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"Keep taking the meditation (Part 1)"
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By Kim Zetter

Can simply tuning out the world on a regular basis make you healthier, happier and calmer? Adherents of meditation say absolutely, but science still needs convincing. Now, an intriguing study into the mind of a monk might provide the proof.

He wore crimson and saffron robes and sported a shiny, shaved scalp like many of his Tibetan counterparts at the Shechen Monastery in Nepal. But the monk being tucked into the claustrophobic tube of the University of Wisconsin's functional magnetic resonance imaging machine (fMRI) was no stranger to a science lab.

Matthieu Ricard - aka Öser in his role as an anonymous test subject for these unique experiments - was a renowned molecular biologist with a PhD in cell genetics from the Institut Pasteur in Paris. But that was before he embarked on the Buddha path 36 years ago and traded in his lab coat for holy raiment and a string of mala beads.

Now, as a team of scientists and technicians settled behind a bank of computers, Ricard was being asked to tune out his audience of academics, as well as the persistent whirr of the electronic imager, and slip into something more comfortable - a quiet, meditative state.

Over three hours, as Ricard dutifully alternated between periods of meditation and rest, the fMRI recorded video images of the activity in his brain. It was the first time scientists had peered so extensively into the mind of a meditating monk. What they discovered has been causing them to rethink the workings of the human brain and its ability to be rewired for health and happiness.

Led by Dr Richard Davidson, director of the Laboratory for Affective Neuroscience at the University of Wisconsin, the fMRI tests with Ricard involved various types of meditation.

While engaged in what Buddhists call compassion meditation, in which the meditator focuses on compassionate thoughts for a specific individual or all of mankind, Ricard showed very high levels of activity in the left prefrontal cortex of his brain (just inside the forehead).

The prefrontal cortexes are significant players in the regulation of emotions. In previous tests, Davidson had established that people who exhibit a higher ratio of persistent activity in the left prefrontal cortex - an area associated with feelings of joy, happiness and enthusiasm - have happier temperaments and tend to bounce back quickly from negative events. Those who have a higher ratio of activity in the right prefrontal cortex are more prone to anxiety, fear, sadness and depression.

Most people fall into the middle ground.

In a bell curve of subjects Davidson had previously tested, 67 per cent were moderately happy people, while 33 per cent were on the extreme side of either happy or unhappy.

But the degree to which the monk's left brain lit up far surpassed anyone Davidson had measured to date. His happiness level was, as a Davidson colleague later remarked, "off the chart". Even when he was not meditating, his left prefrontal cortex lit up consistently.

Not long ago, scientists declared that people have a preset capacity for happiness, which is determined by biology and changes little whether a person wins the lottery or experiences a debilitating accident. If someone is prone to unhappiness and has more activity in their right prefrontal cortex, winning the lottery might temporarily spike activity in the left cortex, but it won't tip them into the company of happier, left-brain people in the long run.

But Davidson's tests seem to indicate that happiness isn't as static as previously believed.

A significant step towards a scientific understanding of meditation was taken three years ago, during a series of extraordinary meetings in Dharamsala, India, between the Dalai Lama and a group of Western scientists and philosophers, including Richard Davidson and Owen Flanagan, professor of philosophy at Duke University in North Carolina.

For five days, the Tibetan leader held discussions with select experts in psychology, philosophy and neuroscience to examine what science could learn about the mind and body, particularly emotions, from Buddhism's 2500-year tradition of meditation.

It has long been accepted in Eastern cultures that the mind and body are intricately connected. Centuries of anecdotal evidence back Buddhist beliefs that the state of the mind has a direct effect on physical health. In Tibetan medicine, two of the most important factors affecting a patient's ability to heal are the mindset of the doctor and the mindset of the patient.

But scientists are loath to accept findings not substantiated in a lab. So the Dalai Lama presented his guests with a challenge: to scientifically prove that meditation has medical and emotional benefits, and then to divorce it from its spiritual roots to make it accessible to non-Buddhists.

