

The Chi-Square Doorway

By Clifford Hui

Lieutenant John Puztai's voice came over the intercom. "Mr. Bell, we are at checkpoint alpha. Altitude is one thousand feet. Changing heading to three four four magnetic."

"Roger. Thank you. Let me know if you see anything." Carl Bell slid open the cargo door and sat down on the edge, his legs hanging out of the right side of the Sikorsky H3 helicopter. His gunner's belt, the long strap connecting Bell to a tie-down ring on the floor, ensured that he didn't fall out. He looked at the Pacific Ocean laid out below him, dull indigo directly beneath and shifting to a sparkling azure satin near the northern horizon. With Puztai's change of course, that scene was now shifting to his left. Bell started watching for whales and dolphins, his notebook clutched in his hand sheathed in a snug-fitting glove.

Bell's ongoing project was to conduct a survey of dolphins and whales in the waters off southern California. He had been riding Navy helicopters four or five times a month for the last six months to execute it. Today, however, his experienced eyes were needed for another project. Today he was looking specifically for pilot whales.

The pilot whale project was one of the Navy's few research projects with a goal of learning more about the general ocean biology. It focused on animals that were the length of a torpedo and used sonar like modern torpedoes. Bell's mission today was to fly from San Diego to the leeward side of Santa Catalina Island, twenty-six miles west of Los Angeles, and find pilot whales for the two research boats operating below. No one knew exactly where the pilot whales would be, but they were known to visit this general area.

Lieutenant Puztai chatted with the copilot, Lieutenant Arthur Carlson, about the merits of Elvis Presley and the rock-'n'-roll culture. The pilots had primacy on the intercom, so Bell never got to chat with the crew chief, Chief Petty Officer Ernesto Cruz, during flights. Many of Bell's survey flights had been with Cruz, and he had managed to earn Cruz's respect through his careful planning, briefing presentations, and proficiency, even though he was "only" a civilian.

It took over an hour to fly from San Diego to Catalina and he had a lot of water to look at along the way. They rarely saw anything on the early part of their flights, and this day was no different. Sparkling in the sunlight, the water looked empty and endlessly the same.

Bell's headphones crackled to life. It was Lieutenant Carlson. "Mr. Bell, we have a big bunch of dolphins coming up on the starboard side."

Bell leaned out of the doorway and looked forward. The prop wash buffeted his helmet, and blew down some of the jet exhaust, warming his neck. "I see them. Thanks. Can I get a position fix and a heading for the dolphins?" He leaned back into the chopper.

"Stand by."

The ocean turned white. A huge herd of common dolphins was swimming toward their flight path. They were leaping and churning the water as though celebrants in a traveling festival. Bell methodically went through the process to estimate their number. He selected a small area and took a quick estimate of the bodies he actually saw there in an instant. This was the tricky part. Each leaping dolphin created two splashes -- one when it emerged from the water and one when it returned. Bell had to concentrate on seeing the bodies, not the splashes. Carlson interrupted him.

"We are at twenty-nine nautical at four two magnetic from S C I. Dolphins are heading two one zero magnetic," Carlson said, providing distance in nautical miles, and direction in degrees on a magnetic compass from the navigation beacon on San Clemente Island. He also gave the direction the dolphins were going using degrees on a magnetic compass.

"Got it. Thanks."

Bell scribbled down the information and started his count over again. He counted three areas of the same size, determined the average, and multiplied for the area covered by the whole herd. To compensate for the animals that were underwater where he couldn't see them, he multiplied that number by ten for a total of 8,000 animals. When he got it all written down, he gave a thumbs-up to Cruz. Even if they never found any pilot whales, at least he had some data for his ongoing survey project.

Bell's situation contrasted sharply with the refreshing image below. His tall frame was covered head-to-toe in fire-retardant flight coveralls and gloves, steel-toed flight boots, and a helmet with enough ear protection to keep the screams of the twin jet turbines from getting to his head. He'd flown with poor ear protection once. At the end of that three-hour flight, his head felt like there was someone inside trying to chop his way out with an axe. Since then he'd been very conscientious about ear protection.

They passed over the dolphins, and the once-foaming water became a solid blue, sparkling but empty. Bell raised his eyes to look at the coastline. Because of the recent fall rains, the air over southern California was invisibly clear. The foam of the breaking waves looked like interrupted lines of pure white cotton sliding sideways to the shore. Beyond the surf, he could see Interstate-5 that paralleled the coast northward from San Diego. On it were tiny-looking cars, like colorful bugs on a shoelace. Beyond it lay the coastal hills, whose pattern of lumps and folds were reminiscent of a blanket on an unmade bed. Their brown color from the arid summer showed hints of green, the beginnings of their response to the rains.

