In this series of short essays, stories, poems, and personal observations, Robert A. Burton, neurologist and writer, uses both fiction and non-fiction to explore the many paradoxes and contradictions inherent in scientific inquiry. A novelist as well as author, Burton brings story to science and science to story.

Where Science Meets Story: Notes from an Extended Field Trip

ROBERT A. BURTON

A young woman with a viral brain infection believes that she is dead. You put a stethoscope on her chest and have her listen to her heartbeat and feel her pulse. She agrees that her heart is beating but swears that she has died. Being a savvy neurologist, you suspect that the woman has Cotard's syndrome—the rare illusion of feeling dead associated with certain brain conditions, including viral encephalitis. In that brief gap between hearing someone insist that she is dead and settling into the ritual of diagnosis and treatment, your mind is flooded with odd emotions and suspicions as disparate as what it means to feel that you are dead to the possible neurological basis of self-delusion. You sense that you are on the edge of an important insight about the human condition, but time intrudes, another patient beckons, the experience—so difficult to label and categorize—slips beneath consciousness, relegated to the dusty interstices of distant memory.

Check out the peer-reviewed literature on Cotard's syndrome and you will see fascinating descriptions and speculations, but no detailed descriptions of how it feels to see such a patient. Traditional scientific exposition works through carefully reasoned argument and supporting evidence; unsubstantiated meditations and ineffable feelings are the stuff of personal essay and memoir. And yet, if we accept the prevailing cognitive science view that thoughts arise out of subconscious brain activity, it seems self-evident that such encounters with the unusual, even if long forgotten or inaccurately recalled, are the experiential building blocks with which we address the complexities of human behavior, including ethical dilemmas.

Though we commonly feel our thoughts as simply popping into our heads, we also have the occasional wonderful sense that we can both summon thoughts up into consciousness and then shape them into compelling lines of reasoning. But this marvelous feeling of a personal self endowed with sufficient personal agency to consciously manipulate thoughts is itself a phenomenon arising out of involuntary subliminal brain mechanisms. As I have previously

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discussed at length,[1,2] the involuntary mental sensations of self, agency, causation, and a feeling of knowing collectively make it impossible to accept that conscious reasoning is likely to be an illusion foisted on us by our biology.

My reason for downplaying our ability to consciously manipulate our thoughts is to challenge the notion that tough ethical decisions that affect mankind's future must be addressed primarily via argument and evidence—the tacit assumption underlying most public discourse from academic debate to political talking heads.

Early in my neurology career, fascinated by the nature of personal identity, the role of biology in determining intention and responsibility, reason versus faith, the limits of agency and choice—I found myself writing a novel that imagined what it might feel like to find out that you were one of 10 identical clones. After doing the necessary research, I stepped back from hard facts and sat quietly, allowing characters to bubble up, often with unexpected perspectives that I did not know that I had. By listening closely and not editing my thoughts, I was able to grab a glimpse of how the raw me thought and felt. Though the arguments for and against cloning have since become fuzzy and oddly unpersuasive, the characters remain vivid and compelling.

After nearly two decades of writing about the relationship of the brain to the mind, I have again decided to step back from hand-picked data and tidy conclusions and allow my uncensored mind to offer up potentially new perspectives on age-old obsessions. What are emerging are loosely interwoven stories, poems, personal reminiscences, clinical narratives, and ruminations unfettered by explicit purpose. My hope is that these meanderings will collectively offer a kaleidoscopic yet coherent sense of a senior neurologist's late-night meditations on being human.

By the way, the Cotard patient fully recovered from her encephalitis and no longer believes that she is dead. However, she remains convinced that she was dead during her illness.

The Spark

The woman was a routine clinic follow-up. Her previous treating resident had diagnosed a right hemisphere stroke of unknown cause, possibly secondary to birth control pills. A brief exam showed moderate left-sided weakness and difficulties with coordination—unchanged from the last two clinic visits. As always, her lab tests were normal. There was nothing more to do. I suggested that she return to the care of her family doctor in Ukiah.

