOTZ: The guy is angry.

Angry! Klotz’s feelings are hurt! His plane is moments from disaster. But he cannot escape the dynamic dictated to him by his culture in which subordinates must respect the dictates of their superiors. In his mind, he has tried and failed to communicate his plight, and his only conclusion is that he must have somehow offended his superiors in the control tower.

In the aftermath of the Kennedy crash, the management of Avianca airlines held a postmortem. Avianca had just had four accidents in quick succession—Barranquilla, Cucuta, Madrid, and New York—and all four cases, the airline concluded, “had to do with airplanes in perfect flight condition, aircrew without physical limitations and considered of average or above-average flight ability, and *still* the accidents happened.” (italics mine)

In the company’s Madrid crash, the report went on, the copilot tried to warn the captain about how dangerous the situation was:

The copilot was right. But they died because...when the copilot asked questions, his implied suggestions were very weak. The captain’s reply was to ignore him totally. Perhaps the copilot did not want to appear rebellious, questioning the judgment of the captain, or he did not want

to play the fool because he knew that the pilot had a great deal of experience flying in that area. The copilot should have advocated for his own opinions in a stronger way...

Our ability to succeed at what we do is powerfully bound up with where we’re from, and being a good pilot and coming from a high-power distance culture is a difficult mix. Colombia by no means has the highest PDI, by the way. Helmreich and a colleague, Ashleigh Merritt, once measured the PDI of pilots from around the world. Number one was Brazil. Number two was South Korea.*

11.

The National Transportation Safety Board, the US agency responsible for investigating plane crashes, is headquartered in a squat, seventies-era office building on the banks

* Here are the top five pilot PDIs by country. If you compare this list to the ranking of plane crashes by country, they match up very closely.

1. Brazil
2. South Korea
3. Morocco
4. Mexico
5. Philippines

The five lowest pilot PDIs by country are:

15. United States
16. Ireland
17. South Africa
18. Australia
19. New Zealand

of the Potomac River in Washington, DC. Off the agency's long hallways are laboratories filled with airplane wreckage: a mangled piece of an engine turbine, a problematic piece of a helicopter rotor. On a shelf in one of the laboratories is the cockpit voice and data recorder—the so-called black box—from the devastating ValuJet crash in Florida in 1996, in which 110 people were killed. The recorder is encased in a shoe box-size housing made out of thick hardened steel, and on one end of the box is a jagged hole, as if someone—or, rather, something—had driven a stake into it with tremendous force. Some of the NTSB investigators are engineers, who reconstruct crashes from the material evidence. Others are pilots. A surprising number of them, however, are psychologists, whose job it is to listen to the cockpit recorder and reconstruct what was said and done by the flight crew in the final minutes before a crash. One of the NTSB's leading black-box specialists is a gangly fiftyish PhD psychologist named Malcolm Brenner, and Brenner was one of the investigators into the Korean Air crash in Guam.

“Normally that approach into Guam is not difficult,” Brenner began. Guam airport has what is called a glide slope, which is like a giant beam of light stretching up into the sky from the airport, and the pilot simply follows the beam all the way down to the runway. But on this particular night, the glide slope was down. “It was out of service,” Brenner said. “It had been sent to another island to be repaired. So there was a notice to airmen that the glide slope was not operating.”

In the grand scheme of things, this should not have been a big problem. In the month the glide slope had been

under repair, there had been about fifteen hundred safe landings at Guam airport. It was just a small thing—an inconvenience, really—that made the task of landing a plane just a little bit more difficult.

“The second complication was the weather,” Brenner continued. “Normally in the South Pacific, you’ve got these brief weather situations. But they go by quickly. You don’t have storms. It’s a tropical paradise. But that night, there were some little cells, and it just happens that that evening, they were going to be flying into one of those little cells, a few miles from the airport. So the captain has to decide, What exactly is my procedure for landing? Well, they were cleared for what’s called a VOR/DME approach. It’s complicated. It’s a pain in the ass. It takes a lot of coordination to set it up. You have to come down in steps. But then, as it happens, from miles out, the captain sees the lights of Guam. So he relaxes. And he says, ‘We’re doing a visual approach.’”

The VOR is a beacon that sends out a signal that allows pilots to calculate their altitude as they approach an airport. It’s what pilots relied on before the invention of the glide slope. The captain’s strategy was to use the VOR to get the plane close and then, once he could see the lights of the runway, to land the plane visually. It seemed to make sense. Pilots do visual landings all the time. But every time a pilot chooses a plan, he is supposed to prepare a backup in case things go awry. And this captain didn’t.

