

the rain man in all of us

World expert Darold Treffert '55, MD'58 believes that savant syndrome may point toward untapped abilities in everyone.

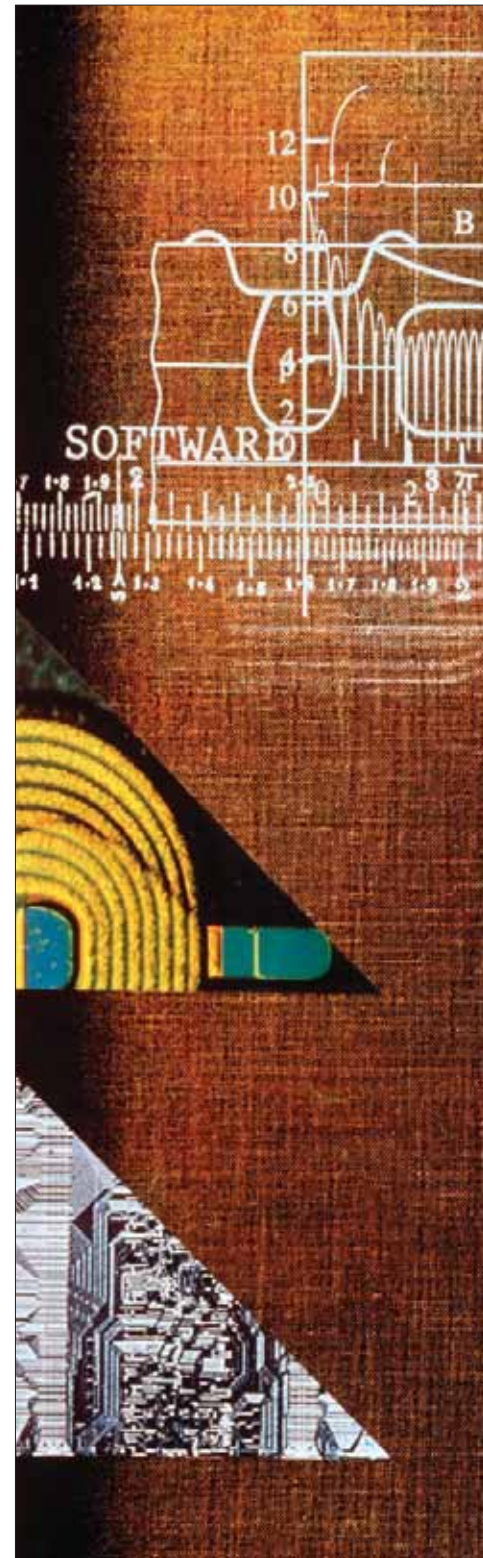
BY NIKI DENISON

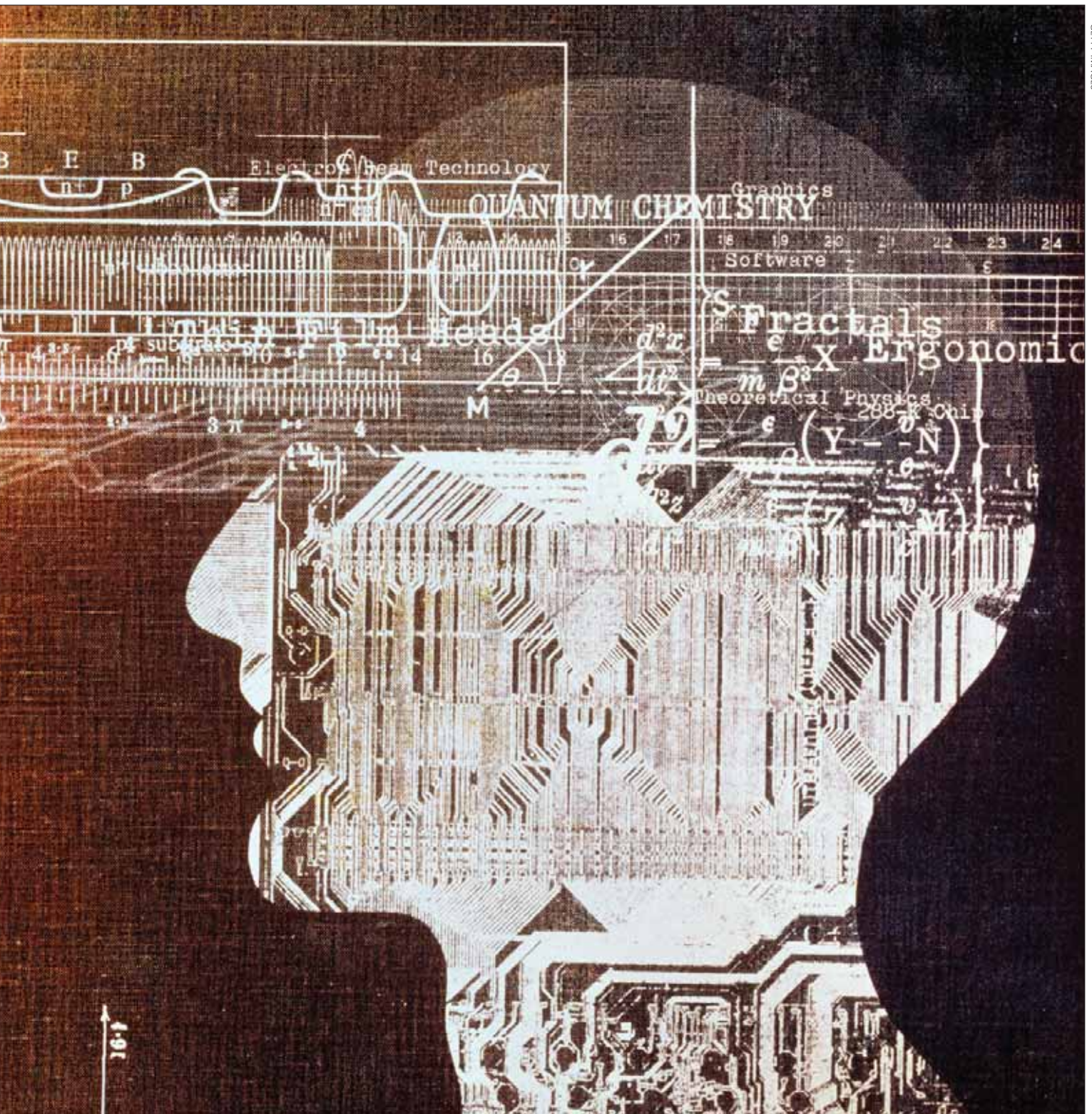
KIM PEEK has read some 7,600 books in his lifetime, and he has 98 percent recall of each one — not to mention a storehouse of facts on subjects ranging from music to history to sports. He's also developmentally disabled.

LESLIE LEMKE, who is blind and severely cognitively impaired, had never had a music lesson in his life. Yet at the age of fourteen, he amazed his mother by playing a complex Tchaikovsky piano concerto that he had heard on TV the night before.

DANIEL TAMMET learned Icelandic in seven days, speaks nine other languages, and can recite the number pi from memory to 22,514 decimal places. He developed his special abilities after suffering a series of epileptic seizures.

Peek, Lemke, and Tammet are savants — individuals who display exceptional abilities in areas such as music, art, math, or memory, despite being challenged by disorders such as autism or mental retardation. But the three are unusual even within this specialized group. They are known as prodigious savants — those whose gifts would be considered spectacular even in a person without disabilities.





There are fewer than one hundred prodigious savants in the world, and psychiatrist Darold Treffert '55, MD'58 makes it his business to know about all of them. Treffert, who is considered a world expert on savant syndrome, served as the consultant for the 1998 movie *Rain Man*, which starred Dustin Hoffman as a prodigious savant (see sidebar on page 32).