His aim was to offer the world a practical and secular method for relieving suffering and finding happiness. But remarkably, one of the world's most important spiritual leaders also said that should science disprove the benefits of meditation, he would be willing to rethink thousands of years of Buddhist tradition.

"If science proves facts that conflict with Buddhist understanding, Buddhism must change accordingly," he said. "We should always adopt a view that accords with the facts."

The result of the meeting has been a series of sophisticated experiments mapping the meditating mind, which have delivered a number of surprises - even for the monks. Some of the findings appear in a new book called Destructive Emotions: A Scientific Dialogue with the Dalai Lama by Daniel Goleman. Others will be explored at a conference between scientists, students and the Dalai Lama at the Massachusetts Institute of Technology next month.

What preliminary tests show is that as well as helping people manage destructive emotions like anger, hatred and jealousy, meditation may have startling effects on the brain's plasticity - its ability to be moulded or rewired by experience.

It's interesting to note that it was compassionate thoughts that launched Matthieu Ricard into an especially good mood. Despite being encased in the fMRI for hours, Goleman reports that Ricard emerged from the gruelling tests beaming and refreshed.

Anyone who has ever performed volunteer work or assisted a friend in need can attest that being compassionate makes you feel good. Buddhists have long stated that compassion first benefits the person giving it. Now the pictures of Ricard's brain seemed to prove it.

But none of this explained why Ricard was such an extremely happy camper.

Was it possible, as Daniel Goleman posed in his book, that years of meditation had shifted the monk's emotional setting to make him happier and less flappable than the average person? Or was his left-brain activity the result of an exceedingly happy temperament gifted to him at birth? Was Ricard just an exception?

Or, another possibility: was it simply the logical outcome of living the sort of stress-free lifestyle that only monks and other people in similarly sequestered communities have?

As Owen Flanagan's 17-year-old son, who accompanied him to Dharamsala, put it, "Dad, if I wasn't married and didn't have any teenage children, I'd be happy, too."

To rule out that years of meditation in a closed community were needed to experience positive effects, Richard Davidson conducted an eight-week meditation study with 25 workers at Promega, a biotech firm in Wisconsin. Prior to the study, the workers, who ranged in age from 23 to 56, exhibited high levels of right-brain activity and reported feeling stressed-out and unhappy with their jobs. But after eight weeks of meditation training and practice, the activity in the left side of their brains increased significantly, and the workers reported feeling happier, with a renewed sense of enthusiasm for their life and work. Four weeks later, the meditators still showed elevated left-brain activity. The control group showed no change.

While more long-term tests are needed to eliminate other factors that might have contributed to the workers' elevated moods, scientists are postulating that with prolonged practice, meditation could alter a person's emotional setting so that a positive state of mind could become their emotional default.

The theory goes like this. Whenever we experience emotions, we exercise parts of our brain that correspond to those emotions and build a pattern of circuitry in neural connections. As the same emotions repeat, the circuitry associated with them strengthens. Like a river cutting a path through a gorge, the circuitry etches pathways in the brain that, over time, become our default pattern of emotion or temperament. If we experience strong negative emotions without equally positive ones, the negative ones will dominate, and will show up as increased activity in the right side of the brain.

But Davidson's early research suggests that, just as exercise strengthens muscles, meditation can strengthen the parts of the brain that calm anger and fear and elicit happiness. And, unlike pleasant activities like dancing that result in temporary mood changes, meditation has a cumulative effect over time so that the depth of negative emotions becomes much shallower.

Should this hypothesis turn out to be true, meditation could help tip the balance for patients who are prone to depression. In fact, tests on patients who suffered recurring bouts of major depression showed that meditation substantially reduced the risk of relapse from 66 per cent to 37 per cent.

But negative emotions don't just affect our happiness and moods, they may also affect our health. The prefrontal lobes, along with two other areas of the brain that play crucial roles in the initiation of emotions - the amygdala and the hippocampus - are closely tied to blood pressure, hormones and the immune system.

