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NOVEMBER 2007

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{ PERSON OF THE YEAR }



BRAIN

STORM

**Richard Davidson wants you
to free your will, change your
brain, and take a journey to
the center of your mind**

BY FRANK BURES

PORTRAIT BY MARTHA BUSSE



The building is locked. Most of the windows are dark. But in a small room on the first floor of the Waisman Center, a group of four is gathered around Richard Davidson. It's 8:30 p.m., and most people are at home letting their own minds unwind, trying to slough off a day's work. But Davidson has shown up in the night to have his brains scanned, to have his mind read. ¶ Actually, he's

here to read his own mind. ¶ The room is lined with computer screens, and there is a small window that looks into the next room to the giant white MRI machine, which pulls mountains of data out of people's brains. The four scientists are here to run the programs and sort through that data, mining it for nuggets of scientific gold. ¶ "So, what are we doing?" Davidson asks crisply. He's dressed in jeans and a plaid shirt, as if this were no big deal to be here, peering into his own brain. ¶ Drew Fox, one of the project coordinators, explains how they are going to run a program they call the "amygdalizer," where Davidson will go into the MRI and stare at disturbing, distorted photos so they can locate his "amygdala," which is activated by fear and surprise. Once they find it, Davidson will watch his amygdala activity on a graph. Then he will try to tone it down, to control it, to rule it instead of being ruled by it. It is a pilot project. It is something that has never been done before. ¶ "All right," Davidson says. "Are we ready?"

Everyone nods, so Davidson slips off his Birkenstocks, takes off his belt (so the 3-Tesla magnet won't rip it off) and walks into the other room, where he lies down on the table and gets strapped in so tight that he can't move—even two millimeters could ruin the whole project. He crosses his legs, rests his arms on his stomach. Then, slowly, the table slides into the middle of the machine, where his head is centered and his face is fitted with goggles in which he will watch the images. "Everything okay?" one of the scientists asks over the speaker.

"Everything's fine," Davidson says. His voice comes back calm. On the screen, his eyes blink, then stare ahead as the experiment begins.



Richard Davidson has

known all along this is what he wanted to do. Years before he came to Madison. Years before there was such a thing as an MRI. Years before he'd been chosen as one of *Time* magazine's one hundred most influential people or had been summoned to present his work to the Nobel Committee. Years before any of these things, a very young Richie Davidson knew he wanted to understand what

goes on in our heads.

"I was fascinated by the mind," Davidson says now, "and I knew that the key to happiness, to creating a better world, was through transforming the mind. I had that conviction from early on. When I was in high school, I began reading extensively in these areas. And it became apparent to me that the way to understand the mind, in the West, is through the brain."

So while Davidson's classmates were reading comic books, he was reading about the brain and volunteering at a local hospital's sleep lab, doing crude EEG readings on the only machine available to read the human brain's tiny electric signals.

PHOTO COURTESY OF MATTHIEU RICARD



BRAIN TRUST: (Left) Davidson has been studying the science of the mind with Buddhist monks, including the Dalai Lama, for fifteen years. (Right) The professor lectures on brain imaging and behavior.

“When I met him,” says Susan Davidson, his wife of more than thirty years and a perinatologist at St. Mary’s Hospital, “he’d already been cleaning electrodes in a lab line since the age of fourteen.”

That meeting was in 1968, when the two seventeen-year-olds showed up at New York University Heights as freshmen, and started dating. But Richie’s scientific acumen and curiosity were no match for the fact that Richie had been a speedskater.

“We grew up very close to each other,” she says, “and when I heard he was on the Brooklyn Blades, I was like, ‘Oh, wow!’”

In college, Richie Davidson glided through his courses almost as fast as he’d skated. He finished his undergrad work by the time he was twenty, when he and Susan moved to Boston so that he couldn’t roll at Harvard. He finished his Ph.D. by the time he was twenty-four.

“One thing I remember about Richie from graduate school,” says Dan Goleman, the best-selling author of *Emotional Intelligence* and a friend of Davidson’s from Harvard, “was that doing my dissertation was one of the most diffi-

cult things I’ve ever done. It went on forever, and was just agony. Then Richie polished his off in about three weeks, then he published it as an article. I think he’s kind of a scientist-savant. I think he was born to be at the top of the field.”