"Savant syndrome provides a unique window into the brain and its inner workings, but it also provides a look at the hidden potential within us all," he says. "No model of brain function is going to be complete until it can fully incorporate this jarring juxtaposition of ability and inability in the same person. We tend to leave it out there [and think] 'Oh, isn't that interesting' — sort of like a UFO. [But] until we can explain the savant, we can't explain ourselves."

In trying to determine what causes savant syndrome, scientists turn to an increasing body of evidence that shows that when a particular part of the brain is thrown out of commission, another part attempts to compensate. Many have come to believe that in savant syndrome, the left hemisphere of the brain is damaged, so the brain adapts by drawing more heavily on the right hemisphere, which is responsible for creativity and skills in things like art and music. The left hemisphere, which is the home of language, comprehension, and logical, sequential thinking, is more vulnerable to harmful prenatal influences because it develops later and more slowly than the right hemisphere.

One theory holds that an excess of circulating testosterone can impair left-hemisphere development, causing nerve cells to migrate to the right hemisphere and overdevelop that part of the brain. Because testosterone reaches very high levels in male fetuses, this could explain why savant syndrome is six times more common in boys than in girls.

The study of savant syndrome "has promoted the idea of the brain's plasticity, and the brain's ability to recruit other areas to be put to use when there's injury," Treffert says. Savant skills sometimes appear suddenly in individuals who have had a brain injury, or in elderly people suffering from

dementia. Thus, Alzheimer's patients may abruptly develop artistic skills when they couldn't draw a straight line before.

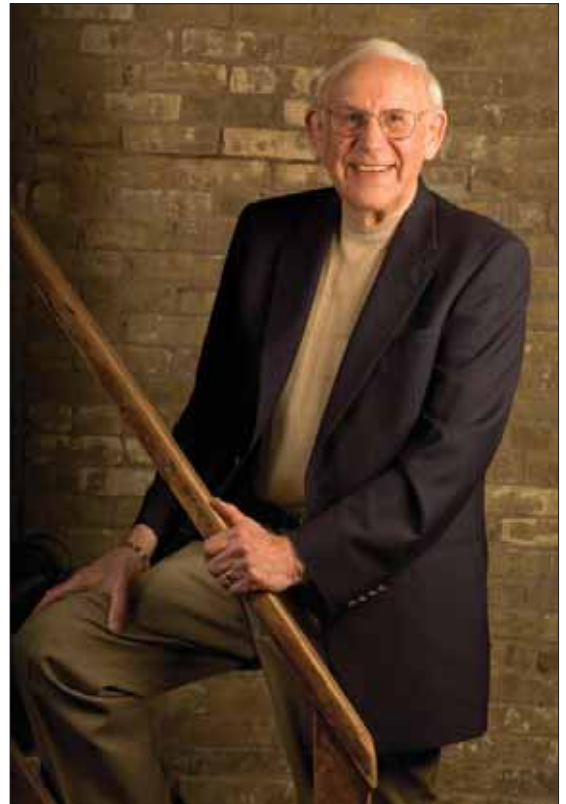
"We're not all little Mozarts or Picassos," Treffert says, "but the acquired savant raises questions about the dormant capacity in us all, and are there ways to access that without having a stroke or a head injury or dementia?"

Researchers like Allan Snyder are trying to find out. Here's a news flash for anyone who has ever suffered from math anxiety: Snyder hypothesizes that we're all born with the ability to do lightning-fast multiplication, division, and prime number identification. We just don't know how to access it, he says.

The Australian scientist uses a device called a transcranial magnetic stimulator (TCM) to temporarily dial down the left-hemisphere functions of research subjects and allow them to tap into their right brains, where more savant-like abilities reside. In a *New York Times* article called "Savant for a Day," writer Lawrence Osbourne describes how Snyder used TCM to send electromagnetic pulses to Osbourne's frontal lobes, thus temporarily improving his ability to draw pictures of cats.

