



Science and Mysticism

Modern science is rooted deeply in mysticism. Both systems have a central tenet, that the universe fundamentally can be understood. The underlying principles of reality can be gleaned. A good working hypotheses, to be sure! The Hermetic axiom, *As is above, so tis below*, reveals the basis of alchemy (from which modern chemistry arose). This axiom has been shown to be valid again and again in the interconnections between mathematics and physics. Often in history a branch of mathematics developed for it's intrinsic beauty and compelling nature is later to be precisely what physicists need to model physical phenomena. The stuff "in our heads", mathematics, seems to reflect the "external" universe quite precisely. This is a profound mystery, this intimate connection between neural firings in our brains and the external universe as a whole. Each advance in physics has been a step deeper into our own minds, for the mathematics becomes increasingly abstract. As with the mystic, everyday notions of "common sense" must be thrown out the window in order for a deeper understanding to emerge. Things are not what they appear!

In scientific philosophy, nothing can be said to be absolutely true. All understanding is thus tentative. Any contradictory evidence is sufficient to throw out the entire theory, and in fact requires that the theory be abandoned. Attachment to theories is a huge impediment to the progress of science, just as it is for the student of mysticism. One Zen master said "The Great Way is easy - merely cease to cherish your opinions". Buddha himself explained to his students that believing him was useless. One must do one's own "homework", and prove in the laboratory of one's own life the usefulness of Buddha's teachings. Dogma is the enemy of both science and spiritual practice (from the mystic's point of view). As a scientist or mystic, one should equate all dogma with conceptual idolatry, and reject it as *absolute* truth. All conceptual understanding is tentative, and at best working hypotheses.

Physicists in the early 20th century were forced to abandon "common sense" notions concerning the nature of physical reality. Both the theory of relativity and quantum mechanics supplanted the earlier and more intuitive notions of physics developed by Newton and many others. These radical and bizarre physical theories turn our common sense on its head. Interestingly, many of the non-intuitive concepts of this new physics resonate strongly with the world view of the mystic. The mystic also must turn conventional "common sense" on its head. Whereas the physicist uses that unique product of the human brain, mathematics, to go beyond the limitation of our common sense intuitions about things, the mystic uses meditation. Like mathematics, meditation can take one's attention deep within, where all the great treasures reside.

Advances in brain imaging have forged tools with which brain researchers can finally study mysticism empirically, to see in what ways the brain of a mystic functions differently from the brains of those who haven't practiced meditative disciplines. Early EEG studies revealed interesting changes in the brain-wave patterns of people in meditation. Brainwaves became more regular, and slower, and the amplitudes became much larger. Early studies also revealed that meditation lowered blood pressure, heart-rate, stress hormones, neurotic symptoms, and increased reaction rate. I recall back in the late '70s, when I looked at a printout of abstracts of hundreds of brain wave studies of meditation, I was struck by the fact that almost all of them used beginners who were given very short periods of training. Imagine subjecting beginners to 10 one hour music lessons, and then judging music by what they could then play! It takes years of dedicated practice to become a good musician, or a good meditator. Nonetheless, amazingly, most of these studies were getting interesting results.

Brain imaging has now evolved to the point where brain function can be studied with great precision. Using magnetic resonance imaging (MRI), and fMRI, and positron emission tomography (PET), and more sophisticated EEG imaging techniques, one can probe the workings of the human brain as never before. These tools are beginning to be turned to the interesting questions of what happens in the brain during meditation, and what permanent changes in the brain occur after years of intensive meditation training. And now studies have begun to appear that used highly experienced meditators as subjects, as well as normal controls. Fast brain waves have been discovered, called gamma waves, that may be the key to how our brains crystallize many parallel internal processes together into a unitary percept (the so-called *binding problem*), and even how all these parallel mental processes coalesce into a sense of being conscious. Experienced meditators surprised the researchers, who had never before seen such high gamma wave activity. These results so far look very promising. It's beginning to seem that studying meditation will yield important clues as to exactly *how* brains manifest consciousness.

In the readings and videos below, many of the above threads are dealt with in more detail.

Happy perusing!

Further reading on science and mysticism

[Science and Spirituality - Complementary or Contradictory?](#) (by your prof!)

[Science and Mysticism in the 20th Century](#)

[Wikipedia's entry on Quantum Mysticism](#)

[Buddhism and Quantum Physics](#) – Compares Nagarjuna's point of view to that of quantum mechanics.

[Time and Impermanence in Buddhism and Modern Physics](#)

[Tibetan Buddhism and Modern Physics - Towards a Union of Love and Knowledge](#)

Further reading on meditation and gamma waves

[Wikipedia's entry on Gamma Waves](#)

[Meditation Alters Brain Function](#) (fairly technical)

[Meditation Changes the Brain](#) (less technical)

Further reading on meditation and the brain

[Meditation Increases Brain Size](#) (describes a Harvard Medical School study)

[Meditation, the Brain's Treadmill](#)

[This link is to several interesting articles on meditation and the brain](#)

Videos (and audios) relating to science and mysticism

Neuroscience and Buddhist meditation practice

Tibetan Monks in the Lab: [Part 1](#) [Part 2](#) [Part 3](#)

James Austin, Professor of Neurology, and Zen practitioner - [This is Your Brain on Meditation](#) (audio)

Physics and mysticism

[Quantum Physics and Consciousness](#) (Deepak Chopra)

Alan Wallace: [The Conscious Universe - Where Buddhism and Physics Converge](#)

[Quantum Entanglement](#)

[Zen Biology Lesson for Enlightenment](#)

Biologist Rupert Sheldrake on his concept of the *biomorphic field*: [The Extended Mind - Recent Experimental Evidence](#)

[Discussions between Rupert Sheldrake, Terence McKenna, and Ralf Abraham](#)