(Actually, Davidson says, it only took him sixteen days.)

But after graduate school, Davidson did hit some rough ice, as he sent out applications and went to interviews, only to find that no one would hire him.



Today it’s become one of the hottest areas of brain research in the world. But in the end, the creation of a new field of science may not be Davidson’s biggest achievement. That will be something else entirely.

“People would have him out for job talks,” Susan recalls, “and they’d go, ‘Wow, you’re really interesting, but you’re too clinical for our physiological line, or you’re too physiological for our cognitive line, and you’re too this for our that.’ Nobody wanted to commit their line that they had to him, because he didn’t fit neatly into any box.”

Eventually, Davidson found a university—State University of New York—Purchase—that was just starting up, and just building its lab and its psychology department, so he could basically build his own box and fill it with EEG machines. It was there that Davidson did some of his pioneering work, which found that certain parts of the brain were specially linked to positive and negative emotions.

This was something of a revelation. Until then, no one thought about the human brain’s role in emotions. In fact, the entire field of cognitive neuroscience saw the mind as a cold, calculating machine. It only dealt with memory, language, reasoning and other logical faculties. This discrepancy would later lead Davidson to call for the creation of a whole new field called “affective neuroscience.”

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These are strange times.

Anxious times. For many of us, these are depressing times. We find ourselves sad and lonely and feel as if there’s nothing we can do about it, short of going to a doctor and tweaking our biochemistry.

It is a creeping sensation that started in the nineties, and has grown since then. It may have started with the invention of Prozac, an amazing drug that could cure the seemingly incurable: clinical depression. Its discovery was revolutionary, and to the casual observer held a simple lesson: Your brain is chemical, and if the chemicals are wrong, you have to fix it with more chemicals. It gave us the sense that we are not in control of our own minds.

On top of this came the growing domi-

nance of evolutionary science, and the apparent location of many obscure human behaviors deep in our evolutionary past. From stereovision to basic morality to our taste for fat, everything seemed to have its root in some ancient purpose for a world that had disappeared.

Then there was genetics—the code, the plan for how everything should unfold, the blueprint for the human being. When the code was sequenced, it seemed as if all of our secrets would soon be laid bare.

Taken together, these developments have given us a sense of helplessness, a feeling that we are hostage to our genes, to our chemistry and to our past.

“A lot of the media descriptions of neuroscience research, and lay people’s understanding of this work, lead them to a kind

“Whether you look at mental illness or even something like discontent and unhappiness the research just keeps chipping away at the idea that any of that is set in stone.”

—Sharon Begley

of deterministic viewpoint,” says Davidson, “particularly in light of genetic research, and the thought that we’re all genetically predetermined, that there are all kinds of predispositions to illness, and it’s really out of our hands.”

“In my view, the rigorous, hard-nosed, neuroscientific research could not paint a more different picture.”

Davidson is one of a handful of scientists whose work is overturning this conventional wisdom, and shedding light on what is called neuroplasticity, the fact that the brain is much more flexible, adaptable, and trainable than anyone had ever thought.

Sharon Begley is a science columnist for Newsweek and author of the best-selling book *Train Your Mind, Change Your Brain*, which features a chapter on Davidson’s work.

“Anyone who believes in what’s called ‘neurogenetic determinism’ is like a polar bear on a shrinking ice floe,” says Begley. “There’s just less and less ground to stand on. Whether you look at mental illness or even something like discontent and unhappiness, the research just keeps chipping away at the idea that any of that is set in stone.”

Much of our “hardwiring” isn’t so hard after all, this research shows. And just because your brain *is* doing something doesn’t mean that’s what your brain *must* do. This is one of the things Davidson has been showing in his lab over and over.

“We have far more control over our well-being, over how we respond to the world, than a simplistic, deterministic view would permit,” says Davidson. “This work leaves us with a much more hopeful and optimistic message. It also places more responsibility on us. In some sense, this work is really a call for us to take ownership over our own minds.

“We have an extraordinary ability to transform our minds, if we so choose.”



Richie Davidson’s first glimpse of the ability came years ago, long before he came to Madison, and very far from any laboratory. It was high in the mountains of northern India, where he and his then-girlfriend, Susan, were on a meditation retreat.