Snyder is now using the technique to enhance counting skills, since artistic ability is subjective and more difficult to judge. In one study, he tested twelve university students on their capacity to instantly count a large number of objects on a computer screen while undergoing cranial stimulation. He found that accuracy improved for ten of the subjects and receded an hour after TCM exposure for eight of them.

While Treffert believes that the technique is probably not specifically targeted enough to cause inner savant abilities to surface in a dramatic way, he acknowledges that it can show modest gains at tapping into dormant capacity. However,



MICHAEL KENITZ

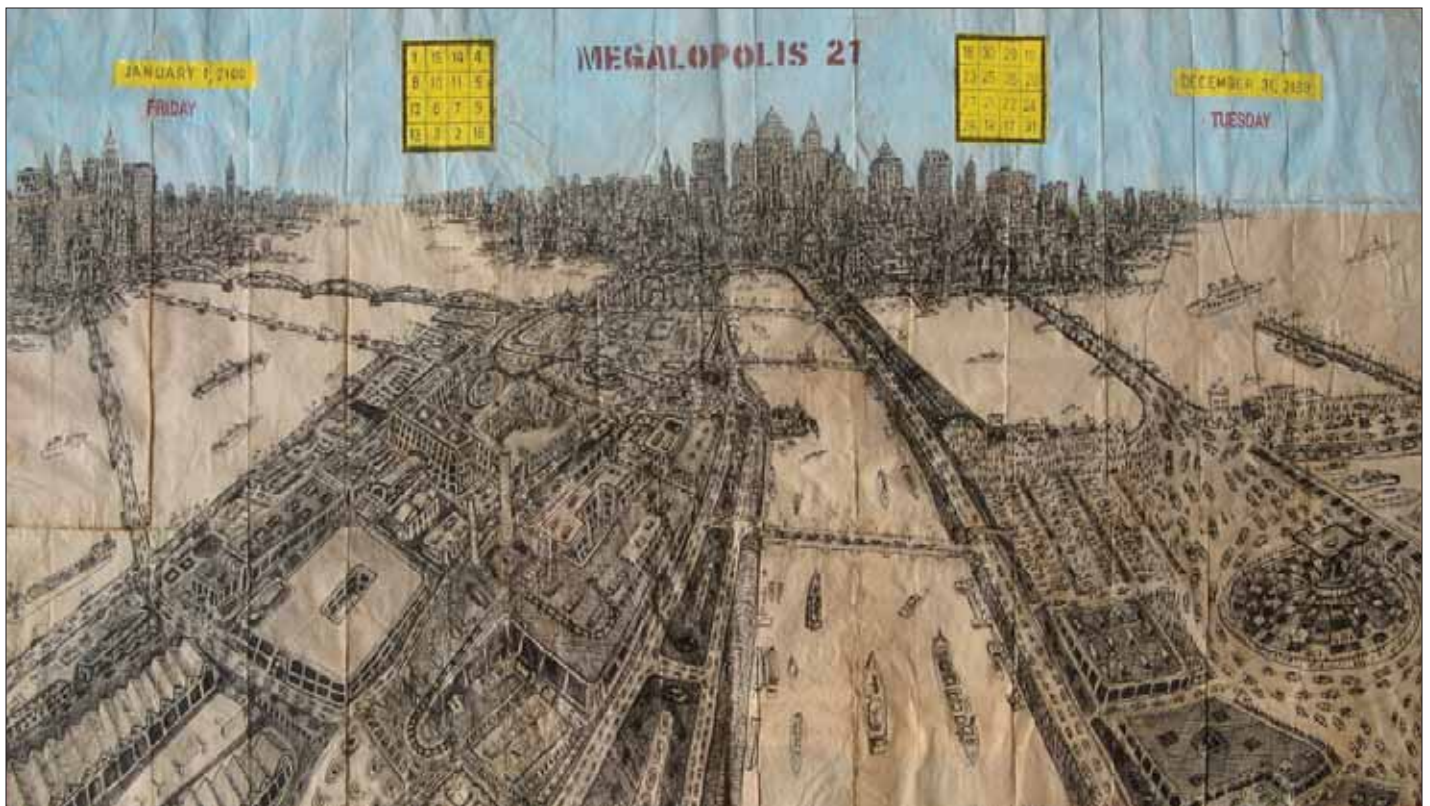
Darold Treffert has appeared on *Oprah* three times, as well as programs such as *60 Minutes*, *Larry King Live*, and more than a dozen documentaries, including some made in South Africa, Germany, Iceland, and Japan.