Bell had driven I-5 regularly during his first year as a student at San Diego State, heading home to visit his family and high school friends in Los Angeles. He usually took his dirty laundry with him. On his first trip home, his mother showed him how to operate the clothes washer.

His trips home became less frequent once he got the job as a student part-time employee with the Navy dolphin research program. The program had just moved to San Diego from Point Mugu when they hired Bell to help feed dolphins. Bell loved working with the animals. But more than that, after two years of careful observation, he became enamored of the research aspect of the program. The research issues fascinated him. And he loved the attention to detail that was required for a successful execution. He wanted to be more than a technician or assistant on someone else's projects. He wanted to be a Project Leader, to run his own projects.

There was no particular training to be a Project Leader, so Bell trained himself to be a better biologist. Once, another student employee asked him why he was taking courses on botany, parasitology, and statistics if he wanted to do dolphin research. Bell looked up from the bucket of fish he was weighing and responded, "I don't know what opportunity is out there, but when it knocks on my door, I want to be able to say 'I am ready.'"

As he neared graduation, Bell didn't appear happy, but worried. In a phone call to his mom he confided, "Mom, I just realized that when I graduate in a few months and am no longer a student, I will no longer be eligible to be a student employee here. And, even worse than that, there were no openings for full-time work here, either. I don't know what I'm going to do. Maybe I'll have to work in a liquor store or something until I get a break."

"Oh, Carl, don't do anything silly like that. You'll have a college degree. Don't waste it in a liquor store. You'll start forgetting what you learned. Who's going to hire a liquor store clerk to do biology research?"

"But I don't know what else to do."

"Go to graduate school. You'll be a student again and eligible to continue working there. Working in a liquor store is like giving up. Don't give up. Get better."

Bell got the forms to apply for graduate school. He looked over the graduate courses, the degree requirements, and the areas of specialization of the various professors.

Then Dave, his Project Leader, started the dolphin survey project and managed to wrangle a new full-time position to execute it. Dave couldn't offer the position directly to Bell, but he asked Bell to apply. To no one's surprise, Bell got the job. Bell was ecstatic. Full time employment executing someone else's project was a big step on the path to running his own projects.

Dave accompanied him on his first few flights to make sure they both understood the observation protocol. Dave told him, "Write down every piece of information about the flight tracks, weather, and dolphin sightings. I haven't figured out what we're going to analyze or how we're going to do it yet, but I'll figure that out later. The Navy didn't need to know that in order

to give us these flights. If you come up with something workable, you can be co-leader of the project.”

Bell’s eyes got big, but he didn’t say anything. He just nodded.

Dave had explained that the size estimate of the same herd could vary among different observers because there was no way to verify any estimate. He had decided that the best approach was to have all size estimates done by the same observer, so any errors in technique would be consistent. If, in the future, someone figured out how to calibrate estimates made from the air, all the observations could be corrected using only one correction factor. That’s why Dave wanted him to be the sole surveyor.

As Bell began the project, he asked himself, “How can I analyze the data to get something BIG? Surveying to know where the dolphins are or were at one time doesn’t help understand them. I need something bigger than that.” He laid out his old textbooks at home to review.

After another half-hour or so of empty water, Lieutenant Carlson’s voice came on the intercom again, “Two T R B’s dead ahead.”

Cruz adjusted his gunner’s belt to increase its length and stepped over to the open cargo door, standing next to where Bell was now sitting with his back against the rear edge of the doorway and his right leg dangling outside. Cruz leaned outside, looking for the TRBs, the forty-foot long torpedo retrieval boats the project was using. Because they were designed to retrieve practice torpedoes, each TRB had a long, clear working deck behind the wheelhouse, perfect for stowing whale-catching gear. Project research teams augmented the Navy crews on the boats.

The teams would capture the twenty-foot creatures and hold them alongside the boat to attach tracking radios, so they could trace the animals’ movements minute by minute. One of the boats with its tracking crew was prepared to follow a whale’s radio signal for several days before triggering the mechanism to release the radio package. It would be grueling work for the

tracking crew, but exciting at the same time. This would be the first study of swimming routes, dive frequency patterns and dive depth patterns ever done on free-swimming pilot whales.

