We Are All Savants

DIANE POWELL

How is it that after 100-plus years of careful research documenting evidence of parapsychology, it has yet to gain scientific acceptance? We all have the capacity for psi, and when pressed, many naysayers admit they have had an experience or two that qualify as psi. So why the continued skepticism? A primary reason is that the current scientific model for the brain provides no mechanism by which these phenomena could occur. And yet while this model doesn't explain how consciousness could arise from something material like the brain, no one questions whether there is consciousness. I thus suggest that the model, and not psi, is what needs to be questioned.

WHEN THE ONLY TOOL IS A HAMMER, SCREWS BECOME NAILS

Science relies upon the scientific method, so when there was no "adequate" method for studying consciousness, it became a taboo subject for scientific inquiry. The taboo arose under the influence of John Watson, an American psychologist who believed that only behavior could be studied scientifically. By the 1920s his "behaviorism" came to dominate psychology, and as a result, consciousness was not even mentioned in leading psychology texts between 1930 and 1950.

Consciousness research became respectable when it was tied to research on the brain. This was assisted by several major technological advances in the 1970s and 1980s. Imaging technology enabled scientists to look at color-coded pictures of a subject's brain activity, the electron microscope allowed a more detailed look at neurons, and radioactive tracers enabled neural interconnections to be better defined. Additionally, biochemical techniques helped identify more than 100 chemical messengers in the brain. The underlying hope was that consciousness could be understood by studying our gray matter, a belief that is analogous to understanding music by disassembling a CD player.

Nevertheless, contemporary science has come to assume that consciousness is generated by the brain. The substrate for our memory is thought to be the complex pattern of networking among the brain's 100 billion neurons, each of which has an average of 50,000 connections with other neurons. During learning we select and reinforce specific connections and pathways in this network. Communication among neurons relies upon chemical messengers and electrical impulses between adjacent neurons. Since neurons in one person's head can't send messages via chemicals or electrical impulses to neurons of another person, the model doesn't allow for psi.

ANOTHER COPERNICAN REVOLUTION

We are on the verge of another scientific revolution because scientists can no longer ignore data that are shifting their paradigm away from the "neurocentric"

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model of consciousness. In fact, the greatest challenge to the current model comes from research on scientifically accepted phenomena that are raising questions with no easy answers. An example of such research concerns "the savant syndrome."

Savants demonstrate remarkable abilities that are not understood by conventional theories about consciousness and the functioning of the brain. These skills can appear and disappear suddenly and without explanation. Their skills are all the more remarkable because the savants lack the education and cognitive abilities normally associated with their talents. Many of these skills involve their amazing memories, which are so profound that they have difficulty forgetting anything.

Daniel Tammet, a 26-year-old autistic savant, can speak seven languages, recall the constant pi to 22,514 decimal places, and figure out cube roots as fast as a calculator. Kim Peek, the man on whom the movie *Rain Man* was based, can read two books simultaneously—one with each eye—and recite in detail the 7,600 books he has read. Leslie Lemke is a blind savant who played Tchaikovsky's Piano Concerto no. 1 after he heard it the first time. Like most musical savants, he never had a piano lesson. Stephen Wiltshire is an artistic savant who drew a highly accurate map of the London skyline from memory after a single helicopter trip. The twins in Oliver Sacks's book *The Man Who Mistook His Wife for a Hat* (Touchstone, 1998) amused themselves by calling out six-digit prime numbers that just appeared in their minds; they also had calendar-calculating skills that spanned over 8,000 years.

No one has understood how the savants perform their feats, but an important clue lies in the fact that the savant syndrome is vastly over-represented in autism. In fact, the savant syndrome is over 100 times more prevalent in autism than in other forms of mental retardation or mental illness; almost 10 percent of autistic individuals have some savant skill(s). What is it about autism, which otherwise severely impairs functioning, that can lead to such seemingly superhuman abilities?

One approach to answering this question has been to look at the second-by-second activity of brain regions in autistic subjects, using functional MRI (magnetic resonance imaging). In two studies, autistic individuals and IQ-matched controls were given identical memory and attention tasks. Both groups performed at equal levels, but they used different sections of their brains. The controls activated several areas of their left and right neocortices in an integrated fashion, whereas the autistic subjects preferentially activated a small portion of their right neocortex and/or both sides of their *visual* cortex.