“They should have been coordinating. He should have been briefing for the [DME] step-downs,” Brenner went on. “But he doesn’t talk about that. The storm cells are all around them, and what the captain seems to be doing is

assuming that at some point he's going to break out of the clouds and see the airport, and if he doesn't see it by five hundred sixty feet, he'll just go around. Now, that would work, except for one more thing. The VOR on which he's basing this strategy is not at the airport. It's two-point-five miles away on Nimitz Hill. There's a number of airports in the world where this is true. Sometimes you can follow the VOR down and it takes you straight to the airport. Here if you follow the VOR down, it takes you straight to Nimitz Hill."

The pilot knew about the VOR. It was clearly stated in the airport's navigational charts. He'd flown into Guam eight times before, and in fact, he had specifically mentioned it in the briefing he gave before takeoff. But then again, it was one in the morning, and he'd been up since six a.m. the previous day.

"We believe that fatigue was involved," Brenner went on. "It's a back-of-the-clock flight. You fly in and arrive at one in the morning, Korean time. Then you spend a few hours on the ground, and you fly back as the sun is coming up. The captain has flown it a month before. In that case, he slept on the first-class seat. Now he's flying in and says he's really tired."

So there they are, three classic preconditions of a plane crash, the same three that set the stage for Avianca 052: a minor technical malfunction; bad weather; and a tired pilot. By itself, none of these would be sufficient for an accident. But all three in combination require the combined efforts of everyone in the cockpit. And that's where Korean Air 801 ran into trouble.

12.

Here is the flight recorder transcript of the final thirty minutes of KAL flight 801: It begins with the captain complaining of exhaustion.

0120:01. CAPTAIN: If this round-trip is more than a nine-hour trip, we might get a little something. With eight hours, we get nothing. Eight hours do not help us at all... They make us work to maximum, up to maximum. Probably this way... hotel expenses will be saved for cabin crews, and maximize the flight hours. Anyway, they make us... work to maximum.

There is the sound of a man shifting in his seat. A minute passes.

0121:13. CAPTAIN: Eh... really... sleepy. [unintelligible words]

FIRST OFFICER: Of course.

Then comes one of the most critical moments in the flight. The first officer decides to speak up:

FIRST OFFICER: Don't you think it rains more? In this area, here?

The first officer must have thought long and hard before making that comment. He was not flying in the easy collegiality of Suren Ratwatte's cockpit. Among Korean Air

flight crews, the expectation on layovers used to be that the junior officers would attend to the captain to the point of making him dinner or purchasing him gifts. As one former Korean Air pilot puts it, the sensibility in many of the airline's cockpits was that "the captain is in charge and does what he wants, when he likes, how he likes, and everyone else sits quietly and does nothing." In the Delta report on Korean Air that was posted anonymously on the Internet, one of the auditors tells a story of sitting in on a Korean Air flight where the first officer got confused while listening to Air Traffic Control and mistakenly put the plane on a course intended for another plane. "The Flight Engineer picked up something was wrong but said nothing. First Officer was also not happy but said nothing....Despite [good] visual conditions, crew did not look out and see that current heading would not bring them to the airfield." Finally the plane's radar picks up the mistake, and then comes the key sentence: "Captain hit First Officer with the back of his hand for making the error."

Hit him with the back of his hand?

When the three pilots all met that evening at Kimpo for their preflight preparation, the first officer and the engineer would have bowed to the captain. They would all have then shaken hands. "*Cheo eom boeb seom ni da,*" the copilot might have said, respectfully. "It is first time to meet you." The Korean language has no fewer than six different levels of conversational address, depending on the relationship between the addressee and the addresser: formal deference, informal deference, blunt, familiar, intimate, and plain. The first officer would not have dared to use one of the more intimate or familiar forms when

he addressed the captain. This is a culture in which enormous attention is paid to the relative standing of any two people in a conversation.

The Korean linguist Ho-min Sohn writes:

At a dinner table, a lower-ranking person must wait until a higher-ranking person sits down and starts eating, while the reverse does not hold true; one does not smoke in the presence of a social superior; when drinking with a social superior, the subordinate hides his glass and turns away from the superior;...in greeting a social superior (though not an inferior) a Korean must bow; a Korean must rise when an obvious social superior appears on the scene, and he cannot pass in front of an obvious social superior. All social behavior and actions are conducted in the order of seniority or ranking; as the saying goes, *chanmul to wi alay ka ita*, there is order even to drinking cold water.

So, when the first officer says, "Don't you think it rains more? In this area, here?" we know what he means by that: *Captain. You have committed us to visual approach, with no backup plan, and the weather outside is terrible. You think that we will break out of the clouds in time to see the runway. But what if we don't? It's pitch-black outside and pouring rain and the glide scope is down.*

But he can't say that. He hints, and in his mind he's said as much as he can to a superior. The first officer will not mention the weather again.

