BOOKS & ARTS

Meditating on consciousness

Two books exploring the relationship between Buddhism and science reveal surprising synergies — and hint that insights into the brain may come from studying the religion's practices, finds **Michael Bond**.

Buddhism and Science: A Guide for the Perplexed
by Donald S. Lopez
University of Chicago Press: 2008, 280 pp. $25, £13

Mind and Life: Discussions with the Dalai Lama on the Nature of Reality
by Pier Luigi Luisi, with Zara Houshmand
Columbia University Press: 2008. 232 pp. $24.95, £14.95

In the troubled relationship between science and religion, Buddhism represents something of a singularity, in which the usual rules do not apply. Sharing quests for the big truths about the Universe and the human condition, science and Buddhism seem strangely compatible. At a fundamental level they are not quite aligned, as both these books make clear. But they can talk to each other without the whiff of intellectual or spiritual insult that haunts scientific engagement with other faiths.

The disciplines are compatible for two reasons. First, to a large degree, Buddhism is a study in human development. Unencumbered by a creator deity, it embraces empirical investigation rather than blind faith. Thus it sings from the same hymn-sheet as science. Second, it has in one of its figureheads an energetic champion of science. The current Dalai Lama, spiritual leader of Tibetans, has met regularly with many prominent researchers during the past three decades. He has even written his own book on the interaction between science and Buddhism (*The Universe in a Single Atom*; Little, Brown; 2006). His motivation is clear from the prologue of that book, which Donald Lopez cites in his latest work *Buddhism and Science*: for the alleviation of human suffering, we need both science and spirituality.

Not all scientists are convinced by the need for this dialogue, and some are profoundly suspicious. When the Society for Neuroscience invited the Dalai Lama to give the inaugural lecture at its 2005 annual meeting in Washington DC, more than 500 researchers signed a petition objecting. They claimed it was inappropriate for a religious leader to address a scientific meeting, and that the study of empathy and compassion and how meditation affects brain activity, on which the Dalai Lama had been invited to speak, was too flaky to be taken seriously (see *Nature* **436,** 1071; 2005).

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The Dalai Lama is keen for Buddhists and scientists to interact.

It is unclear if the petitioners' motives were also political — many of the signatories were of Chinese origin — but their concerns over scientific integrity are hard to justify. Science has nothing to fear from a religious leader who has declared that should science prove some Buddhist concept wrong, "then Buddhism will have to change". Lopez, whose book is more a history of the discourse between Buddhism and science than an examination of how the two inform each other, makes much of the Dalai Lama's doctrinal flexibility. He suggests that this stems partly from the Tibetan leader's desire to show that his religion is not the primitive superstition that many nineteenth-century European writers — and modern Chinese communists — have described. Perhaps so, but it must also derive from the Buddhist desire to know reality and not hide behind false assumptions about the world or our own nature.

During the past two decades, the Dalai Lama has directed his enthusiasm for modern scientific knowledge largely through the Mind and Life Institute, a non-profit organization based in Boulder, Colorado, which promotes dialogue and research partnerships between science and Buddhism. The institute holds regular private conferences at which scientists and Buddhists explore their respective views of the world. Pier Luigi Luisi's book *Mind and Life* is a first-hand account of one of these meetings, held over a week in 2002 in Dharamsala, India, where the Dalai Lama lives. The discussion, entitled 'the nature of matter, the nature of life', covered everything from particle physics to the evolution and nature of consciousness. One glance at the guest list, which included the Nobel prize-winning physicist Steven Chu and the biologist Eric Lander, should dispel any doubts about how seriously the scientific community takes such collaborations.

Luisi, a biologist himself, does a fine job of capturing the ebb and flow of debate and the delicate dynamics of cross-cultural interaction. Some of the dialogue is riveting, in particular when the participants come up against each other's characterization of reality. When Chu describes how physicists measure the properties of simple particles as if the particles were independent entities, there is a buzz of scepticism from the monks in the Tibetan benches; his depiction conflicts with the Buddhist idea that it makes sense to consider something only in terms of the parts or properties that make it up. What the monks want to know is whether, say, the electron "is really something out there that has those properties?" Chu responds: "we don't actually ask that question!"

What does science get from such an exchange? At the least, it encourages alternative ways of thinking about reality. Yet there is one area in which dialogue between Buddhists and scientists could lead to genuine advances in understanding: the study of consciousness. Here, Buddhism offers something that science lacks — a tried and tested way of observing and altering, through careful attention to meditation, the subjective workings of the mind. Neuroscientists can show how the practices used by meditators result in physiological changes in the brain, but as several of the Dharamsala conference participants attest in the book, neuroscience does not yet have the tools to explore the various states of consciousness they experience. Buddhism seems to offer a kind of science of introspection.

As a research exercise, the East–West discourse on consciousness sounds harmonious, but at a deep level, it is anything but. Both Luisi and Lopez identify this as an area of great conceptual divergence. Whereas cognitive science's best guess is that consciousness is an emergent property of neuronal organization, Buddhists see it at some pure subtle level as not contingent on matter at all, but deriving instead from "a previous continuum of consciousness" — the Dalai Lama's words — that transcends death and has neither beginning nor end. That is hard to test. Furthermore, it seems impossible for anyone to grasp such Buddhist notions of consciousness without experiencing them, because there is no way yet of quantifying them — and that means years of meditation. As Chu says in *Mind and Life*: "It's like a physicist explaining electromagnetic waves to someone who doesn't know mathematics."

