RAIN MAN *for a* DAY

You may be smarter than you look. I was.

by Lawrence Osborne

In a concrete basement at the University of Sydney, I sat in a chair waiting to have my brain altered by an electromagnetic pulse. My forehead was connected, by a series of electrodes, to a machine that looked something like an old-fashioned beauty-salon hair dryer and was summarily described to me as a "Danish-made transcranial magnetic stimulator."

This was not just any old Danish-made transcranial magnetic stimulator, however; this was the Medtronic Mag Pro, and it was being operated by Allan Snyder, one of the world's most remarkable scientists of human cognition.

The Medtronic was originally developed as a tool for brain surgery: By stimulating or slowing down specific regions of the brain, it allowed doctors to monitor the effects of surgery in real time. But it also produced, they noted, strange and unexpected effects on patients' mental functions. For instance, one minute they would lose the ability to speak, another minute they would speak easily but make odd linguistic errors.

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A number of researchers started to look into the possibilities, but one in particular intrigued Snyder: that people undergoing trans-cranial magnetic stimulation, or TMS, could suddenly exhibit savant intelligence — those isolated pockets of genius-like mental ability that most often appear in autistic people.

Snyder's assistant made a few final adjustments to the electrodes, and then, as everyone stood back, Snyder flicked the switch. A series of electromagnetic pulses were being directed into my frontal lobes, but I felt nothing. Snyder instructed me to draw something. "What would you like to draw?" he asked merrily. "Cats? You like drawing cats? Cats it is."

While I drew, Snyder continued his lecture. "You could call this a creativity amplifying machine. It's a way of altering our states of mind without taking drugs like mescaline. You can make people see the raw data of the world as it is — as it is actually represented in the unconscious mind of all of us."

Two minutes after I started the first drawing, I was instructed to try again. After another two minutes, I tried a third cat and, in due course, a fourth. Then the experiment was over, and the electrodes were removed. I looked down at my work. The first felines were boxy and stiffly unconvincing. But after I had been subjected to about 10 minutes of trans-cranial magnetic stimulation, their tails had grown more vibrant, more nervous; their faces were personable and convincing. They were even beginning to wear clever expressions.

I could hardly recognize them as my own drawings, though I had watched myself render each one, in all its loving detail. Somehow, over the course of a very few minutes, and with no additional instruction, I had gone from an incompetent draftsman to a very impressive artist of the feline form.

Snyder looked over my shoulder. "Well, how about that? Leonardo would be envious." Or turning in his grave, I thought.

As remarkable as the cat drawing lesson was, it was just a hint of Snyder's work and its implications for the study of cognition. He has used TMS dozens of times on university students, measuring its effects on their ability to draw, to proofread and to perform difficult mathematical functions, such as identifying prime numbers by sight. Hooked up to the machine, 40 per cent of test subjects exhibited extraordinary, and newfound, mental skills.

That Snyder was able to induce these remarkable feats in a controlled, repeatable experiment is more than just a great party trick; it's a breakthrough that may lead to a revolution in the way we understand the limits of our own intelligence — and the functioning of the human brain in general.

Snyder's work began with a curiosity about autism. Though there is little consensus about what causes this baffling and increasingly common disorder, it seems safe to say that autistic people share certain qualities: They tend to be rigid, mechanical and emotionally dissociated.

Despite these limitations, a small subset of autistics, known as savants, can also perform super specialized mental feats. Perhaps the most famous savant was Dustin Hoffman's character in the movie, Rain Man, who could count hundreds of toothpicks at a glance, a talent at odds with his difficulty in performing simple daily tasks.

But the truth has often been even stranger: One celebrated savant in turn of the century Vienna could calculate the day of the week for every date since the birth of Christ. Other savants can speak dozens of languages without having formally studied any of them or reproduce music at the piano after only a single hearing. A savant studied by the English doctor J. Langdon Down in 1887 had memorized every page of Gibbon's "Decline and Fall of the Roman Empire."