it's not automatic that prodigious savant gifts are present in everyone who puts on an experimental electrode cap. He reminds us that such high-level skills are present in only a fraction of the disabled population, just as genius occurs in only a fraction of the general population.

Treffert initially became interested in savants in medical school when Leo Kanner, the psychiatrist who first described autism in 1943, spent a semester as a visiting professor. (Some 10 percent of autistic individuals possess savant abilities.)

Kanner, Treffert recalls, was "a very gentle soul with a pleasant bedside manner. He wasn't just describing these people, but he cared about them as well." Treffert, who has an appointment as a UW-Madison clinical psychiatry professor, could easily be describing himself. He is universally respected and liked in the campus medical community, no doubt due to a kindly and unassuming civility that seems more typical of a bygone era.

"There's a tendency to look at the savant with sort of a gee-whiz type of mentality," says Treffert, "but there's



Artistic ability is a typical “island of genius” for savants. This ink drawing, *Megalopolis 21*, was created by savant artist George Widener.

really much more to it than that. Scientific advances are important, but the other side of it is the incredible input and love and support and belief of the families of these youngsters and what that can do for them.” Treffert is fond of saying that on his quest to understand savants, “I’ve learned as much about matters of the heart as I have about circuits in the brain.”

Lewis Leavitt, a pediatrician who works at the UW’s Waisman Center, concurs. Treffert, he says, “should be recognized for not forgetting the humanness

charged with helping to start a children’s unit, and most of the patients were autistic. “One little lad had memorized the bus system in Milwaukee, and another had put jigsaw puzzles together without looking at the picture, and then a third little guy was sort of a walking almanac of history,” he says. The children solidified Treffert’s interest in savant syndrome.

He then went on to combine private practice with serving as executive director of the Fond du Lac County Health Care Center. It was in 1980, when Leslie

syndrome. But he was unable to explain how it works. “One of the most pressing questions for me,” he says, “is how do people know things they’ve never learned?” He believes these individuals may be accessing knowledge that was already there but lying dormant. “I think we all come with much more software installed than we formerly believed,” he says. “Many times, people think of us being born with this marvelous piece of equipment called the brain with a blank disk, and we become what we put on the

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and personhood of the people he studies. He has been writing about them in a very empathetic way ... and has provided insight into the larger life of people who have these extraordinary skills.”

After completing his residency, Treffert began working at Winnebago Mental Health Institute near Oshkosh, Wisconsin, quickly rising to superintendent. He was

Lemke played a concert in Fond du Lac, that Treffert began attracting a stream of media inquiries that continues to this day. A local TV station asked Treffert to explain how an untaught, mentally disabled musician acquired the knowledge to play like a master.

Treffert could tell them that this was due to a condition called savant

disk.” But the prodigious savant, he says, “tells us that there’s much more on that disk when we’re born. That gets at this whole idea of the potential within us all.”

Treffert uses the term *genetic memory* to refer to things that we may be born knowing, but later lose as more complex mental development supersedes this knowledge. “We hear that we only use

ten percent of our brain or less,” he says, and he posits that genetic memory could account for some of that underutilized 90 percent. In the animal kingdom, he continues, we see genetic memory all the time — for instance, when birds migrate. Consequently, genetic memory in humans “shouldn’t come as any surprise.”

