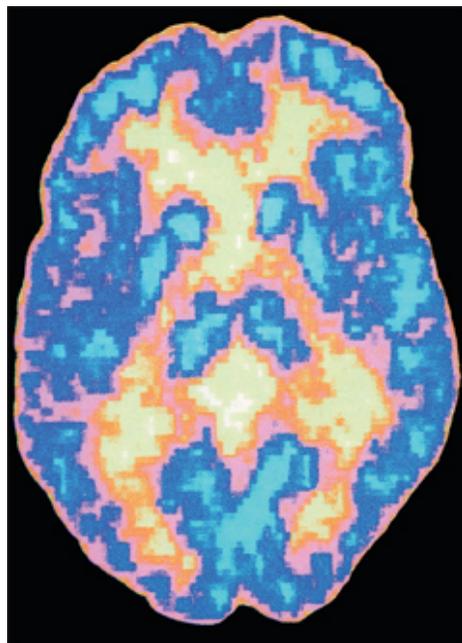


# This Is Your Brain On Zen

Zenshin Michael Haederle looks inside the meditating mind.

By Zenshin Michael Haederle FALL 2009

The brightly colored slide projected on the screen shows a PET (positron emission tomography) scan of the brain of someone in a deeply relaxed meditative state. It's a safe bet that few of the nearly 100 people gathered in the adobe zendo at Santa Fe's Upaya Zen Center fully understand what they're seeing, but they're rapt nevertheless. The speaker, a distinguished-looking silver-haired man wearing gray samue—Zen work clothes—uses a laser pointer to highlight the pattern of heightened activity on the brain's right side. He waits a beat before delivering the punch line: "This is an image of the speaker's brain from two decades ago."



A PET Scan of Dr. James H. Austin's brain during meditation. Courtesy James H. Austin

Everyone laughs appreciatively. But the revelation should come as no surprise for many who have come to hear Dr. James H. Austin, a retired academic neurologist and longtime Zen practitioner. Austin has been building a bridge between his two loves for years, investigating the neural correlates of Zen experience. In 1998 he published *Zen and the Brain: Toward an Understanding of Meditation and Consciousness*, an 868-page tour de force of explanatory neurology interlaced with personal accounts from his own decades of Zen training. The book was a hit for the MIT Press, selling close to 40,000 copies, and was followed in 2006 by *Zen-Brain Reflections*, noticeably slimmer at 614 pages. Now Austin is back with *Selfless Insight: Zen and the Meditative Transformations of Consciousness*, published last March: it specifically examines the Zen experience of no-self in a mere 352 pages.

Even without his other publications, including a book on creativity, it's a prodigious output for an 84-year-old who dictates his manuscripts or writes them out longhand, eschews email, and does all his online research in a university library near his home in Columbia, Missouri. (He's an

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emeritus professor of neurology at the University of Colorado Health Sciences Center in Denver.) Boundlessly curious, Austin continually trolls the latest neurological research to test his theories of how brain function translates into Zen experience. With the field expanding exponentially, it's getting harder and harder to keep up with the literature, he finds. But as scientists gain a better understanding of how the brain works, Austin's own insight into the neurology of Zen is deepening. "The answers are starting to cohere," he says.

Austin has come to Santa Fe on this bright, chilly January weekend to participate in a program called "Zen Brain: Open Presence, Selflessness, and Compassion— Perspectives from Buddhism, Neuroscience, and Complexity Theory." The all-star panel includes Upaya's head teacher, Roshi Joan Halifax, and University of Wisconsin- Madison neuroscientist Richard Davidson, who carried out pioneering functional magnetic resonance imaging (fMRI) studies of meditating Tibetan monks, as well as Evan Thompson, professor of philosophy at the University of Toronto, and neuropsychologist Alfred Kaszniak from the University of Arizona.

During a break in the program, Austin and I sit down in a quiet corner of the dining hall to talk about his work. He picks his words carefully while maintaining a steady, blue-eyed gaze.

It all began, Austin says, in 1974, when he took a sabbatical from the University of Colorado medical school to do research at Kyoto University in Japan. A friend had given him a copy of Eugen Herrigel's *Zen in the Art of Archery*, which he read on the long trans-Pacific flight. Austin asked a Japanese colleague where he might learn more about Zen and was directed to Ryokoin, a sub-temple of Daitoku-ji, a 14th-century Rinzai Zen monastery whose abbot, Kobori Nanrei Sohaku, was fluent in English. Kobori Roshi allowed Austin to become a lay student. "My first experience with a thought-free mode of awareness, which occurred several weeks after I started, was a real eye-opener," Austin says, "because I had never really been without thoughts before."

