Without and Within: Science and the Middle Path

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Background

I have no formal training in ethics, philosophy or Buddhism, nor is he from a country with a substantial Buddhist tradition. I was first exposed to Buddhist teachings almost 40 years ago, then trained in medicine and public health, environmental science and what has recently been termed "sustainability science".[2] Indeed, since that first encounter with Buddhist teachings in January, 1971, my life course has been substantially motivated and influenced by my understanding and experience of the dhamma, especially of metta and bodhicitta, the wish that all beings can be free from fear and pain, as far as possible. These are my qualifications for writing an essay that links Buddhism, science and the environmental crisis. I am delighted to have this opportunity.

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[2] Kates RW, Clark WC, Corell Jr, R, Hall M, Jaeger CC, Lowe I, et al., 2001, "Sustainability science" *Science*, 292:641-2.

In 2009, at the United Nations Day of Vesak meeting in Bangkok, I spoke about Buddhism and the environmental crisis.[3] At the end of my talk, which was held at one of Thailand's most famous universities, I asked if anyone in the audience of about 60 people had a science degree. Not a single person raised their hand. In retrospect, I wish I had asked how many of my international audience had any kind of university degree – but I am sure at least some did. Perhaps someone in that audience might one day read this essay. This experience at Vesak reinforced a growing perception that there is limited understanding of modern science among serious scholars and practitioners of Buddhism.

Buddhism and science

Of course, in some countries where Buddhism is widely practiced (most notably Japan, but increasingly in nations such as China, Sri Lanka, Taiwan and Thailand), there is a growing public understanding of the scientific method. India, the land of the Buddha, has an ancient and distinguished history of mathematics and science.[4] His Holiness the Dalai Lama, one of the few Buddhists to be awarded the Nobel Prize for Peace, has long had an interest and a close involvement with neuroscientists. In fact, the Dalai Lama has participated sufficiently closely to offend some of the neuroscientific community, who have claimed this involvement to be unscientific.[5]

Buddhism and science share more in common than some experts in either field may first appreciate. Indeed, I would argue, all forms of religion have more in common with science than prominent contemporary critics of religion seem to understand.[6] Both Buddhism and science are concerned, in part, with understanding the nature of phenomena. Both are concerned with causes, and the causes of causes. Both can provide a profound level of understanding, and yet both also reach a point at which mystery is inevitable.

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[3] Butler CD., 2009, "The Global Environmental Crisis and Sustainability of Civilization: Time for the Buddhist World to Awaken" Dhammasami K, Dhammahaso P, Wutthikaro P, Peoples D, eds., *Buddhist Approach to Environmental Crisis*. Bangkok, Thailand: Mahachulalongkornrajavidyalaya University Press; p. 216-25.

[4] Joseph GG., 1987, "Foundations of Eurocentrism in mathematics", *Race and Class,*;28:13-28.

[5] Bhattacharjee Y., 2005, "Neuroscientists welcome Dalai Lama with mostly open arms" *Science,* 310:1104.

[6] Dawkins R., 2006, *The God Delusion*. London: Bantam Books; Grayling AC.; _ , 2008, "Children of God?" *The Guardian*, 28 November.

This mystery may in part occur because no single "cause" exists for any phenomena. Indeed, it can be argued that no phenomenon exists of itself, but is dependent on context and observer. Instead it can be argued that nothing exists other than a pattern in reality which is observable and distinguishable from another pattern, or from an amorphous background by senses and consciousness. At one level, it is clear that no absolute reality exists but is instead dependent upon the observer. An ant crawling across the surface of field will perceive (perhaps more by touch than sight) thousands of sharp green blades, each of which is many times its height. A sheep, walking on that same terrain will see a diverse green carpet, containing both attractive and less tasty forms of food. The ant may be effectively invisible to the sheep. A human being, seeing the same scene from a satellite with a powerful magnifying camera might spot a hundred white specks, each of which represents a single sheep. All these perceptions are valid, and they all have causes. Yet no single perception can be considered absolutely right – they are all shaped by the context, the sensory perception, the experience, and the intellect of the observer.