In his book *Extraordinary People: Understanding Savant Syndrome*, Treffert writes about the calendar-calculating twins, George and Charles. George, for example, has difficulty with simple arithmetic, but if you ask him which year in the next two hundred Easter will fall on March 23, he “will name those years with lightning rapidity, faster than a computer and just as accurately,” writes Treffert. George also remembers the weather for every day of his adult life. Neurologist Oliver Sacks observed the twins swapping twenty-digit prime numbers for amusement, and other reports mentioned that they had such a highly developed sense of smell that they could pick out their own clothes simply by sniffing them.

Treffert writes of other savants who seem to have extrasensory abilities, such as a boy who knew that his parents had suddenly decided to pick him up from school, although they did not tell him, and who astounded his teachers by going to the door to wait for them. Another savant named Ellen, who is blind, can tell the time to the minute without referring to any timepiece.

In his quest to understand savant syndrome and share what he learns with others, Treffert maintains an exhaustive Web site at www.savantsyndrome.com. The site includes video clips of perhaps the most astounding savant living today — Kim Peek, who was the original inspiration for *Rain Man*. Known as “Kim-puter” to his friends, Peek was born without a corpus collosum, which connects the two hemispheres of the brain. This may explain how he can read two pages at a time — one with each eye.

NASA has done studies of Peek’s brain, and he has been the subject of a *Scientific American* article and several documentaries. Peek is unusual because he has “islands of genius” in more than a

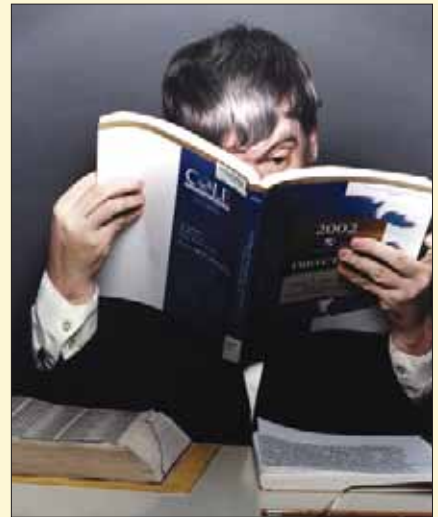
behind the scenes of *rain man*

Darold Treffert was asked to serve as a consultant for the movie *Rain Man* in order to ensure that savant syndrome was portrayed accurately. In the film, Dustin Hoffman plays the autistic savant Raymond Babbitt, who counted 246 toothpicks at a glance, memorized the phone book, and computed square roots in his head, much to the amazement of his brother, Charlie, played by Tom Cruise.

Although Treffert thought that the movie was “very accurately and sensitively done,” his expertise did result in a few changes. For instance, Raymond returned to the hospital at the end of the film rather than being “cured” in a six-day cross-country tour. The original script also included more typical Hollywood scenes — mobsters, narrow escapes, and a chase scene in which Charlie and Raymond roar out of a bunker on a motorcycle and sidecar, thanks to Raymond’s mechanical skills. “But savant syndrome is spectacular in its own right,” says Treffert. “There is no need to embellish it.”

Dustin Hoffman would agree. The actor was originally asked to play the role of Charlie in the movie, but he was so inspired by a *60 Minutes* program featuring pianist Leslie Lemke, a savant from Arpin, Wisconsin, that he was moved to tears and decided to play the savant part instead. Hoffman spent time with several savants, including memory master Kim Peek, to prepare for his role.

Hoffman ultimately won an Oscar for his portrayal and dedicated it to Peek, who provided the original inspiration for the film. — *N.D.*



ETHAN HILL

Kim Peek has read some 7,600 books and has 98 percent recall of all of them.

dozen areas, whereas savant expertise is usually deep, but confined to one or two very narrow areas. A savant of Peek’s abilities typically comes along only about once a century, Treffert says.

