SIGNAL DETECTION

The long line of passengers waiting uncomfortably at the American Airlines check-in counter at Charles de Gaulle International Airport was *typical* of what one saw every day of the week at 8:40 a.m., two hours before the flight to Miami International Airport in Florida, a scant four months after 9/11. *Typical*, it should be pointed out, with one glaring exception: the lone passenger who had only now worked his way to the front of the queue and was sauntering up to the next available agent at the counter. This man was difficult *not* to notice. He was tall, about 6 feet 4 inches, of undetermined race, with a long ponytail, scruffy beard, and unkempt appearance. A small knapsack hung over his shoulder and he handed his ticket and passport over the countertop to the agent at the check-in station. He was on his way to Antigua in the Caribbean, via Miami, to visit relatives. The ticket was for a round trip. The passport was British. The agent opened it and typed the passenger's name at the keyboard. A stench snaked up over the counter.

One had to handle these matters with considerable sensitivity. When the agent's display rebounded with a glaring red code, no clue about the computerized CAPPS (Computer Assisted Passenger Profiling) warning was revealed to the odoriferous customer. It was the red, not green, color code that signaled a suspect passenger, a passenger targeted for follow-up screening by airline security. Sometimes passengers were selected at random by the system in order to keep inspectors on

their toes and would-be terrorists slightly off balance, but a random selection appeared unlikely in this case. A set of conditions had been triggered in a program, a small number of the 40-odd undisclosed cues established by the U.S. Federal Aviation Administration. Perhaps it was the fact that the ticket had been purchased just four days before, a ticket bought with cash from an office in Paris, or the fact that the passenger had no verifiable address and no luggage to speak of. This was not a random selectee. The agent politely directed him to step over to the side a short distance away where they needed to ask him a few questions.

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The American Airlines security agent was actually a contractor from another company, an employee of ICTS, trained to uncover inconsistencies in people's stories, skilled at ferreting out lies, sensitive to subtle signs of nervousness. First impressions can be surprisingly accurate when you are observant, and the agent's first impression of the passenger was one of suspicion. It may have been this man's disheveled look, his standards of personal hygiene, his druggie gaze. Most likely it was a combination of things that gave rise to the hunch that not all was aboveboard. It was best to err on the side of caution, especially in view of recent history.

From the agent's and airline's point of view, the consequences of a *false alarm* — tagging an innocent passenger as a terrorist — were regrettable but tolerable as long as they didn't do it very often and they corrected their mistakes once they were made. A *correct rejection* was the term given to innocent passengers who were, as the phrase states, correctly rejected as being terrorists. Correct rejections were, by far, the most common classification of passengers passing through security.

Most airline travelers throughout the world only wanted to go about living their lives honestly and peacefully, not imposing their own values on others. Also, the airline didn't want to be perceived as making travel overly onerous for their good customers. The most important objectives were to accurately classify a security threat as a security threat, which they called a *hit*, and, of course, to never classify a terrorist as an innocent passenger, which was known as a *miss*. There had been 19 *misses* on September 11, 2001 in the United States, a fact that changed the course of modern history.

Bias was the term used to describe the shifting sensitivity to the signal or signals, the tendency of an observer to accept more *false alarms* or increase the probability of a *hit* at the expense of making more mistakes. Bias reflected the benefits and costs of all outcomes, but especially the consequences of missing a signal, which in this case was letting a terrorist slip through the cracks and past security. Bias shifted according to many factors, especially recent terrorist activity, the current perceived threat, and the observer's assessment of the danger to himself, his employer, his country, or even fellow passengers.

As for the *signal*; the stronger the better. The most important factor in detecting the signal was *sensitivity*, the capability of the system to actually detect what it was looking for, the resolution of the sensors, the ability to *discriminate* between an actual signal and background noise. In this case the noise was the ever-changing behavior of passengers, the things they could say, the objects and clothes they carried with them, their infinite variety of appearances and mannerisms and cultures that passed through the airport by the hundreds of thousands each and every day. No one ever pretended that detecting these people would be easy, especially with a system that may not be up to the task.

The agent already knew the answers to some of the

questions about to be asked, but they were asked anyway to see if the man's story matched the facts that he didn't know were known. "Where did you purchase your ticket?" "Where do you live?" "What is the purpose of your trip?" "Where is your luggage?" The ticket, the passenger replied, was purchased in Paris a few days before, a ticket to fly to Miami and then on to Antigua to visit his relatives. He had clothes and personal items at his relative's place. He didn't need to take any with him. He was Jamaican, he said, but a British citizen.

The security agent thumbed ever so slowly through the pages of his British passport, inspecting the photograph and examining each box for a departure and arrival stamp. The document was unusual in both appearance and content. The front half was new and had been issued only two weeks before in Brussels. An older but relatively new-looking passport was stapled to the back. It appeared to be missing a few pages and also contained a visa for a trip to Israel made in July. Israel seemed an odd place to travel for a man with no visible means of support, who occasionally worked as a dishwasher, a man with no permanent address and no appearance of having any purpose whatsoever to his life. There were no stamps in the passport showing a past arrival in Miami or, for that matter, Antigua.