For two weeks, they peered into their thoughts and emotions in silence (except for the whispered rumors about Nixon’s resignation) before coming back to the rigid, scientific world of Harvard, circa 1974. Because even though Davidson had witnessed firsthand the mind’s power to reshape itself through training, it would be years before he could turn to this as a legitimate topic of research. Instead, after taking a good look at his equipment, at the means for investigating the mind, at the mood of the times and at the climate in the scientific community, Davidson decided to keep his head down and stay on what looked like the most promising track: his work on emotion and the brain.

So he went about his business collecting data on his EEG machine, discovering how asymmetrical the brain is, and laying the groundwork for the establishment of the

field of affective neuroscience. He and Susan moved to Madison in 1985 with their daughter Amelie (they would soon have a son, Seth), and Davidson was made associate professor of psychology. Once here, he began to build what would become one of the most important and productive brain research programs in the world.

But when he wasn't busy with his work on the emotional brain, Davidson was still meditating on his own, still thinking about the mind, still remembering his time in India, and wondering what discoveries lay along that path.

Then one day in 1992, Davidson got a fax from the Dalai Lama, who had heard about his work on positive emotions. The letter invited Davidson to Dharamsala, India, to investigate the brains of long-term meditators. At first, he didn't think it was for real, but he investigated and sure enough, it was a real fax from the real Dalai Lama, the exiled spiritual and political leader of Tibet. He'd caught wind of Davidson's work through the Mind & Life Institute, a collaboration of brain scientists and Buddhists looking at implications of the new science of the mind.

Davidson accepted the invitation and organized a trip to India with two other neuroscientists. They lugged along heavy brain-scanning equipment, but didn't have much luck: Not many of the monks could see the use for Davidson's science. In the end, the group did manage to convince one monk to come back to Madison for some testing. The amount of data they got wasn't much. But it was a beginning.

"It was clear to me that that was the time to come out of the closet with my interest in this area," Davidson says. "By then I had already had a very successful academic career and had won numerous awards for my basic research, so I didn't have to worry about my credibility. Rather I felt that I could harness that credibility to effectively change the scientific view toward this whole area."

After that, Davidson became more deeply involved with the Mind & Life Institute. The group holds frequent meetings to discuss the state of this research, and at the 2000 meeting in Dharamsala, when the Dalai Lama began peppering Davidson with questions about how the machines like MRI and EEG work, Davidson invited him to come see for himself. The following year,

he did, and after that visit, a parade of robed monks began making their way to Madison, to Davidson's lab, where scientists tried to find differences in their brains and see if their years of mental training had had physical effects.

One of those monks whose brain was examined was Matthieu Ricard, a French-born Buddhist monk who has lived in the Himalayas for thirty-five years (and who has a Ph.D. in genetics). He's been a key player in the monk experiments. In an interview from France, he had only good things to say about Davidson and the work being done in his lab.

"On a personal level, Richie really stands out as such a remarkable person," says Ricard. "He is so incredibly kind, and polite, and always trying to see the constructive aspects of things and emphasize what will move us toward a more compassionate society."

"At the same time, the rigor! He doesn't jump to conclusions. When I come to the lab and we get some exciting things, and I think, 'Oh, that's really good!' and I expect there will be a paper after a few weeks. But it takes years, because he really wants robust and solid analyses."

What those analyses have shown has been startling. They have found that meditation can increase activity in areas of the brain associated with happiness; that long-term meditators have increased "gamma waves" in their brains; that meditation can increase your attention span and help your immune system. It is a body of work that rivals and may eclipse Davidson's earlier work on the emotional brain. Besides, Davidson has continued that earlier research and made many discoveries there, too: Asthma is as much a disease of the mind as of the lungs; positive emotions boost your immune system; the amygdala plays a large role in autism; clinically depressed brains react differently to negative situations; and so on.

This shee volume of work coming out of Davidson's office, and the Waisman Center, is amazing to see, as is the fact that the two phases of his research are now coming together and intertwining to show not only how important positive emotions are, but that they are not fixed, and that with mental training, we can change our own emotional brain patterns. It is a synthesis that not many scientists would have been able

to achieve.