But of all of the prodigious savants, Daniel Tammet is the most unusual in that he can articulate what is going on in his mind. Tammet also has a condition known as synesthesia, causing him to see numbers as mental images that have various colors and shapes. (The number 333 is lovely, he says, while 289 is ugly.) When solving math problems in his head, he simply recites the numbers as he sees

them. As Treffert explains on his Web site, “When computing, the images merge together and out comes the new, correct combination for his instant inner viewing,” enabling Tammet to do math calculations more quickly than a calculator.

Tammet makes a stunning observation in the documentary *Brainman*. “The line between profound talent and profound disability,” he says, “is really a surprisingly thin one.”

Treffert explains: “They’re finding that the way a math genius does his work is a preconscious process, and you can measure that on PET scans or MRIs now and



Treffert had become good friends with the late Richard Wawro, who painted *Wash Day in Pakistan*. He also keeps in close touch with Kim Peek and several other savants and their families.

see that the person is using more primitive circuitry.” Those of us who are not math geniuses, he says, use higher-level, more sophisticated circuitry —generally in the left hemisphere — to do our equations, whereas with the genius, the answer just automatically comes to him or her. “If you compare the circuitry of the savant who is doing that same kind of math problem

with physicist and artificial-intelligence expert Ken Hennacy to come up with such a model. They term the processing that the brain does when we’re aware of it “classical.” This process is linear, relatively slow, depends on neurochemical connections, and uses abstract concepts.

But they posit that there is another method of processing information that

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It’s almost as if the savant comes programmed with the math module or the language module or the music module, Treffert says, “and it appears as if the genius probably does, too. So when they encounter music or math, they’re able to grasp it instantly, whereas the rest of us have to work at it.”

The inability of current models of the brain to explain savant syndrome has led some researchers to suggest that we need a new model for how the brain works. Psychiatrist Diane Powell has collaborated

they call “quantum.” This process is one that the individual is usually not aware of. Like quantum computers, it features many parallel computations going on at the same time, is lightning fast, and is “capable of handling exponentially more information than classical processing,” Powell writes in an article titled “We Are All Savants” in the magazine *Shift: At the Frontiers of Consciousness*. “Quantum processing in the brain could explain how savants perform calculations so rapidly and without their conscious awareness.” This type of quantum processing, she says, is more evident when classical processing is turned down or off — just as it is in the savant.

Treffert says that he would not choose those terms, instead preferring to use “conscious” and “preconscious” thinking. But “the idea of two levels of circuitry within us all makes sense and is compatible with research findings,” he says, adding that the word quantum might apply in the sense of using the brain more efficiently.

The effort to understand the baffling abilities of savants has caused many to think outside the brain case, so to speak. People have told Treffert that encountering savants can be almost a spiritual experience, and he does not disagree. The struggle to understand the savant brain has even led a few researchers to venture into the paranormal. Powell maintains that the quantum model could also explain the extrasensory abilities of some savants.

In the *Shift* article, she writes about a quantum phenomenon known as “entanglement,” which holds that an atomic particle may become “entangled” with another at a great distance and may have an instantaneous effect on it. “Entanglement,” she writes, “provides a means for consciousness to be coupled to other locations in space-time or for consciousness between others to be coupled — in short, a mechanism for telepathic communication.

This notion, which was also proposed by Nobel Prize-winning physicist Brian Josephson, remains controversial. Treffert says that he parts ways with Powell and Hennacy in applying their quantum theory to telepathic communication, “but then, who knows for sure?”

It does seem fitting that the weirdly wonderful field of quantum mechanics, which hints at things we can barely wrap our minds around, could one day explain the equally weird and wonderful, awe-inspiring abilities of the savant. ✍

Niki Denison, who is co-editor of *On Wisconsin Magazine*, has a savant-like ability to always pick the slowest line at the grocery store.