On the other hand, to dispute the existence of *any* absolute reality on the basis that all experience is subjective and relative is itself very doubtful. It also leads to chaos, both physical and moral. After all, it is very likely that the perception and interpretation of grass by each ant has much more in common with other ants than with the perception of a flock of sheep. Furthermore, even though the life experience and the mind of every person on the planet is different, it is equally clear that each of the almost 6,900 million people alive today not only was born on Earth but also requires food, oxygen, water and so on. Without invoking any claim of absolute reality, it is clear that phenomena such as those involved in the transition of a plant from a seed to a flower and back to a seed can be better understood using the scientific method. Finally, views which deny absolute reality risk disintegration into a moral abyss, in which for example, murder or extreme selfishness is considered equivalent to service and compassion. No society could exist for long in such a world. It therefore follows that some attitudes and actions are more beneficial than others, while are some are more harmful.

Reductionism, emergence, and systems thinking

The separation of phenomena into smaller and smaller constituents is frequently called reductionism, from the root word "reduce". Its origins in the West are credited to Greek philosophers such as Hippocrates (c460-377 BC), who Rambihar describes as "changing the world-view from one of divine intervention and supernatural causes, to a new Greek science".[7] This scientific view was later developed by great European scientists such as Francis Bacon (1561-1626) and Isaac Newton (1642-1727). There is no doubt that reductionism has considerable explanatory power, but it also has limits. Reductionism ultimately led to concepts such as a "clockwork universe" which postulated that everything that exists is like giant machine, whose unfolding could be determined and predicted if only we had a sufficiently powerful calculator and sufficiently precise measurements. Such a worldview provides little room for uncertainty, for religious experience, or for any form of cause and effect transmitted by a mysterious law of kamma.

However, reductionism is itself now widely discredited, at least as being the sole or dominant explanation of reality. After all, no amount of insight into the components of an organism can bring it to life. Indeed the finer the division of the organism (for example to organs, cells, cellular components, molecules and even smaller), the less the chance of understanding the actual occurrence of life. After all, life does not depend on any single component of a living organism, but is better understood as a phenomenon that arises (or *emerges*) from the interaction of sufficient constituent elements of life. Many other phenomena (including consciousness) are also better considered as processes.[8] Similarly, the behaviour of a crowd at the end of a performance involves more than the thoughts of the individuals in it at the moment the music or voice fades away. For example, the decision by that crowd to applaud or to provide a standing ovation is influenced by the behaviour of other individuals in that crowd. If a critical number of people stand up to applaud, then most, or even all of the crowd will also stand, through a process of observation and social networking.[9]

[7] Rambihar, V. S., 2000,. Science, evidence, and the use of the word scientific. *The Lancet* 355: 1730.
[8] Noble, D., 2010, *Systems biology and the concept of no-self (anātman)*, paper presented at the Colloquium Buddhism and Science. Oxford, UK, 4/5 March 2010.
[9] Miller JH, Page SE., 2004, "The standing ovation problem" *Complexity*;9(5):8-16.

Once an investigator starts to understand and to analyse the world as containing many linked processes, then views such as atheism or "proof" in the non-existence of spiritual rules such as those espoused by leading atheist philosophers such as Dawkins and Grayling dissolve into internally consistent theories, which on close examination have no certainty. This does not mean that religious views are correct, but it does open the possibility. It also opens the possibility that religions, including Buddhism, may provide extremely rich and insightful windows into reality, as well as ethical systems of great value. However, critics of religion do make valid points when they attack absolutist attachments and interpretations of dogma, be they Buddhist or other forms. For example, some fundamentalist forms of religion claim to have the entire truth, and that other versions are therefore wrong. It is logically impossible that both versions can be correct, and it is far more likely that both are untrue. Indeed exposure to such extreme, rigid versions of religion may have catalysed the vehement anti-religious views of Richard Dawkins.[10]