> "Buddhism seems to offer a kind of science of introspection."

Despite this, Luisi's depiction leaves you with the impression that if cognitive scientists and Buddhists can learn a little more of each other's language, they might be on to something. Consciousness aside, the book is stimulating whatever your field or expertise, because it is likely to offer a way of looking at the world that you had not tried. Readers will also get a short, sharp primer into the nature of fundamental particles and the origins of life, and the philosophy behind Buddhist ethics. Lopez's book, by contrast, is more likely to excite those seeking an in-depth analysis of Buddhism's historical relationship with science. He purports to offer a 'guide for the perplexed' — presumably those who are perplexed that the two disciplines should be compatible at all. His scholarly treatment should provide succour, yet he gets off to a sticky start by pondering what it means to group the words 'Buddhism' and 'science' in the same phrase, concluding that it depends on "what one means by Buddhism, what one means by Science, and, not insignificantly, what one means by and". It would take more than a week in Dharamsala to unpack that one. ■

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Seeing is behaving

Living Control Systems III: The Fact of Control
by William T. Powers
Benchmark Publications: 2008. 250 pp.

The field of behavioural science, combining psychology, sociology and neuroscience, has diversified over the past century such that there is a desperate need for an integrative theory. William T. Powers, medical physicist and engineer, proposes that 'control' is the unifying process. *Living Control Systems III* is the latest in an influential but contentious series of works in which Powers presents his theory of perceptual control and illustrates its explanatory power.

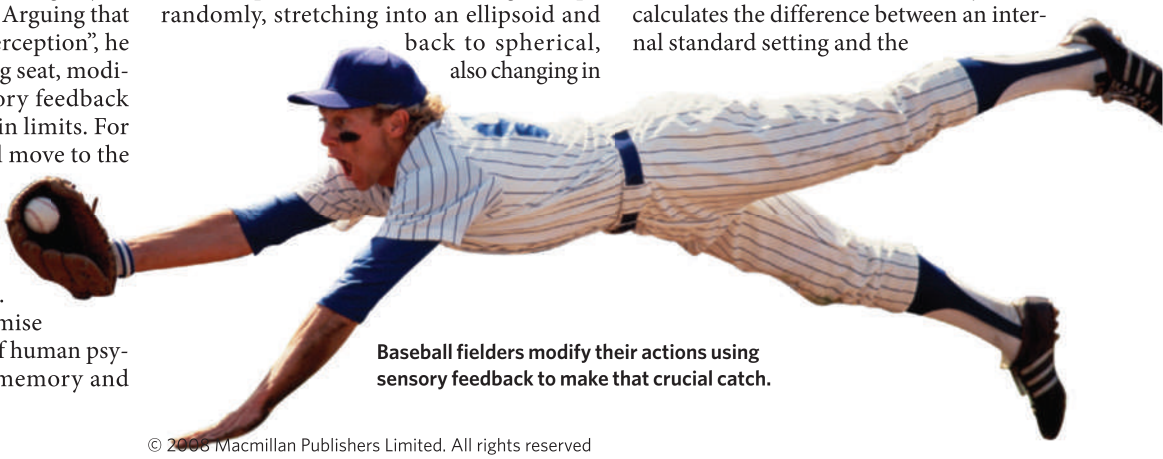
Powers innovatively applies the principles of 'control engineering' — as used in devices such as amplifiers and cruise-control systems — to the management of perceptual variables, such as our ability to track a moving object or maintain a sense of comfort. Arguing that "behaviour is the control of perception", he puts the organism in the driving seat, modifying its action through sensory feedback to control its experiences within limits. For example, a baseball fielder will move to the optimum position to catch a ball by maintaining an image of the ball moving at a constant velocity, relative to the playing field, on the retina of his eye. Powers builds on his basic premise to account for the complexity of human psychology, including learning, memory and skill acquisition, through the operation of multilevel hierarchies of control systems.

Recent developments within computing allow Powers to bring his theory to life. The book is organized around an accompanying compact disc containing 13 computer simulations of perceptual control. They span from the tracking of moving targets and the simulation of balance, to three-dimensional models of arm coordination and the emergence of crowd behaviour. Powers uses a combination of common sense reasoning, philosophical argument and mathematical models to make his case. Throughout, the style is engaging yet authoritative.

After setting the historical context, Powers turns to the interactive computer demonstrations. A sphere on the screen changes shape randomly, stretching into an ellipsoid and back to spherical, also changing in placement and projected angle. The viewer is asked to control the shape, location or orientation of the figure by moving the computer mouse, the movement of which is recorded and plotted. The graph makes it clear that the user's behaviour exactly opposes the random changes in the sphere's perceived properties. The more that the computer tries to squash its shape, the more the user moves the mouse to return it to a spherical form. According to Powers, this shows that behaviour is controlling perception and is not a learned response to the environment. By contrast, most traditional theories explain behaviour as the result of a learned association between a stimulus and a response; for example, as a rat might be conditioned to press a lever for a food reward. Such theories, Powers proposes, do not provide an adequate explanation of behaviour.

> "Behaviour is the control of perception and not a learned response."

The basic unit of control is the negative feedback loop. This is a mathematical system that calculates the difference between an internal standard setting and the



D. MADISON/GETTY IMAGES

Baseball fielders modify their actions using sensory feedback to make that crucial catch.