Later that year, he had an arresting experience of meditative absorption during his first Rohatsu sesshin, a rigorous seven-day silent retreat. A vivid vision of a red maple leaf arose, then abruptly disappeared into a deep, silent void in which there seemed to be no witness at the center. "Looking back, it wasn't the leaf that impressed me," Austin recalls. "It was all the other things that had dropped out. The fact that I could be hyperaware of looking out into a space that was blacker than black in a world of absolute silence, without any perceptual self at the center of this experience, was, in retrospect,

quite an awesome experience for a neurologist, because we don't see this in our patients, let alone in ourselves."

After his sabbatical Austin returned often to Kyoto to see Kobori Roshi, and also studied with other Rinzai teachers, including Myokyo-ni at the Zen Centre in London and Kyozan Joshu Sasaki Roshi in California, as well as Thich Nhat Hanh and Robert Aitken Roshi.

When Austin first began investigating Zen experience from a scientific standpoint, the tools available to neurologists were primitive, consisting mainly of electroencephalograms (EEGs), which recorded patterns of brain wave activity. Then, in the 1980s, PET technology became widely available, making use of short-lived radioactive isotopes injected into the bloodstream to trace metabolic activity. A decade later, fMRIs allowed researchers a real-time look at which

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brain structures were engaged as people performed various mental tasks. These tools have shed new light on how the living brain functions during meditation.

Like Austin's earlier books, *Selfless Insight* takes as a given the basic assumptions of contemporary neuroscience, starting with the understanding that groups of neurons in the brain form multiple interactive networks and constantly signal one another. These signals can either excite or inhibit the neuronal activity in neighboring structures. Somehow the rapid, cumulative effect of all these activations and deactivations creates the phenomenon we experience as consciousness.

In *Selfless Insight* Austin focuses on the startling, momentary experience of no-self that arises unexpectedly, like the deep awakening he experienced in London eight years after that first Kyoto sesshin. In Japanese Zen these experiences are called *kensho* or *satori*, with *satori* signifying a deeper realization.

Austin starts his explanation of the neuroscience of no-self by highlighting two modes of attention that arise in distinct areas on the outer surface of the brain. The dorsal ("upper") attention system is a "top-down" network we deploy when we voluntarily focus on a stimulus. It engages both sides of the brain. In contrast, the ventral ("lower") attention system reacts automatically to unexpected stimuli, remaining watchfully alert

in the background of consciousness. This bottom-up reflexive attention, in which the right brain is dominant, allows for more open awareness.

According to Austin, the two basic categories of meditation—"concentrative" and "receptive"—offer complementary ways to train the intentional and involuntary kinds of attention. Concentrative meditative practices flex our dorsal voluntary attention skills, while more global receptive techniques—sometimes referred to as "choiceless awareness"—activate the ventral involuntary mode.

Another fundamental duality arises as the brain interprets information received by our eyes, formulating two different views of visual-spatial reality. The egocentric perspective always sees things subjectively, in relation to "me," while the allocentric, or other-centered, point of view represents an object as "out there" so that it can be identified and interpreted objectively. These two systems operate unconsciously and for the most part seamlessly, although the strong psychic representations of our ego-self tend to dominate our weaker perception of the outside environment.

The first of these processes, the one that determines where things are in relation to "me," is deactivated during *kensho*, Austin contends, while the second, which decides where objective "things" are in relation to one another, is enhanced, leading to a startling experience of selfless reality. During *kensho*, "perception seems to be realer than real and fundamentally the way all things are," he explains. "The other-centered landscape comes in, occupies the whole mental scenery, and lacks all self-referential ties. This happens for the very first time in an individual's experience, which makes it startling. It's actually been there all the time, but many veils of the personal stuff had been interposed, distorting the way in which the real world enters our consciousness. Let all that stuff drop out, and you start seeing the world through an allocentric prism. So two things go on simultaneously, and they reinforce each other in the final

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experience. One of the Buddhist terms for that remarkable allocentric perception is 'suchness.' Suchness is the way things really are, without self in the picture."

Austin believes that the thalamus, the large sensory way station located deep in the center of the brain, is the key region where this process of activation and deactivation of self-referential signaling occurs. The thalamus is in two-way communication with the cerebral cortex, the outer part of the brain that contributes to higher levels of thought. During kensho, the functioning of an array of thalamic nuclei—dense clusters of neurons—may be inhibited by the release of the neurotransmitter GABA (gamma-aminobutyric acid). The bottom line, says Austin, is that much of the usual signaling that creates our dominant sense of self is briefly taken offline.