"But what about my arm and leg?" she asked, good hand on hip. "Four months of physical therapy and there's no improvement. Surely there must be something you can do." She paused just long enough to savor my discomfort before making a dismissive downward gesture of her hand.

Three months later, she made an unscheduled drop-in visit to the clinic. "Check this out," she said, strutting up and down the small waiting room corridor. Her limp was gone; she looked at me and proudly snapped the fingers of her previously clumsy hand.

"Wow," I said.

"Prayer," she said.

"Prayer?"

She stood alongside my desk. "Aren't you going to ask me to sit down and tell you about it?"

I motioned for her to have a seat.

"After my last visit, I was touch and go with suicide. My local pastor recommended a healer he'd heard on TV. Our congregation raised enough money for the two of us to Greyhound down to LA

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to see Katherine Kuhlman. We got there in time for her Sunday church meeting. She saw me sitting in the top row of the balcony and said, 'Will the lady from Ukiah stand up, raise your good arm, and sing the praises of the Lord'. My pastor helped me to my feet. Miss Kuhlman said that my bad arm would be healed if I believed. 'I believe', I shouted at the top of my lungs. And just like that, my bad arm rose by itself. It's been fine ever since. Same with my leg."

As she talked, I flipped through her previous diagnostic scans. They were inconclusive, but at that time, the only available noninvasive imaging—the radioisotope brain scan—was relatively insensitive for the detection of small strokes.

When she finished, I did a thorough exam. She was entirely normal.

"Thanks for listening." She handed me a box of home-made cookies. "So you and the other residents will remember the value of faith."

In response to hearing the story, the head of the clinic informed me that a famous Minnesota neurologist had a spark-gap machine in his office for treating cases of so-called hysteria. "He claimed pretty good results—about the same as placebo. 'The bigger the spark, the better,' he used to say."

Nina

Nina had been on the neurology ward for a week. Despite extensive brain wave monitoring and the usual imaging tests, no one was sure if this young woman's "falling-out-spells" were bone fide seizures. She had failed all anticonvulsant medications, and we were stumped. Having seen several episodes, I was struck by their quasi-erotic nature. Without ever hurting herself, Nina would dramatically slump to the floor, arch her back, and make suggestive humping movements. Between spells, her in-your-face "why can't you diagnose me" attitude made the staff hate dealing with her. Though at least 5% of medically uncontrollable seizure patients turn out to be nonphysiologic (inelegantly referred to as "psychogenic"), we gave her a half-hearted benefit of the doubt. Perhaps we were overlooking something not obvious on the tests.

One morning, right in the middle of rounds, she sauntered out into the hallway barefoot, her hospital gown half-undone, and asked when we would be seeing her. "Soon, but not now," I told her, "We've got some new admissions to see first." Nina made a glorious swan dive directly in front of the chart cart. Rather than give in, I indicated to the junior residents, interns, and med students that we needed to "keep moving." Just as I steered the chart rack around her bucking body, the department vice chairman came around the corner, saw Nina, and rushed over to do a quick assessment.

"What are you doing just standing there? This is an emergency; she could die."

I tried to explain, but he insisted that she have an immediate arteriogram. "Let's get her down to radiology right now." Nina's bucking stopped; she was now motionless and unresponsive.

Having difficulty catheterizing the femoral artery through a skin puncture, the radiologist opted for direct visualization. Without using any sedation or local anesthesia, he took a scalpel and made an incision in Nina's groin, spread open the wound with two small retractors, and threaded the catheter into the exposed artery. I winced; Nina did not flinch. Not the slightest change of expression even when the radiologist injected the dye—a procedure that normally feels like searing heat going through your head. I was alarmed at

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her lack of response and filled with guilt that I had doubted her.