The lack of luggage and the knowledge that the ticket had been purchased with cash were the most disturbing points. The agent's job was to detect passengers who might pose a security risk, a passenger having a motive and capability to hijack or destroy an aircraft with hundreds of people aboard. But as a contract employee of an airline, the agent had no authority to search the passenger or rummage through his possessions. The job had been done, though, and the scruffy man was asked politely to stay where he was for a few moments. The handset was lifted and a call placed. The words were spoken in a soft tone so as not to be overheard. An officer of the French Air and

Frontier Police would be available shortly to continue with the next phase of screening. In the parlance of *signal detection theory*, the passenger was a tentative *hit*.

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The ensuing discussions were held in private, away from the lines of people, and, with the exception of the French-accented English, they were nearly identical to the discussions held between the American Airlines security agent and the passenger. The outcome was considerably different, however.

"Why are you not carrying any luggage?" "Why are you traveling to Antigua?" "What are your travel plans once there?" The passenger had the same answers as before. His stories remained unchanged. His name did not show up on any terrorist watch list accessed by the French Air and Frontier police, nor was his name on a list of people with criminal records. He did not appear to be a threat, concluded the Air and Frontier Policeman, and, accordingly, there was no need to have him gone over by one of the six "explo" bomb-sniffing dogs on duty that day at Charles de Gaulle. And after an hour, and then more, the gaps in the conversation grew longer and the passport was examined and reexamined one last time.

Unlike his counterparts in the regular French National Police force, the Air and Frontier Policeman was forbidden by law from searching a passenger or examining his possessions. In fact, the passenger could not even be touched by him, and at half past 10 and without any additional evidence in support of the airline security agent's decision to hold him back, it was decided by the French Air and Frontier officer that the passenger should not be further detained. He was not a threat. Traveling without luggage was not illegal, paying cash for an airline ticket was not a crime, and although he pitied whoever had to sit next to him

on the flight, you could not lock up a man for being malodorous.

From there Richard Reid, also known as Abdel Raheem and Tariq Raja, former British criminal who converted to radical Islam in a London prison, started the race to the gate, stepping prudently on the explosive-filled heels of his black suede high-top athletic shoes. Once again in the parlance of *signal detection theory*, he was now technically a *miss*, a terrorist who had been cleared through security and was about to board an airliner headed for America. But to his disappointment he soon learned that AA Flight 63 to Miami had already departed. He had missed his chance. At a nearby airline counter Reid was rebooked on AA Flight 63 for the next day, Saturday, December 22, and given a complimentary hotel room near Paris for the night as compensation for the morning's inconveniences, the fact that he had been, according to all this particular agent could tell, classified as a *false alarm*. His new seat assignment was in row 29, an ideal location, Reid knew, just at the back of the wing root and trailing edge, near an outside section of the fuselage and just over the aft end of the fuel tank.

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At 8:30 a.m. the next morning Richard Reid arrived again outside Terminal 2 at Charles de Gaulle International Airport. It was a drizzly December day. His damp clothes smelled even worse than the day before. After the previous morning's escapade, he had returned to the area near the Gare du Nord train station and Montmartre, settling in for the afternoon at an internet cafe within sight of the white domes of la Basilique du Sacré-Coeur, the Church of the Sacred Heart. He e-mailed his handler in Pakistan, who told him to persevere and proceed with his plans to reboard the flight on Saturday. From there he stopped at a fast-food restaurant and spent the night at an

unknown location in the area. He did not check in to the hotel booked for him by American Airlines.

As on Friday, the CAPPS passenger screening system sent up a red flag on the agent's display when Reid checked in at the counter for AA Flight 63 to Miami on Saturday morning. Nothing had changed. He still had no luggage to speak of and was traveling on a ticket purchased with cash. But this time he sailed through the security check when he was singled out; the same security agent who interviewed him on Friday was on duty, and Reid was waved on. There was no point, it seemed, in having the passenger jump through all of the same hoops as the day before.

He went through passport control where the officer examined his photograph to make sure the picture matched the face and the name was the same as the name on the ticket. Given that Reid was departing France — not arriving — his passport was not scanned into the computerized system that might have shown where he had actually traveled in the recent past. The passport officer didn't know that Reid had acquired a new passport in July, telling British authorities in Amsterdam that his old one had been ruined when it went through the wash. Out with the wash went the obvious record of where he had traveled, the questions this might have raised, and his trips to Pakistan and Turkey. The Pakistan trip had an unrecorded crossing into Afghanistan and training at an al Qaeda camp in Khalden, near Kabul. His recent trip to Israel included a road excursion to the Gaza Strip and a jaunt across the border into Egypt. He also sent a letter from Iran to his mother. For a man who worked only occasionally as a dishwasher, he had certainly been getting around.