Unfortunately, the project budget was so tight, and mounting a hunting expedition with two boats and a helicopter was so expensive that they could afford to hunt pilot whales only once. Each person on the project was acutely aware that there was no guarantee of finding pilot whales, much less of capturing one. They all had their fingers crossed.

Puztai cut the speed, dropped to five hundred feet, and flew a couple of lazy circles around the boats. With the helicopter's arrival, the entire hunting enterprise was now poised to engage pilot whales. Here, on this leeward side of Catalina, the water was like glass and the late morning sunlight seemed to penetrate it for at least a hundred feet. Whale-hunting conditions were ideal.

Bell and Cruz stood in the cargo door and exchanged waves with the crews below. Bell grabbed for the hand radio. Navy helicopter and boat radios operate on different frequencies, so Bell couldn't use the on-board radios. He yelled into the mike to be heard above the jet turbines and took off his helmet, so he could put his ear on the speaker to hear the response. His sandy-colored hair, although pressed down by the helmet for the last hour or so, was long enough to be blown by the wind, but short enough to stay out of his eyes.

"Good morning, pilot whale hunters. How are you on this fine whale-hunting morning? This is your friendly air recon crew. How do you read? Over."

On the lead TRB Dave picked up the microphone of his boat's handset. "Good morning recon. We read you loud and clear. Glad you decided to join us. We are ready for whales. Let's go to work."

"Roger. Follow us. Recon out."

Puztai put the helicopter back at a thousand feet, and cut its speed to forty knots. They continued flying northward, parallel to Catalina's eastern coast. The island rose from the water in steep cliffs here while the ocean bottom plunged just as steeply to the deep blue.

Everyone on board was looking now. The slower flight speed enabled them to look twice. There was no intercom chatter. They just looked. Bell and the crew looked at every square foot of water. Their eyes scoured the entire coastal area of the lee side of the island, penetrating into the water as deep as the mid-day sunlight. Nothing.

They flew beyond the northern tip of the island. They were now out of its lee, and the sea was choppy and sprinkled with white caps. Those white caps acted as camouflage for any whale splashes, so the odds of seeing whales suddenly got smaller. Besides, they were so far ahead of the boats now that if they spotted any whales, they would not have enough fuel to stay with them until the boats got close enough to see the whales on their own. They turned around and flew back on a parallel course about a mile farther off shore.

The TRBs came back into view in the distance. After another twenty minutes of hunting, all of the ocean within the range of helicopter assistance to the boats would be scoured. If there were no pilot whales, the project would fail.

Bell was scanning the empty water continuously, scrutinizing every splash in case a pilot whale caused it. Nothing. He looked at every dark whisper below the surface to see if it was the silhouette of a pilot whale. Nothing. His focus didn't waver. As the minutes ticked by, he searched more and more intently, never raising his eyes from the ocean below.

Then, almost directly below the chopper, as if by magic, there were four adult pilot whales. Their size, between that of a dolphin and a big whale, bulbous heads, and dark purple-brownish color made them unmistakable. Bell pushed the intercom push-to-talk button and let rip a big "Yahoo!" Cruz, who had been looking out a window on the other side, was immediately at the door. Puztai slowed the chopper, and traced a large circle in the sky, being careful not to pass directly over the animals in case the engine noise and prop wash spooked them.

Bell yanked off his helmet with one hand as he grabbed for the radio with the other. "Whale hunters, this is recon. Whale hunters, this is recon. We have whales. I say again, we have whales. Over."

“Recon, we read you loud and clear. Say number and type. Over.”

“We have a pod of four adult pilot whales directly below us. Would you like us to mark with smoke? Over.”

“Affirmative. Affirmative. Mark with smoke. Mark with smoke. Over.”

“Dropping smoke. Dropping smoke. Stand by.”

From the rack near the rear of the helicopter Bell and Cruz pulled out two smoke buoys, aluminum cylinders about the diameter of the big end of a baseball bat and about half as long. They turned the switch to arm them and tossed them out the door. When each one hit the water, it spewed a billowing cloud of dark gray smoke, providing an easy marker for the boats to guide on. The chopper continued flying big circles around the whales and the smoke buoys while Bell took pictures.