After what seemed like an interminable wait, Nina still out cold, we gathered around the view-box as the radiologist put up the X-rays. "Absolutely nothing," the radiologist said. "You're looking at a text-book demonstration of a normal brain."

"That's not possible," came a piercing voice; Nina was sitting up and staring at us. "There has to be something." The clamped arterial catheter still hung from her groin.

The vice-chairman, humiliated at having been seemingly duped, was livid. "Young lady," he said, his face nearly in hers. "You'll have to leave the hospital. We are not going to put up with this kind of behavior."

She shrugged, lay down on the procedure table, closed her eyes and folded her hands on her chest as though showing us what it would be like if she were dead.

I last saw Nina being rolled into the elevator in the discharge wheelchair. In her lap were her belongings, including a canvas carry-all bag and a potted plant. She flashed a royal smile and gave a slight wave of her hand. "Thanks," she mouthed as the elevator doors closed.

A few hours later, I received a phone call from the local Veteran's Hospital. Nina was in the ER with a flurry of seizures; the ER physician wanted to know her discharge medications.

"None," I said. "There are no medications for what she has."

"You discharged her on nothing? You must be kidding."

Once again, I tried to explain.

"I should report you," the doctor said.

"You probably should. Oh, and give Nina my best for an outstanding performance."

The following morning, a woman from hospital housekeeping handed me a letter that she had found under the pillow while cleaning Nina's room. It was an official notification from the U.S. Army. Two months ago, just before her seizures began, Nina's husband had been killed in Vietnam. "We are sorry for your loss," the letter concluded. On her admission history, Nina had told me that her husband was in Vietnam but said that he was "out of harm's way."

Sight Line

The man looked around the consultation room. "Where's my wife?" he asked, looking directly at her.

"I'm here, honey, right in front of you."

The man reached out and ran his hand along his wife's face. He stopped at the bridge of her nose. "Yes, I'd recognize you anywhere," he said with a tentative smile, like a young child seeking approval. He kept his fingertips lightly balanced on the tip of her nose. "Can we go now?" he asked her.

"In a moment. The doctor has a few more questions." Making no effort to remove his hand from her face, she turned to me and said, "John's like the man in Oliver Sacks' book, *The Man Who Mistook His Wife for a Hat*, isn't he?" Her eyes filled with tears.

"I'm afraid so," I said, watching John repeatedly run his fingertips up and down the sides of his wife's nose.

She watched me watching. "He's very gentle. It gives him something to hold onto."

"You're so beautiful," John said to his wife. "I've always loved this little bump. You got that falling off a bike, didn't you?"

"What a great memory," she said to her husband. To me she said, "So far it seems to be mostly visual."

He took his hand away and reached into his wallet. "I've got some old pictures in here somewhere. I'd never seen anyone like her before." He

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searched through some credit cards and then came across a faded wrinkled photo—a young woman in a flowery dress and straw hat, ankle-deep in ocean surf. John stared at the picture; his brow furrowed. "No, this isn't it. Not it at all."

His wife took the photo and slipped it back into the wallet. John abruptly folded both hands in his lap. "I hate old people who bore you to death with their reminiscences. Sorry. I'll leave as soon as my wife gets here."

The Pre-Eminence of Reason

Over lunch at Google, I suggested to a couple AI researchers that computers would appear human when they could adequately interpret the short story often attributed to Hemingway. "For Sale, Baby Shoes; Never Worn." One of the scientists said, "That's a very sad story." A second seemed puzzled and interjected, "What's to be sad about; you can probably get the shoes at a huge discount."

Question: Would the second scientist pass the Turing Test?

Notes

1. Burton RA. *On Being Certain: Believing You are Right Even When You're Not*. New York: St. Martin's Press; 2008.
2. Burton RA. *A Skeptic's Guide to the Mind: What Neuroscience Can and Cannot Tell Us About Ourselves*. New York: St. Martin's Press; 2013.

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