"Richie's doing about ten times more than anyone else," says Joe Newman, chair of the UW-Madison Department of Psychology. "He has this incredible energy, where he reads everything and knows everything and stays abreast of everything. And a lot of us learn about these things through Richie, because we don't have the energy to do what he does. Not only can most of us not keep up with all these developments in the field, we can't even keep up with just what Richie's doing."

"We're very fortunate to have Richie here at Wisconsin. He could be at any university he wanted to be," says Davidson's colleague and collaborator in the psychiatry department, Ned Kalin. He is referring, no doubt, to Harvard's 1998 attempt to recruit Davidson by giving him a named-chair position. But there is another reason Kalin is glad to have him around: "His work is at the point where it can have a true impact on people's lives."

"He's got a very rare set of qualities," says Mind & Life Institute director Adam Engle, who has worked with Davidson since the early 1990s. "He's visionary. He's brilliant. He's compassionate and kind. And he's a very, very good scientist. And what he's done attests to all that."

But what he's done isn't immediately clear when you first glance over his 87-page curriculum vitae. Instead, it seeps up through the details, much as it will seep into our society: Davidson is helping to give us the tools to take back our minds from those who took them away, who would have left us washed up on history's shore, covered in neurological barnacles.

No one is denying the power of evolution. No one is denying that *Homo sapiens* have adapted to live in the world. But what is being denied is the assumption that our ability to change ceased eons ago. Humans are not like other creatures: our most powerful evolutionary adaptation is precisely the ability to change. Our brains are dynamic, alive, shifting, and with effort and input, can be pushed in the direction we choose.

"The brain is the organ that is built to change in response to experience more than any other organ," Davidson says. "It is built to learn. It's a learning machine. Structurally and functionally it changes as a function of new information and new learn-

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ing. It forms new connections. It grows new cells. All of this work is very, very new and it provides an understanding of the mechanisms by which self-regulation, training through meditation, and other kinds of strategies involve changing the brain.”

Again, in plain English?

“This is really a case for the exercise of a certain kind of free will, which we can use to change our minds, and thereby change our brains.”

If our brains can change, we can change. Our moods—good and bad—are not due to the Fates. They are states. They’re learned patterns. Davidson calls them skills.

The implications of these discoveries will be far-reaching. They will be social, because people will have to take more responsibility for the lives they build around them. They will be political, because if the individual can change, society can change. They will be personal, because we will all have more say over (and responsibility for) our lives, our minds and our happiness.

It will not be easy—real change never is. And there are limits, caveats. Like a good

scientist, Davidson always hedges his statements, careful not to overreach. But there doesn’t seem to be any way around the fact that a big change is in the air.

“What my work suggests,” says Davidson, “is that our capacity to experience free will is a skill that can, to some extent, be enhanced through training.”

In other words, it’s up to you to free your will.



And so here we are, at the

Waisman Center, watching Richie Davidson through the window as he lies in the center of the MRI machine at the heart of the ten-million-dollar laboratory he’s built.

“Are we ready with the amygdalizer?” asks one of the scientists.

“Sure,” answers another.

“Okay, we’re going to start.”

“Three...two...one...”

There is a loud rattling noise as the wire coils start spinning and the machine hums to life. Through the window, we can see Davidson lying as still as a corpse. But that stillness beliesthe struggle going on. On the

screen, we can see his brain, and a graph that shows the activity of his amygdala. It spikes upward, and then we watch as Davidson wrestles it down, working to control it, to increase his ability to master it, to bend it to his will. Up and down it goes, again and again.

Around 10:30 p.m., after two hours on his back, Davidson emerges from the machine. He looks refreshed, relaxed, like he just went for a run. And though it’s late, and everyone is tired, there is an air of excitement. Because we know that this is the edge—the cutting edge—of our knowledge of our brains and ourselves.

“So,” one of the scientists says to Davidson as he slips his sandals back on, “That was your first taste of seeing your brain.”

Davidson smiles a far-off smile, as if there were more to say, as if he has seen something in the distance that pleases him, a promise of something that someday we will all see for ourselves.

Smiling, he nods, and says simply, “Very cool.”

Frank Bures is a contributing writer for *Madison Magazine*.