Meditation, concentration, insight and uncertainty

Irrespective of the absolute certainty of religious insights into nature, there is no doubt that Buddhism and other religions reward their practitioners with deep insights and beneficial states of mind through meditation and prayer.[11] The deepest insights of science require similar intense and sustained concentration, but with different goals. No matter how diligent the mental effort, neither science nor Buddhism can explain everything. Buddhism uses concepts and words with great explanatory power but, for most practitioners, some of these aspects require faith or critical consideration. In this category belong teachings about rebirth and the karmic causes of events due to actions in earlier lives. For beginners (and certainly myself!) recall of past lives is very vague or non-existent. The reality of past lives may be either denied (by a reductionist), recalled (by an accomplished meditator) or accepted, as a credulous beginner might. But a fourth possibility exists: that it be considered possible but unproven. Similarly, many scientific explanations at their heart depend on the acceptance of esoteric and subtle facts which are

[10] Dawkins, *The God Delusion*; _ *Children of God?*
[11] Miller G., 2009, *A quest for compassion*. *Science*. 324:458-9.

either beyond the understanding of most people or are explicitly understood to be unproven, hypothesised theories.

For example, scientists' theories about fundamental (subatomic) particles and the origin of the universe are unlikely ever to be fully confirmed. In 1973, Western philosopher Fritjof Capra published a classic book called *The Tao of Physics*, which explored many parallels between modern physics and Eastern mysticism.[12] Though not conventionally religious, Albert Einstein had a deep appreciation of and sympathy with views many call mystical.

Using an early telescope, the great Italian astronomer, Galileo Galilei (1564-1642) observed the movement of four of the moons of Jupiter.[13] Galileo later challenged the official view that the sun rotates around the earth. This conception of the solar system is today widely accepted, even though very few of us have observed the moons of Jupiter. Galileo's name and memory are still honoured, including by naming space expeditions.

Scientific understanding of the solar system rests on a vast amount of other evidence, beyond that observed by Galileo. The evidence of rotation of the moons of Jupiter and the means to observe it are widely documented. This observation can be reproduced by anyone with sufficient training and equipment. The evidence is also established and traced through the scientific literature. These points illustrate two important aspects of the scientific method: reproducibility and the integrity of the scientific peer review process. Somewhat similarly, at least in some schools of Buddhism, teachings are transmitted from master to student through generations of an accredited lineage. Some distinguished Buddhist teachers are also remembered for generations. In each case the reasons for this transmitted respect are the quality of the teaching and the clarity of the insight.

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[12] Capra F., 1973, *The Tao of Physics. An Exploration of the Parallels Between Modern Physics and Eastern Mysticism*. London: Fontana.

[13] Rosenstock L, Lee LJ., 2002, "Attacks on Science: the risks to evidence-based policy" *American Journal of Public Health*. 92:14-8; Anonymous, *Galileo and the Telescope*. [cited; available at http://outreach.atnf.csiro.au/education/senior/astrophysics/galileo.html.

Much of science is less well accepted than the rotation of earth around the sun. Galileo was also disbelieved for some time by an institution which had considerably more power than did science: the Christian church based in Rome and its leader, the Pope.[14] The scientific process may be considered a large family of competing theories and hypotheses which are gradually evolving towards a more complete understanding of the physical and psychological universe. Nevertheless, it is extremely unlikely that science can explain everything. In the same way, complex software is unlikely to be completely error-free, and the toss of a coin is random. As has been stated, "The fact that the future is like the past makes science possible ¾ the fact that the future is different to the past makes science necessary".[15]

The universe contains both predictable and unpredictable elements. This lack of absolute certainty appears to be a necessary part of the way things are, and is a fundamental component of quantum theory. One consequence is the opening of a pathway for human choice. Kamma may determine human destiny and humans may determine their kamma, but the finer details of its- unfolding are impossible to know in advance. Similarly, if we live in a temperate zone, such as the United Kingdom or Korea, we can confidently predict that July will be warmer than January. However, we can never predict with total accuracy the maximum temperature on any day in July, even on the day before.