Reid had little concern about being detained at the mass security screen where the carry-on bags and coats were x-rayed and the passengers herded through the metal detectors like

sheep passing through a gate. There was no metal in his shoes — just 10 ounces of triacetone triperoxide and pentaerythritol tetranitrate in the heel of each. The fuse that ran up the underside of each shoe tongue was nonmetallic as well. It was the same combination of powerful plastic explosives used to blow a deadly hole in the USS *Cole* the year before. Unlike the exploded al Qaeda bombs used elsewhere, Reid's bombs retained the personalized imprint of the palm of the bomb's maker and a strand of hair from someone other than Reid. Even if a metallic detonator had been placed in the plastic explosive in his heels instead of the chemical accelerator, it would not have set off the alarm; he knew the detector's sensor array was too high above his shoes to detect the presence of metal. Regardless, it no longer mattered.

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The Boeing 767 was now out over the ocean about seven miles up and equidistant from all runways on either side of the Atlantic, not quite halfway between Paris and Miami. Richard Reid was on the right side of the right aisle in seat 29H, one seat away from the window. The passenger seated next to him in 29J got up to go the lavatory. Reid shifted over to the now-empty seat to the right. He took off his right shoe and placed it on his lap, pulling back the tongue and exposing the fuse wire, slightly damp from his own perspiration and the wet Paris day. He then wedged the shoe between the right arm rest and the outside wall where it would blow a hole large enough to rip the plane in half. He pulled out his book of matches, tore one from the pack, closed the safety cover, ignited the sulfur tip on the scratch surface and held the flame under the end of the fuse running out the tongue of the shoe. Having flown exclusively on European and other carriers known for inconsistent enforcement of no-

smoking policies on aircraft, Reid had no idea that striking a match on a U.S.-based carrier might create an immediate stir. From this perspective, an odorless butane lighter would have been a better choice.

Flight Attendant Hermis Moutardier, cleaning up the coach cabin after having served dinner, detected the whiff of smoke only seconds after Richard Reid struck his first match. She walked fast up the aisle and a passenger pointed to the man sitting in Seat 29J, next to the window. "Excuse me, you know that this is a nonsmoking flight!"

"Oh, I'm sorry, I'm sorry," replied Reid, who then stuck the lit match in his mouth to extinguish it.

Moutardier turned away and walked back 10 rows to the intercom where she called the cockpit and informed them that a passenger had lit a match, but that it was now out. She hung up the receiver and returned back up the aisle to check again. Incredibly, he had lit another match. His shoe was wedged against the wall and he was trying to set fire to the tongue with the flame. Then she saw the fuse. Moutardier grabbed for the shoe and Reid shoved her back hard. She came back at him fiercely, lunging for the shoe again. Reid, still seated and trying to hold the flame to the fuse to ignite it, slammed her to the aisle floor with his left arm. "Oh, my God!" she screamed at the top of her lungs. "Somebody help me! Water, contact solution, anything you have!"

Flight Attendant Cristiana Jones, drawn to row 29 by the smell of smoke, joined the fray, grabbing furiously for the shoe and the lit match in Reid's hand. She felt his teeth on her hand and the sharp pain of a crushing bite, and she screamed in pain. "Stop him, stop him! Someone stop him!" By this time a half-dozen bottles of water and plastic cups full of soft drinks had been handed up by nearby passengers, and Moutardier emptied a bottle on Reid and his lit match as he continued to bite Jones.

Eric Debry of Paris, sitting in row 30 behind Reid, awoke to the ruckus and screams for help and stood up and grabbed Reid's arms and shoulders. Two other men lunged for Reid's legs and, within a minute, Reid was being held down by a team of passengers while he screamed out in Arabic. The plane's relief pilot, taking a nap in the first row of first class, had by now been awakened and was orchestrating the permanent restraint of Reid. When his verbal request was not understood by the non-English speaking passengers nearby, he took off his own belt, held it up for everyone to see, and was passed twenty belts within a matter of seconds. More than a few headset cords were thrown in for good measure. Reid was securely lashed to the seat, and two large passengers stood guard over him for the remainder of the fight, one holding his mangy ponytail. Two physicians injected him with sedatives from the plane's medical kit.

Flight 63 was diverted to Boston, a shorter distance at that point in the flight, where FBI agents had some difficulty removing Reid from his make-do restraints. At his trial a year later Reid initially insisted that he had acted alone and out of his personal hatred toward the United States. He had learned how to make the bombs off the internet, he said. But by the end of the trial he had admitted to all eight counts against him and, with the fervor of a convert, declared publicly his loyalty to Osama bin Laden and membership in al Qaeda. On January 30, 2003 Reid was sentenced to life plus 110 years, with no chance of parole.

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