The conventional wisdom has long been that autistics' hyper-literal thought processes were completely separate from the more contextual, nuanced, social way in which most adults think, i.e. a different mental function altogether. And so, by extension, the extraordinary skills of autistic savants have been regarded as flukes, almost inhuman feats that average minds could never achieve.

Professor Allan Snyder of the University of Sydney, Australia.

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Snyder argues that all those assumptions — about everything from the way autistic savants behave to the basic brain functions that cause them to do so — are mistaken. Autistic thought isn't wholly incompatible with ordinary thought, he says. It's just a variation on it — a more extreme example.

He first got the idea after reading The Man Who Mistook His Wife for a Hat, in which Oliver Sacks explores the link between autism and a very specific kind of brain damage.

If neurological impairment is the cause of the autistic's disabilities, Snyder wondered, could it be the cause of their genius-like abilities, too? By shutting down certain mental functions — the capacity to think conceptually, categorically, contextually — did this impairment allow other mental functions to flourish? Could brain damage, in short, actually make you brilliant? Snyder turned to TMS, in an attempt, as he says, "to enhance the brain by shutting off certain parts of it."

If Snyder's theories are correct, in fact, and savants have not more brainpower than the rest of us, but less, then it's even possible that everybody starts out life as a savant. Look, for example, at the [illegible]guages — a mysterious skill that seems to shut off automatically around the age of 12.

"What we're doing is counter-intuitive," Snyder tells me. "We're saying that all these genius skills are easy, they're natural. Our brain does them naturally, like walking. Do you know how difficult walking is? It's much more difficult than drawing!"

Not all Snyder's colleagues agree with his theories. The late Michael Howe, who was an eminent psychologist at Britain's University of Exeter, argued that savantism (and genius itself) was largely a result of incessant practice and specialization. "The main difference between experts and savants," he once told New Scientist magazine, "is that savants do things which most of us couldn't be bothered to get good at."

Robert Hendren, executive director of the M.I.N.D. Institute at the University of California at Davis, brought that concept down to my level: "If you drew 20 cats one after the other, they'd probably get better anyway." Like most neuroscientists, he doubts that an electromagnetic pulse can stimulate the brain into creativity: "I'm not sure I see how TMS can actually alter the way your brain works. There's a chance that Snyder is right. But it's still very experimental."

Even skeptics concede that by intensifying the neural activity of one part of the brain while slowing or shutting down others, TMS can have remarkable effects. One of its most successful applications has been in the realm of psychiatry, where it is now used to dispel the "inner voices" of schizophrenics, or to combat clinical depression without the damaging side effects of electroshock therapy, all of which has not gone unnoticed by canny entrepreneurs and visionary scientists. How long before Americans are walking around with humming anti-depression helmets and math-enhancing "hair dryers" on their heads? Will commercially available TMS machines be used to turn prosaic bank managers into amateur Rembrandts? Snyder has even contemplated video games that harness specialized parts of the brain that are otherwise inaccessible.

Neurology professor Bruce L. Miller, of the University of California at San Francisco, is intrigued by Snyder's experiments and his attempts to understand the physiological basis of cognition. But he points out that certain profound questions about artificially altered intelligence have yet to be answered. "Do we really want these abilities?" he asks. "Wouldn't it change my idea of myself if I could suddenly paint amazing pictures?" It probably would change people's ideas of themselves, to say nothing of their ideas of artistic talent. And though that prospect might discomfit Miller, there are no doubt others whom it would thrill.

But could anyone really guess, in advance, how their lives might be affected by instant creativity, instant intelligence, instant happiness? Or by the sudden disappearance of such attributes, once the TMS is switched off?

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Snyder, for his part, radiated the most convincingly ebullient optimism. "Remember that old saw which says that we only use a small part our brain? Well, it might just be true. Except that now we can actually prove it physically and experimentally. That has to be significant. I mean, it has to be, doesn't it? More important than that, we can change our own intelligence in unexpected ways. Why would we not want to explore that?"