It is just after that moment that the plane, briefly, breaks out of the clouds, and off in the distance the pilots see lights.

"Is it Guam?" the flight engineer asks. Then, after a pause, he says, "It's Guam, Guam."

The captain chuckles. "Good!"

But it isn't good. It's an illusion. They've come out of the clouds for a moment. But they are still twenty miles from the airport, and there is an enormous amount of bad weather still ahead of them. The flight engineer knows this, because it is his responsibility to track the weather, so now he decides to speak up.

"Captain, the weather radar has helped us a lot," he says.

The weather radar has helped us a lot? A second hint from the flight deck. What the engineer means is just what the first officer meant. *This isn't a night where you can rely on just your eyes to land the plane. Look at what the weather radar is telling us: there's trouble ahead.*

To Western ears, it seems strange that the flight engineer would bring up this subject just once. Western communication has what linguists call a "transmitter orientation"—that is, it is considered the responsibility of the speaker to communicate ideas clearly and unambiguously. Even in the tragic case of the Air Florida crash, where the first officer never does more than hint about the danger posed by the ice, he still hints *four* times, phrasing his comments four different ways, in an attempt to make his meaning clear. He may have been constrained by the power distance between himself and the captain, but he was still operating within a Western cultural context, which holds that if there is confusion, it is the fault of the speaker.

But Korea, like many Asian countries, is receiver oriented. It is up to the *listener* to make sense of what is being said. In the engineer's mind, he has said a lot.

Sohn gives the following conversation as an illustration, an exchange between an employee (Mr. Kim) and his boss, a division chief (*kwachang*).

KWACHANG: It's cold and I'm kind of hungry.

[MEANING: Why don't you buy a drink or something to eat?]

MR. KIM: How about having a glass of liquor?

[MEANING: I will buy liquor for you.]

KWACHANG: It's okay. Don't bother.

[MEANING: I will accept your offer if you repeat it.]

MR. KIM: You must be hungry. How about going out?

[MEANING: I insist upon treating you.]

KWACHANG: Shall I do so?

[MEANING: I accept.]

There is something beautiful in the subtlety of that exchange, in the attention that each party must pay to the motivations and desires of the other. It is civilized, in the truest sense of that word: it does not permit insensitivity or indifference.

But high-power distance communication works only when the listener is capable of paying close attention, and it works only if the two parties in a conversation have the luxury of time, in order to unwind each other's meanings. It doesn't work in an airplane cockpit on a stormy night with an exhausted pilot trying to land at an airport with a broken glide scope.

13.

In 2000, Korean Air finally acted, bringing in an outsider from Delta Air Lines, David Greenberg, to run their flight operations.

Greenberg's first step was something that would make no sense if you did not understand the true roots of Korean Air's problems. He evaluated the English language skills of all of the airline's flight crews. "Some of them were fine and some of them weren't," he remembers. "So we set up a program to assist and improve the proficiency of aviation English." His second step was to bring in a Western firm—a subsidiary of Boeing called Alteon—to take over the company's training and instruction programs. "Alteon conducted their training in English," Greenberg says. "They didn't speak Korean." Greenberg's rule was simple. The new language of Korean Air was English, and if you wanted to remain a pilot at the company, you had to be fluent in that language. "This was not a purge," he says. "Everyone had the same opportunity, and those who found the language issue challenging were allowed to go out and study on their own nickel. But language was the filter. I can't recall that anyone was fired for flying proficiency shortcomings."

Greenberg's rationale was that English was the language of the aviation world. When the pilots sat in the cockpit and worked their way through the written checklists that flight crews follow on every significant point of procedure, those checklists were in English. When they talked to Air Traffic Control anywhere in the world, those conversations would be in English.

"If you are trying to land at JFK at rush hour, there is

no nonverbal communication," Greenberg says. "It's people talking to people, so you need to be darn sure you understand what's going on. You can say that two Koreans side by side don't need to speak English. But if they are arguing about what the guys outside said in English, then language is important."

Greenberg wanted to give his pilots an alternate identity. Their problem was that they were trapped in roles dictated by the heavy weight of their country's cultural legacy. They needed an opportunity to step outside those roles when they sat in the cockpit, and language was the key to that transformation. In English, they would be free of the sharply defined gradients of Korean hierarchy: formal deference, informal deference, blunt, familiar, intimate, and plain. Instead, the pilots could participate in a culture and language with a very different legacy.