So Davidson conducted an additional test with the Promega workers by giving them influenza vaccinations after their initial eight-week meditation course. When he later tested their blood for flu antibodies, the meditation group had significantly larger amounts of the infection-fighting protein, indicating a more robust immune system. Those subjects who exhibited greater increases in left prefrontal activity after meditation also had the highest levels of antibodies in their blood.

The tests with Matthieu Ricard do not represent the first time science has studied meditating monks with the aim of divining medical benefits. In the 1980s, Harvard Medical School cardiologist Herbert Benson, with the Dalai Lama's help, conducted now-famous tests on monks in India.

While engaged in a meditation called g-tummo, in a room where the temperature was 4°C, sheets chilled in 9°C water were draped over the monks' shoulders. Instead of shivering uncontrollably as you might expect them to do, the monks generated increased body heat to dry the sheets. Other monks were able to lower their metabolic rate by 64 per cent, a remarkable change given that metabolism drops only 10 to 15 per cent during sleep.

Earlier, in 1975, Benson had written the best-selling book The Relaxation Response based on research into transcendental meditation (TM) and other forms of contemplative practice, which showed meditation's effectiveness in treating stress and high blood pressure.

Benson agreed to explore the effects of TM after a group of TM practitioners urged him to do so in the 1970s. In addition to discovering the physical benefits of TM, he also discovered that contemplative practices in scores of other cultures evoked the same physiological responses. These included decreases in metabolism, heart and breathing rates and blood pressure, accompanied by alpha brainwaves (lower frequency brainwaves that occur during relaxation) and feelings of wellbeing.

All of these physiological changes are in direct contrast to the "fight or flight" response that occurs when we're under stress. When that happens, pupils dilate, heart and breathing rates increase, and stress chemicals like cortisol and norepinephrine are released to prepare the body for a physical response to threats.

The danger of stress hormones is that when no physical response occurs to release them, they build up and can undermine the nervous and immune systems or lead to other health problems like high blood pressure, heart disease, irritable bowel syndrome, rheumatoid arthritis, lupus and skin conditions.

What Benson discovered was that all types of repetitive prayer or movement - saying the rosary in Catholicism, the centring prayer in Protestantism, or davening in Judaism (which involves rocking to and fro while reciting prayers) - produced the same physical changes as TM. So did focused yoga, tai chi, qigong, chanting, the presuggestive stage of hypnosis and even the concentrated rhythmic beating of a drum.

So Benson extracted two steps common to all of them and created his relaxation technique. It involves repeating a word, phrase, prayer, sound or even a movement (a good alternative, he says, for children with attention deficit disorder) and then disregarding any thoughts that arise, in order to return focus to the word or activity. Although similar to Buddhist meditation, which involves focusing on the in and out breath while disregarding thoughts that arise, the relaxation technique is a distilled form of meditation that is designed to achieve medical benefits rather than spiritual insight.

Proponents believe that practising the technique 15 to 20 minutes once or twice a day can help patients reduce stress and high blood pressure and help treat a variety of illnesses and disorders, from heart disease to impotence, PMT to ADD. It has also been used to counter the side effects of chemotherapy. And workers at ground zero at the World Trade Centre were taught the technique to help them cope with their gruesome task.

Recently, Benson discovered the reason the technique relieves stress and high blood pressure: it stimulates the release of nitric oxide in the body, which is a counteragent to the hormone

norepinephrine. Norepinephrine constricts blood vessels when we're under stress. But nitric oxide dilates those vessels and restores blood flow. When stress builds up, however, the release of nitric oxide is impeded. Nitric oxide is also linked to the production of endorphins and other body chemicals that counter pain and produce feelings of wellbeing. (It's a key factor in erections, too. Without it, blood flow to the penis is restricted.)

While the tests on Ricard endeavour to discover the benefits of long-term intensive meditation on the mind and body, the advantage of Benson's relaxation technique is that it can help even people who do not meditate rigorously.