What is the significance of these studies? The current model of brain functioning had led to the expectation that individuals with savant skills would have greater or more complex connectivity within their brains' circuitry. However, rather than having more connectivity, these studies show that they have less. In fact, *Rainman*'s Kim Peek has no corpus callosum, which is the band of fibers that connects the left and right brains. This may be why he is able to read two books simultaneously. Also, because the left brain inhibits the right brain through the corpus callosum, this finding suggests that savant skills might be assisted when the left brain can't interfere with the right brain.

Other evidence that damage to the neocortex—the evolutionarily newest region of our brain—assists savant abilities comes from another neuropsychiatric disorder: fronto-temporal dementia (FTD). Musical talents and artistic gifts have arisen *de novo* in patients with FTD who had no interest or talent in the arts prior to the deterioration of their frontal and temporal lobes.

More clues to the savant puzzle were provided by Temple Grandin, the high-functioning autistic professor of animal science who coauthored *Animals in Translation* (Scribner, 2004). The recent neuroimaging findings fit what she tells us about the inner experience of people with autism. For example, the preferential use of the visual cortex for processing information that was found in the studies is consistent with Grandin's description that she "thinks in pictures." Her statement that she doesn't "abstractify" the way nonautistic people do could be due to the underfunctioning of her neocortex. She states that when people think abstractly, they see what they expect to see rather than what actually is. They form concepts of reality and respond to those rather than consciously processing all of the details. Animals, for example, can use the subtle differences between trees to aid in their navigation. Humans generally just see "trees" and need to physically create their own trail markings in order not to get lost. The research findings on autism and savants have

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far-reaching implications, suggesting that we all have the capacity for savant-like abilities that we don't experience or develop because our neocortex gets in the way.

THE GHOST IN THE MACHINE

I've been collaborating with Ken Hennacy, a physicist with expertise on quantum mechanics and artificial intelligence, to create a new model for understanding savant abilities. Our model suggests that there are two modes of processing information within the human brain. The processing we are consciously aware of is what we call "classical." It is slow, linear, and capable of handling only a limited amount of information. It solves problems by using abstract concepts, relies upon neural network connectivity, and occurs in the neocortex. "Quantum" processing, by comparison, is extremely rapid, parallel, and capable of handling exponentially more information than classical processing, but it usually operates outside of conscious awareness. It takes place in all brain regions and becomes more evident when classical processing is turned down or off.

We chose the terms "classical" and "quantum" in reference to different branches of physics. However, the word "quantum" also refers to the quantum computers that are currently under development. Like the quantum processing in our brains, these supercomputers will capitalize on quantum mechanical principles. Their computational capacities will be exponentially greater than those of modern computers because the quantum wave function of their subatomic particles will enable a vast sea of values to participate in calculations simultaneously, rather than sequentially.

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Quantum processing in the brain could explain how savants perform calculations so rapidly and without their conscious awareness. It could also explain those abilities that appear to be related to psi. In order to understand these, one must include a discussion of the quantum phenomenon known as "entanglement." Physicists have found that two particles can be entangled, or capable of influencing one another instantaneously while separated at vast distances. Entanglement provides a means for consciousness to be coupled to other locations in space-time or for consciousness between individuals to be coupled—in short, a mechanism for telepathic communication.

The existence of free will may also be better understood by quantum processes. One criticism for the neural network model of consciousness is that the brain is portrayed as a biological machine. But what runs the machine? And is it possible for a machine to be conscious? Clearly something directs our thoughts and actions. We call that something "free will." But can we have free will in a machine? Some theorists have drawn a parallel between free will and what happens before and after measurement of the quantum wave function. In other words, before measurement an electron's location cannot be specified. Its location has to be represented as a wave of possibilities. This wave "collapses" after measurement into a discrete location. Thus, our conscious experience of the world may constitute the action of free will continually collapsing the quantum wave function into discrete experiences from a sea of possibilities.

LIVING IN A NONLOCAL REALITY

Our model of savant abilities suggests that our brains operate at two levels, the quantum and the classical. These two levels are no more exclusionary than classical (or Newtonian) physics and quantum mechanics. One major difference between them is that the forces in classical physics operate locally, whereas forces in quantum physics operate nonlocally. Both types of forces operate in our brains, which is why our brains can process consciousness both locally and nonlocally. Some people have conditions such as autism that shift the balance between local and nonlocal processes by knocking out the functioning of the neocortex. The rest of us can decrease this classical dominance by such mind-quieting practices as meditation. Hence, as we become more consciously aware or awake, we use nonlocal processes more and more. Along the way, we will progressively see the world less abstractly. We will see it more as it really is.

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