The two catcher boats, aimed at the helicopter and columns of smoke, were soon close enough to see the whales. Then they split apart to chase individual animals. Bell could see the catchers standing near the bows with their long-handled, breakaway hoop nets. Other project members leaned over the side of the boats, watching and ready to do their part. Some had long poles with looped lines attached. The success of the project now depended on the catchers and the tracking crew.

Their role completed, Bell and the chopper crew wished the catcher crews good luck and signed off. They pointed themselves back to San Diego. Mission accomplished.

With the helicopter cargo door now facing west, Bell watched Catalina Island slide by. He and Cruz settled in for the ride back. Cruz chewed on a candy bar. He held the wrapper out the door. The prop wash ripped it from his loosened grip, and it disappeared in an instant. Bell wagged his finger at Cruz and mouthed the words, “No littering.” Cruz smiled back and gave an exaggerated salute.

The intercom was silent now. The island passed out of their view, replaced by empty blue water and empty blue sky. It was pretty if one’s taste ran to empty blueness. Bell continued to watch for animals for his survey project, but after a few moments his eyes

wandered upward and he was muttering to himself. He was pondering the issue that he seemed to always ponder during the flight back.

“Surveying to know where the dolphins are or were at one time isn’t worth a whole lot biologically. How can we get something bigger out of this? What’s bigger? What is bigger?” He paused. “Bigger is showing that dolphins *want* to be in places where they are and want to *not be* in places where they’re not.” He smiled. “That allows us to look for the differences in those places. Those differences will show that dolphins have environmental preferences ... just like terrestrial mammals ... terrestrial everything!” He slapped his thigh.

“Watch out, Dave. I’m closing in on that co-leader slot.” He paused again. “Now, how do we show that dolphins want to be in some places and want to *not be* in ...”

Lieutenant Puztai came on the line, interrupting Bell’s one-man discussion. “Cruz, Bell, listen up. We have a new mission. Stand by.” Puztai put the helicopter into a steep left bank as he turned it around. Cruz and Bell grabbed onto something, so they wouldn’t slide across the cabin. Puztai came back on, “An airlines pilot flying into LAX reported a boat on fire with people in the water near Catalina. Our chopper is the nearest aircraft with rescue capability. Cruz, get ready for rescue operations.” They were heading back to Catalina.

Cruz slid the cargo door closed, unfastened his gunner’s belt, and reached for his gear bag. He was a certified rescue swimmer, having undergone two years of the most rugged training in the Navy, and always carried his gear on helo flights. He pulled his wet suit out of his gear bag and climbed out of his flight suit. Bell lengthened his gunner’s belt and took a seat near the rear of the aircraft to give Cruz plenty of room to lay out his gear and get ready.

Puztai came back on the line. “Bell, have you ever worked a hoist and horizontal joystick?”

“I have not. But I have watched others doing it.”

“That’s a good start. Cruz will give you the twelve-step course condensed down to one step. If Cruz needs to go into the water, it’s on you to get him out. If there’s a big problem, one

of us can go back there to help you out, but it's better if both of us stay up here. Do you think you can handle it?"

"Sure," he replied, masking his response, so it sounded more confident than hopeful.

Cruz was squeezing his lean frame into his wet suit, focusing on the new mission. His training and experience made him ready for this. If he was nervous, it didn't show.

After Puztai clicked off the intercom, Cruz gave Bell the thumbs-up sign. He then motioned Bell over to show him how to operate the hoist and horizontal joystick, both located next to the cargo door. The horizontal joystick controls the horizontal movement of the helicopter, but not the vertical. The pilots retain control of that. Looking out the cargo door and using the joystick, the hoist operator can maneuver the helicopter to put the rescue harness exactly where it's needed. The location of the pilot's seat doesn't allow him to see well enough to do that. Cruz explained to Bell how to operate the controls for the joystick. A practice run-through would have to wait until they were at the rescue site, because they couldn't stop the chopper to practice.

Cruz then slid the cargo door open enough to put his arm out. After he lowered the hoist enough to grab it, he brought it inside. He attached the harness used to pull people from the water, showing Bell how to operate the connectors and hoist switch. Bell practiced with the hoist while they were flying.

Bell took the slack out of his gunner's belt and slid the door open wide enough to stick his head into the prop wash, grabbing the upper door frame to brace himself with his right hand while manipulating the hoist control with his left hand. He watched the hoist descend and then he recovered it, getting a feel for its speed. Just as he leaned back into the chopper, he raised his eyes to the coast. If he looked hard enough, Bell could just barely see the bull-fighting ring in Tijuana, Mexico, to the south and the patch of haze hanging over Santa Barbara to the north. He paused momentarily to take in the view. He was jerked back to their mission by Puztai's voice crackling over the intercom.