Paul Ekman, a psychologist at the University of California San Francisco, calls Buddhists "gymnasts of the mind". Like Benson, he suggests that we can greatly benefit from the mental techniques they can teach us.

Ekman, a world expert on the science of emotion and nonverbal communication, also participated in the Dharamsala talks. He spent decades pioneering the study of facial expressions among Western populations and African tribes at a time when no one believed such studies could be useful. Eventually he ended up training police and FBI forces in reading the faces of criminal suspects.

He's met thousands of people during his nearly 50-year career, but says the Dalai Lama changed his notion of "what human beings are capable of being".

"It's amazing how much enjoyment Buddhists have and how much humour they see in the world," Ekman says. "That sort of distresses people, seeing them having such a good time."

A self-claimed "Buddhist virgin" prior to the meetings in India, Ekman says he had no interest in attending the gathering but went because his daughter was interested in the Free Tibet movement and wanted to meet the Dalai Lama.

After reading a few of the Dalai Lama's books, he found remarkable convergences with his own studies. This led him to launch a series of tests with Ricard - both he and Davidson met the monk in Dharamsala - which delivered intriguing results.

Buddhists maintain that meditation produces greater self-control and helps cultivate an internal calmness and happiness that are our natural state, underneath layers of emotional combustion and mind chatter. Through persistent practice, meditators free themselves from the grip of destructive emotions and face challenges with greater equanimity.

Ekman was interested in testing the unflappability of Buddhist monks, so he put Ricard through a series of tests to measure his startle reflex.

The startle reflex is an automatic response to loud noise that every person exhibits, regardless of their day-to-day exposure to noise. While everyone's face contracts the same way in the reflex, Ekman says, the degree of reaction differs, as do the corresponding heart and blood-pressure rates.

Ekman says how a person reacts to startling noise is a reliable indicator of how strongly they experience negative emotions. A person who reacts intensely and whose heart and breath take longer to return to normal rates is more prone to strong feelings of anger and sadness.

To measure Ricard's response, testers told him they would count from 10 to zero, then set off a gunshot or firecracker sound in his ear to which he should not react.

In previous tests with 5000 subjects, no one could suppress a reaction to the noise. But Ricard showed no reaction during one meditation session, though his heart rate and blood pressure did increase mildly. During another session, he showed only slight facial expression, while his heart rate and blood pressure remained the same. Meditation had, Ricard later told Daniel Goleman, made the gunshot seem to his mind as neutral as "a bird crossing the sky".

It's just this type of equanimity and self-control that prompted authorities at India's largest prison to teach meditation to inmates. In 1994, the inspector-general of the prison (which has some 9000 inmates) initiated a 10-day Vipassana meditation course, aimed at reducing inmate violence and recidivism by giving prisoners coping mechanisms for destructive emotions and impulses.

Vipassana can be a particularly intense Buddhist meditation, designed to give the meditator deep insight into the mind and body. It's generally taught at 10-day silent retreats that involve up to 12 hours of meditation daily, as well as adherence to a vegetarian diet. After that, practitioners are encouraged to meditate an hour each morning and evening.

Paul Ekman calls doing a Vipassana course and quitting smoking "the two hardest things I've ever done in my life".

The 1000 participating inmates in the prison course included many violent offenders, charged with rape, murder, drug trafficking and terrorist activity. After meditating for 10 days in a giant tent erected at the prison, the results were better than anyone expected.

One inmate who received his release papers before the course ended refused to leave until he had finished. Many prisoners reported losing their anger and their desire for revenge against enemies. And, as the documentary Doing Time, Doing Vipassana recorded, some were so affected by the experience that they fell weeping into the arms of their guards.

In the end, violence decreased in the prison overall and relations between guards and prisoners became more harmonious.

The success in India prompted the National Institutes of Health in the US to fund a recent University of Washington study at a jail near Seattle. Inmates were repeat offenders who had significant drug and alcohol problems, and in many cases mental disorders, too. Researchers conducted a controlled study to determine if Vipassana could reduce recidivism as well as drug and alcohol use.