Austin's working hypothesis for what develops inside the meditating brain, which he acknowledges is continually undergoing refinement, has made him a popular figure at conferences on Buddhism and neuroscience. He has long been a member of the Mind and Life Institute, which brings together neuroscientists, scholars, and Buddhist teachers, often in meetings with His Holiness the 14th Dalai Lama.

"Jim's unique for a number of reasons," says Evan Thompson, who has participated in several Mind and Life meetings with Austin. "He's someone who has a very deep scientific understanding of the brain, and he has many years of practice as a Zen student. He brings those things together in a unique synthesis."

Austin's approach is popular in part, Thompson says, because "it emphasizes the plasticity of the brain, the way the brain can alter its function through training"—currently a hot topic in brain science.

For his Upaya presentation, Austin uses a series of color slides to illustrate various concepts. One slide shows a wooden sculpture of Bodhidharma, the Indian monk said to have brought Zen to China. As is often the case, Bodhidharma is depicted with his eyes wide open, staring upward. Another slide shows "Monk at the Moment of Enlightenment," a wooden sculpture from 14th-century China. The artist captures the monk's startled expression as he gazes up and to the left. Austin notes that the historical Buddha is said to have awakened at the moment he looked up and saw Venus, the morning star, just above the horizon.

According to Austin, gazing up at something in the distance, above the horizon, may help trigger awakening when conditions are right. There are sound physical and anatomical reasons underlying this possibility, he explains: the lower visual field tends to focus on what is near at hand—closest to the presumed "self"—while the upper visual field is better at processing distant objects "out there."

Classical zazen instruction calls for meditators to rest their half-opened eyes on the floor. I ask Austin how this squares with his ideas about the upward gaze. He responds that in later years, Kobori Roshi taught his students to soften their gaze and look up toward their eyebrows. "It fits right in with the Indo-Tibetan practice of sky-gazing—and with moon-gazing, which is firmly anchored in Sino-Japanese cultural history," Austin says. "You go out at night and bathe in the moonlight, looking in the general direction of the sky. You're not looking down." He acknowledges, however, that casting the eyes downward can be useful in concentration practices that hone attention skills: "It's an optimal posture for top-down attentive processing."

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With their extensive use of scientific nomenclature and dense discussions of brain functioning, Austin's books naturally appeal to a professional audience interested in the brain. But his readers also include those "who are interested in anything dealing with the mind or the cosmic big questions," he says. "The word 'Zen' sounds intriguing,

seeming to raise the possibility of learning more about life, how to feel better, and how to adjust to the crazy life we're all living." He has received thoughtful letters from prison inmates, biochemists, philosophers, dharma students, and engineers. "This is just a token example of how wide an influence neuroscience has had when it interfaces with the topic of spirituality," he observes.

Although the meeting of Zen and neuroscience is an abiding intellectual passion for Austin, he maintains a deeply felt personal commitment to daily Zen practice. "It completely changed my whole personal and professional life," he says. "My wife died in 2004 of Alzheimer's disease, and I'd like to think I was a better caregiver and less traumatized by caring for her during her illness, and more understanding than I would have been had I not been a Zen practitioner."

I'm reminded of an earlier phone conversation in which I asked Austin what the neural basis of Buddhist compassion might be. "I think that compassion emerges late and takes a long time to become selfless," he told me. "But when it does, it does so because that individual has really lost a lot of fear and anxiety, much of which is inspired by the amygdala and the limbic system. With that out of the way, our instinctual ... prosocial virtues emerge into consciousness and action. My own view is that these are innate and sculptured by evolution."

I ask Austin, who recently underwent his first MRI as part of a research project, whether he has any more books left in him. He says he has agreed to contribute chapters to three collections of essays exploring the intersection of psychology and spirituality: "They are about how to translate the neuroscientific data into daily life practice. They stress bottom-up allocentric measures and receptive meditation."

Lately, Austin has been actualizing this allocentric approach by taking up bird-watching. It's a hobby he strongly recommends to Buddhist practitioners. "Any time you can go out and keep all of your visual and auditory senses alive—looking above eye level, hearing behind you as well as in front of you—you're performing meditation in the natural world. You're poised for any stimulus coming from anywhere. It's as down-to-earth as you can get and still be up in the sky."

Conversing with Austin has left me with one nagging question: if the experience of kensho somehow seems more real than ordinary reality, is kensho-reality therefore more "real" than the linear theoretical framework of neuroscience, with its belief that consciousness itself can be understood solely as a function of the brain?

"You're getting into a hall of mirrors," Austin says firmly, bringing the discussion to a close. Neither the scientist nor the Zen student will indulge in idle speculation. "I'm more interested in what's right here and now."