"How's it going back there? Are you men ready?"

Cruz's response was crisp. "Yes, sir. We are ready one hundred percent." He gave Bell the thumbs-up sign.

"Good, we're coming up on the coordinates. Stand by." He clicked off the intercom. Cruz and Bell stood looking at each other. The seconds ticked by. The intercom buzzed back to life. "Damn! Wouldn't you know it! Cruz, Bell, look out the door. See any boats on fire with people in the water?" He laughed and clicked off the intercom.

Cruz put on his gunner's belt and slid the cargo door all the way open. The two of them leaned out into the prop wash and peered forward. They saw the two torpedo recovery boats. Smoke from the nearby buoys continued to rise, but no boats were on fire. Two pilot whales were splashing as though they were upset about something, but no people were in the water. Two other pilot whales were tied up alongside the boats. Cruz and Bell looked at each other and burst out laughing. The airline's pilot had it almost right.

Puztai came back on the line, "I'm declaring 'mission accomplished.' Let's get home before we run out of gas." He did a slow turn to the left, enabling Cruz and Bell to get a good look straight out their door at the activities on the two boats.

Only one of the TRBs had a whale tied next to it now. They saw a researcher clamp a radio pack onto the pilot whale's dorsal fin. The whale seemed strangely calm. The crew loosed the lines around the whale, and it swam leisurely towards its waiting companions. Then they all dove in unison, flashing their tail flukes as if in a farewell wave. They soon surfaced nearby, and started providing the first dive data ever recorded from wild pilot whales. The grueling work for the tracker crews was now beginning.

As the helicopter pointed back towards San Diego, Bell took up his position at the open cargo door. Taking advantage of another opportunity to collect data for his dolphin and whale survey project, he scanned the ocean for any signs of dolphins or whales. Like before, all he saw was empty ocean and all he heard was the drone of the engines.

However, this time his eyes didn't focus on the blue emptiness before him or on anything. He muttered to himself, "How do you determine if dolphins prefer some locations

over others?” His eyes drifted upward to the cloudless sky. “How do you determine if dolphins prefer ...” Then his eyes lit up as he struck the side of the cargo door with the heel of his hand. “I got it!” he yelled. But because he didn’t push the intercom button, no one heard him. Cruz looked his way with a questioning expression when he saw Bell strike the door, but shrugged and ignored him when he saw Bell muttering to himself.

“We have to compare where we looked and saw them,” he continued, “to where we looked but did not see them! I need to plot the flight tracks on maps.” He wrote in his notebook “flight track segments w/no sightings vs. flight track segments with sightings. Comp segments for” He stopped writing here. “What are we looking for? I need to know that before I do anything.” He rested his hand in his lap as he gazed out on the blue nothingness.

“Well, if I’m going to plot these flights on a map, what other data are on a map?” Bell paused again. “Bathymetry. But dolphins can’t prefer specific depths. Most of the ocean is so deep the dolphins can’t possibly detect the bottom and deep bottoms won’t directly influence the surface where they are. Hmm.”

Bell pushed the butt end of his pen inside the visor of his helmet and scratched his cheek. “But *differences* in depths affect upwelling... So what?” Bell paused. “Hmmm. Upwelling in turn churns nutrients toward the surface ... which affects abundance of fish!” His eyes got big. “That’s it! See if dolphin occurrences correspond to where there should be more food!” He continued writing “changes in depth.” Then Bell’s enthusiasm waned. He muttered to himself, “How am I going to compare them? I need a statistical test that will ...” He sat motionless, staring off into the blueness. Moments passed.

Cruz looked over at him just as Bell slapped the deck with his gloved hand, a gleeful smile on his face. He then wrote in his notebook, “Compare using chi-square statistics.” His smile settled into one of smugness as he let out a long “Aaaahhhh. This is my door.” Then he yelled as loud as could, but without pushing the intercom button, “I am ready! Dave, make room for your new Project Co-leader!”

Writing Raw

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The End

Clifford Hui bio: Clifford Hui is a retired research biologist and writes fiction when he's in the mood. When he's not writing, his mood revolves around his collection of aloha shirts, his garden, and his Mainsqueeze. He lives and writes in Concord, California. A sampling of his published work can be found at www.CliffordHuiStoriesEtc.com.