This lack of absolute proof of many aspects of science does not invalidate science itself. In the same way great respect for Buddhism does not, in my view, require faith in all aspects of its teaching. Many Buddhist principles can be tested and understood from personal experience, such as the generally beneficial effects which thoughts of loving-kindness bestow.

[14] Rosenstock L, Lee LJ., 2002, " Attacks on Science: the risks to evidence-based policy" *American Journal of Public Health*. 92:14-8.
[15] Levin S., 1999, *Fragile Dominion: Complexity and the Commons*: MacMillan.

What perhaps most distinguishes science from Buddhism is that the scope of the former is mainly concerned with the material and psychological universe, while the latter concentrates on moral laws and includes consideration of past or future lives. However, much of science studies the past, and increasingly, the future. Science is beginning to make serious attempts to examine the near future in ways that extend well beyond the prediction of comets, eclipses and other astronomical events.[16] Indeed, the human capacity to forecast such events derives from ancient forms of science and mathematics.[17] Science is also improving its understanding of the evolution of both fairness, and injustice.[18]

Science also considers the physical rules connecting past, present and future phenomena. The scientific method involves the generations of hypotheses ¾ concepts and theories about events, processes and phenomena ¾ which are refined by repeatable, verifiable evidence. The process of discarding theories shown to be incorrect can be very drawn out, taking decades or longer. Some practitioners may approach Buddhism in this way, too; that is, by discarding beliefs shown to be wrong. Here, my scholarly knowledge of Buddhism falters and I am not able to say how widespread a similar analysis applies. However, I clearly recall my own most revered Buddhist teacher stressing that I and other students should "check up" ¾ investigate ¾ before accepting any basic principle of Buddhism. Perhaps that teacher, Lama Yeshe, was unusual, or perhaps the things that later attracted me to science also made me receptive to his message.

Scientists who are critical of religion, such as Richard Dawkins,[19] frequently assert that religion relies on followers' uncritical assimilation of dogma. Perhaps this occurs in Buddhism, but my sense is that such uncritical acceptance is not essential. Science is similar to Buddhism in that both understand that reality has different forms. Physicists and chemists conceive of matter as

[16] Butler CD., 2005, " Peering into the fog: ecologic change, human affairs and the future" *EcoHealth*. 2005;2:17-21.
[17] Freeth T., 2009, "Decoding an ancient computer" *Scientific American*;301:76-83.
[18] Henrich, J., J. Ensminger, et al., 2010, "Markets, religion, community size, and the evolution of fairness and punishment" *Science* 327: 1480-1484; Hoff K., 2010, "Fairness in Modern Society" *Science,* 327:1467-8.
[19] Dawkins R., 2006, *The God Delusion* ; _ Children of God? *The Guardian.*

being composed of smaller particles or chemical compounds, but also understand that the appearance of events is determined by our senses and instruments. Some parts of science teach that "reality" as perceived by our senses is a construct, a way in which the brain interprets the world, rather than being but not the world itself. Similarly, doctors know that each human is a system of organs and physiological processes, but at the same time an individual being.

Science, daily life and ethics

Any reader who thinks science has no value to a good Buddhist might reflect upon the fact that you can read this page because you have acquired secular knowledge. The world needs both secular and spiritual knowledge to thrive. Even if you are a monk, some secular knowledge, including of science, can surely help you to be more valuable to sentient beings. If, like me, you think Buddhism can help you practice metta or bodhicitta, then you might reflect that science too ¾ at its best ¾ can also help practice and loving kindness. If you have ever had an antibiotic or flown 1,000 kilometres in a couple of hours to show your love for a sick friend or relation, then you have benefited from science.