The crucial part of Greenberg's reform, however, is what he didn't do. He didn't throw up his hands in despair. He didn't fire all of his Korean pilots and start again with pilots from a low-power distance culture. He knew that cultural legacies matter—that they are powerful and pervasive and that they persist, long after their original usefulness has passed. But he didn't assume that legacies are an indelible part of who we are. He believed that if the Koreans were honest about where they came from and were willing to confront those aspects of their heritage that did not suit the aviation world, they could change. He offered his pilots what everyone from hockey players to software tycoons to takeover lawyers has been offered on the way to success: an opportunity to transform their relationship to their work.

After leaving Korean Air, Greenberg helped start up a freight airline called Cargo 360, and he took a number of Korean pilots with him. They were all flight engineers, who had been number three, after the captain and first officer, in the strict hierarchy of the original Korean Air. "These were guys who had performed in the old environment at Korean Air for as much as fifteen to eighteen years," he said. "They had accepted that subservient role. They had been at the bottom of the ladder. We retrained them and put them with Western crew. They've been a great success. They all changed their style. They take initiative. They pull their share of the load. They don't wait for someone to direct them. These are senior people, in their fifties, with a long history in one context, who have been retrained and are now successful doing their job in a Western cockpit. We took them out of their culture and re-normed them."

That is an extraordinarily liberating example. When we understand what it really means to be a good pilot—when we understand how much culture and history and the world outside of the individual matter to professional success—then we don't have to throw up our hands in despair at an airline where pilots crash planes into the sides of mountains. We have a way to make successes out of the unsuccessful.

But first we have to be frank about a subject that we would all too often rather ignore. In 1994, when Boeing first published safety data showing a clear correlation between a country's plane crashes and its score on Hofstede's Dimensions, the company's researchers practically tied themselves in knots trying not to cause offense. "We're not saying there's anything here, but we think

there's something there" is how Boeing's chief engineer for airplane safety put it. Why are we so squeamish? Why is the fact that each of us comes from a culture with its own distinctive mix of strengths and weaknesses, tendencies and predispositions, so difficult to acknowledge? Who we are cannot be separated from where we're from—and when we ignore that fact, planes crash.

14.

Back to the cockpit.

"*Captain, the weather radar has helped us a lot.*" No pilot would say that now. But this was in 1997, before Korean Air took its power distance issues seriously. The captain was tired, and the engineer's true meaning sailed over the captain's head.

"Yes," the captain says in response. "They are very useful." He isn't listening.

The plane is flying toward the VOR beacon and the VOR is on the side of a mountain. The weather hasn't broken. So the pilots can't see anything. The captain puts the landing gear down and extends the flaps.

At 1:41:48, the captain says, "Wiper on," and the flight engineer turns the wipers on. It's raining now.

At 1:41:59, the first officer asks, "Not in sight?" He's looking for the runway. He can't see it. He's had a sinking feeling in his stomach for some time now. One second later, the Ground Proximity Warning System calls out in its toneless electronic voice, "Five hundred [feet]." The plane is five hundred feet off the ground. The ground in this case is the side of Nimitz Hill. But the crew is

confused because they think that the ground means the runway, and how can that be if they can't see the runway? The flight engineer says, "Eh?" in an astonished tone of voice. You can imagine them all thinking furiously, trying to square their assumption of where the plane is with what their instruments are telling them.

At 1:42:19, the first officer says, "Let's make a missed approach." He has finally upgraded from a hint to a crew obligation: he wants to abort the landing. Later, in the crash investigation, it was determined that if he had seized control of the plane in that moment, there would have been enough time to pull up the nose and clear Nimitz Hill. That is what first officers are trained to do when they believe a captain is clearly in the wrong. But it is one thing to learn that in a classroom, and quite another to actually do it in the air, with someone who might rap you with the back of his hand if you make a mistake.

1:42:20. FLIGHT ENGINEER: Not in sight.

With disaster staring them in the face, both the first officer and the engineer have finally spoken up. They want the captain to go around, to pull up and start the landing over again. But it's too late.

1:42:21. FIRST OFFICER: Not in sight, missed approach.

1:42:22. FLIGHT ENGINEER: Go around.

1:42:23. CAPTAIN: Go around.

1:42:24:05. GROUND PROXIMITY WARNING SYSTEM
(GPWS): One hundred.

1:42:24:84. GPWS: Fifty.

1:42:25:19. GPWS: Forty.

1:42:25:50. GPWS: Thirty.

1:42:25:78. GPWS: Twenty.

1:42:25:78. [sound of initial impact]

1:42:28:65. [sound of tone]

1:42:28:91. [sound of groans]

1:42:30:54. [sound of tone]

END OF RECORDING