Three months after their release from prison, the meditation inmates showed significant reductions in alcohol-related problems as well as the use of marijuana, heroin and crack cocaine. Inmates reported feeling less depressed and said they felt greater control over their destructive impulses. Two years after their release, their recidivism rate was 56 per cent, compared with 75 per cent for the control group.

While scientists are encouraged by the results of the recent tests on monks, Ekman says the work to determine the value of meditation is just beginning.

"If you really want to find out what are the benefits of long-term meditation, then you have to study people before they started meditating and follow them for 20 or 30 years," he says. "I think there are things we can learn from Buddhist practices. But you have to evaluate them rigorously."

The results that scientists found with Matthieu Ricard have to be repeated with other monks. And so far this hasn't happened, at least not in the tests that Ekman engineered. A second monk with the same amount of spiritual training as Ricard failed to exhibit similar results in the startle test. Ekman says a few factors could have contributed to these results, but he's reluctant to discuss them until

more controlled tests are performed.

Owen Flanagan of Duke University has written about Davidson's findings in New Scientist magazine. An author of books on the nature of consciousness, Flanagan practises meditation himself, but he thinks that, to determine the practical benefits of long-term meditation for people who aren't likely to adopt the monkish lifestyle, studies will have to focus on testing more non-monks as well. Ultimately he's sceptical that meditation will prove to be the only cause of happiness in monks.

"I think if we find out that [Buddhist monks] as a group are happier, it's not going to have much to do with meditation," Flanagan says. He thinks it will be to do with their entire lifestyle. "Studying monks or nuns who live in a cave is not going to be very helpful to us, because most of us are not going to live like that."

While the recent tests have raised more questions than they have answered, Paul Ekman is encouraged that the questions are even being asked. Although he has come around to acknowledging the legitimacy of meditation as a worthy area for scientific study, many of his colleagues still regard it much the way he did before meeting the
Dalai Lama.

"Most scientists I've spoken to think it's pretty flaky - this idea that there's something to be learned from Buddhism - and that [the results are] probably all in our imagination."

But Ekman doesn't mind. "Everybody thought I was crazy for doing the research on facial expression 30 years ago. Margaret Mead told me I was wasting my time," he says.

Of course, as far as the monks sitting in caves or on mountaintops are concerned, wasting time is precisely the point.

Om, what a feeling...

Loosely defined, meditation is a method of mental training that involves focused attention for the purpose of spiritual development or self-actualisation. There are two main schools of meditation: transcendental meditation, which came out of India and was popularised by the Hindu monk Maharishi Mahesh Yogi; and Vipassana, which was developed by Buddha.

In TM, which is sometimes called mantra meditation, practitioners sit for 15 to 20 minutes twice a day, usually with their eyes closed and hands loosely in their lap, while they turn their attention inward and repeat a mantra. The main purpose of the technique is to get the thinking, active mind to quieten down so that a restful state can emerge. TM practitioners say they develop better concentration and memory and become more creative and self-confident.

The downside of TM is its history. Its cult-like leader, the Maharishi, trademarked the TM name and charged students hundreds of dollars to learn the technique and obtain a personal mantra.

In Vipassana, also called mindfulness or insight meditation, practitioners usually sit for at least an hour a day and focus on the in and out movement of their breath. Mindfulness meditation is designed to help meditators see clearly the patterns of their mind by slowing down thought processes so they can be observed rather than acted on. Through this process of sustained self-observation, meditators cultivate insight into their thoughts, emotions and actions.

During the 10-day retreats at which it is taught, students are prohibited from speaking (inner dialogue is discouraged as well), reading, watching TV, having sex, or doing anything else that would distract them from the focused attention they are supposed to be cultivating.

While the process can be excruciating, most practitioners say they emerge feeling a sense of inner balance and a greater sense of control over their emotions.

- Kim Zetter

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