But science also needs ethics. There is a long history of science being used for purposes such as developing weapons, improving forms of torture and practicing eugenics. Dictatorships are especially good at corrupting science, as occurred under the Nazis[18] and in Communist Russia.[19] Support for the misguided and deliberately exaggerated theories of the Russian agricultural scientist Trofim Lysencko contributed to crop failures and famine in Russia. Pseudo-science is not restricted to dictatorships; the denial of the causes and effectiveness of treatments for AIDS led to many unnecessary deaths in South Africa.[20]

During the Cold War, many behavioural scientists (mainly psychologists, social scientists and anthropologists) co-operated in heightening concerns about the vague enemy of shadowy, alleged communists and subversives.[21] The Nazi regimes rejected the findings

[20] Geffen N., 2005, "Echoes of Lysenko: state-sponsored pseudo-science in South Africa" *Social Dynamics*;31:183-210; Makgoba MW., 2000, HIV/AIDS: The peril of pseudoscience. *Science*; 288:1171.

[21] Holsti O., 2006, The Making of the Cold War Enemy: Culture and Politics in the Military-Intellectual Complex (by Ron Robin) (book review). *Political Communication*;23(1):123-4.

of Jewish scientists, including Albert Einstein. Ethical and prosperous societies need science,-science informed by equitable and ethical practices.

Climate change and science

Finally, Buddhists can learn about science and the global environmental crisis, of which ecological damage is but a part. How do we know that scientific understanding of this crisis is valid? Some of us may sit in comfortable offices. We are well fed every day. Yet for many others at the front line of the environmental crisis, the problems are stark and immense. It might be tempting suppress thoughts about such people and animals, but if we do, then might we not create the cause for others to one day be indifferent to us?

Similarly, if we start to imagine the life of a slum dweller in a low-lying, flood-prone area or the insecurity of a debt-burdened farmer hoping for rain, then this becomes more real and more pressing. Many interlinked forms of evidence inform us of environmental crises in the large and growing literature on this subject.

Recently the science of climate change has attracted sustained and virulent criticism.[22] This follows the theft of private emails from the UK's University of East Anglia[23] and the discovery of minor errors in the report of the Intergovernmental Panel on Climate Change.[24] Sceptics of climate change claim that they have identified numerous errors in climate change science. Outsiders might think that this debate is like a breakaway religious sect. However, there is a crucial difference. With very few exceptions, the critics of science are not trained scientists. The few that are make speeches and write papers, but they do not publish on climate change in the scientific literature. Some critics of climate science also claim that their failure to do this illustrates a form of "groupthink," a collective taboo maintained by scientific editors and peer reviewers. It is true that some pervasive beliefs in science have taken decades to overturn, such as the view of continental drift. First postulated in 1858, this theory was dismissed

[22] Hamilton C., 2010, *Requiem for a Species. Why we Resist the Truth About Climate Change*: Allen & Unwin.
[23] Macilwain C., 2010, Calling science to account. *Nature,* 463:875.
[24] Editorial., 2010, Climate of fear. *Nature*, 464:141.

until the development of plate tectonic theory in the 1960s.[25] There are many similar examples from health and medicine.

However, the science of climate change dates from the mid-nineteenth century, and was ridiculed for many years. It is far more likely that these attacks on climate science are motivated by powerful vested interests, such as industries that profit from the sale of fossil fuels and from the many think tanks supported by these industries[26] than by a genuine new understanding of science.

Conclusion

Buddhists concerned with the well-being of other people and species will be rewarded by investing time in the study of science. Scientists deserve respect, not worship. The message of science can also be distorted and denied, including to serve the interests of powerful minorities not acting in the public good. A recent example concerns the exaggeration of anti-ageing remedies.[27] Science has made progress in this field, but progress is far less mature than claimed by those who seek to profit from this limited understanding and oversell the benefits. Thus, for both science and Buddhist teachings it remains crucial to exercise discrimination, wisdom and other forms of critical thought.

[25] Tobias PV., 1996, "Premature discoveries in Science with especial reference to" Australopithecus" and Homo Habilis., *Proceedings of the American Philosophical Society*;140(1):49-64.
[26] Michaels D., 2008., *Doubt is their Product: How Industry's Assault on Science Threatens Your Health*: Oxford University Press..
[27] Olshansky SJ., 2010, "Exposing the longevity business" *Nature*, 464:491-2.