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James Williams

ABSTRACT Evolution is not, contrary to what many creationists will tell you, a belief system. Neither is it a matter of faith. We should stop asking if people 'believe' in evolution and talk about acceptance instead.

I've attended many creationist meetings in the UK. I've even 'debated' with some creationists and won (I use quotation marks as it's rarely, if ever, a true debate, just an opportunity for creationists to trot out the same old misconceptions and ignore the actual science). At creationist meetings, I often get asked why I 'believe in evolution' when the evidence for creation (the Bible) is so clear. My answer to their question is that I don't 'believe' in evolution, at least not in the way a creationist would use the term 'belief'. This answer takes them by surprise. At first they wonder if they've found another scientist who is a secret creationist, but then, as I explain my answer, they realise that I am not going to join their crusade to vanquish the '*evil lie of evolution*' (Ham, 1987). I explain to them that I accept evolution because of the weight of scientific evidence in its favour. I tell them that I've never been asked if I 'believe' in atoms or gravity so, why ask if I believe in evolution? Evolution is an evidenced, scientific explanation for the development and diversity of life on Earth. To me, asking the question in that way seems odd, and yet creationists often insist on juxtaposing belief and evolution.

Religious Education is a compulsory subject in UK schools; until 1988 it was the only subject that, by law, had to be taught in a school. The advent of the National Curriculum made a broad and balanced curriculum compulsory. So how do we challenge the spectre of creationism in our schools while still allowing people of faith not to feel marginalised, persecuted or ridiculed?

Note: the ideas presented here were explored in more depth in an article in the *Journal of Biological Education* (Williams, 2014).

For some, e.g. Richards Dawkins, it's an open and shut case. Creationism and belief in a God (any God) is wrong and evolution is right. Yet we cannot ignore those people of faith who are also fully accepting of the science of evolution and the age of the Earth as measured in billions of years, but who still maintain a belief in their God(s).

This tricky issue has been a subject that I have considered for many years. My answer, not new or original as such, is that we must better teach the 'nature of science' as part of our science education in schools and colleges, and understand the difference between the philosophical positions of acceptance and belief.

The philosophy of acceptance and belief

The initial question we must ask is '*What is the difference between acceptance and belief; indeed, is there a difference at all?*' In one of the first studies on this subject, the philosopher L. Jonathan Cohen analysed both in an attempt to characterise them (Vahid, 2009). Belief, Cohen said, '*is involuntary, whereas acceptance is a voluntary act under the direct control of the individual*' (Cohen, 1992: 5). Since this is the case, he argues, it's possible to accept certain things that you may well believe to be false.

The nature of beliefs

So how can we describe what a 'belief' actually is? The French philosopher Pascal Engel (1998) lists five characteristics:

- **B1** Beliefs are involuntary, not normally under direct control.
- **B2** Beliefs aim at truth.
- **B3** Beliefs are shaped by evidence for what is believed.
- **B4** Beliefs are subject to integration or agglomeration.
- **B5** Beliefs come in degrees.

The English moral philosopher Bernard Williams expanded on the idea of belief being involuntary, by reasoning that a person with a belief in something is aiming to discover or feel that they have discovered the 'truth' of something (Cook, 1987; Vahid, 2009). All these conditions fit the creationist standpoint well, especially B2 where devout religious belief is often explained as a search for 'truth'. With B3, the 'evidence' is often dictated by the ability of the creationist to fit the evidence to suit their particular religious account, e.g. Genesis I and II. As such, the evidence required for a 'belief' is neither objective, nor as wide-ranging as the nature of evidence required in science.

The nature of acceptance

As with belief, the notion of acceptance has certain characteristics, also outlined by Engels:

A1 Acceptance is voluntary or intentional.
A2 Acceptance aims not at truth, but utility or success.
A3 Acceptance need not be shaped by evidence or evidential reasons.
A4 Acceptance is not regulated by an ideal of rational integration.
A5 Acceptance is an all-or-nothing matter.

The notion of acceptance fits well within the realm of science. As a basis for defining acceptance over belief, these characteristics are useful. It's unlikely though that everyone will agree with all the statements. At first sight, A3 may appear problematic when looked at from a science perspective. That said, the characteristic merely states that acceptance 'need not' be shaped by evidence. The fact that science *is* driven by evidence strongly supports the idea that scientists should accept ideas rather than believing in them.

Why 'accept' evolution rather than 'believe' it?

Acceptance of evolution is not the same as a belief in evolution. It's useful here to draw an analogy from law. A defence lawyer may *accept* a client's proposition of innocence. Whether or not the lawyer *believes* that the client is innocent is another matter. Courts of law determine innocence or guilt on the basis of the evidence presented. Regardless of the outcome, there must be an acceptance of the verdict in all cases, even though there may well be those who believe the verdict is wrong. A convicted person may have the right to appeal against a guilty verdict. Appeals also defer to evidence; what people believe is immaterial.

Science defers to evidence to generate and support its explanations of natural phenomena. As such, scientists should be predisposed to the acceptance of evidence and, ultimately, the acceptance of theories.

The advantage of acceptance over belief for evolution

The presentation of science in the classroom is often empiricist and positivist. Using evidence gathered from observation and/or measurement, empiricists and positivists seek, by use of scientific methods, to determine the laws that govern natural phenomena. As Bill Cobern of Western Michigan University points out, an empirically minded science teacher will say:

Here is the way the world is. Accept the statement because it is factual. There is nothing about science to believe or disbelieve. One has only to accept the facts and to try and understand them. (Cobern, 2000: 232)

Scientific facts taken from a range of sources, such as DNA and fossils, which lead to our understanding of evolution, should be non-contentious and relatively easy for showing evidence for evolution. In most areas of science, this is exactly what happens. Scientific facts about atoms, chemical reactions, the flow of current, forces, gravity, and so on, are presented and the issue of belief or disbelief is not one that arises. After being offered evidence, students are encouraged, through experimentation or further study, to gain an understanding of the concepts being presented.

It's the characterisation of evolution as something to be 'believed' rather than 'accepted' that poses a problem. The association of 'belief' with evolution turns it into a faith-based position or 'belief system'. It plays into the hands of creationists.

Science is built on explanations; these are the currency of science and they are characterised as theories. All scientific theories are open to revision and modification in the light of evidence so, to assert belief in a theory, that is, to think of the theory as 'true', is incorrect. All theories in science are provisional – even gravity – and are subject to change with new evidence. In common

everyday language, of course, we see some 'theories' as being true or factual (like gravity), as to not think this way would be to ignore our everyday experiences of gravity. That said, we cannot with authority claim that gravity acts in the same way across the known universe.

This highlights another issue: the deliberate misuse of 'theory' as a 'guess' or as something in science that is unproven or lacking in evidence. Even laws in science, which should be without exception, often have exceptions; for example, the Universal Law of Gravitation or the Ideal Gas Law may not hold to be 'true' under all circumstances. In the case of the Ideal Gas Law, the 'ideal gas' is hypothetical. Laws also have a different purpose to theories in science – they describe things rather than explain them (the same is also true of principles).

Science education and the nature of science

Should school science portray a sophisticated view of the nature of science, which presents theories as abstractions, derived from many sources of evidence? Perhaps, all too often, we present concepts and ideas as resulting from easily derived 'facts' and that science is unproblematic. School science is not the same as 'real science'. What we present to our students is perhaps too well defined, neat and tidy, leading to a view of science and the nature of science as being settled, agreed and not open to discussion and controversy. What we present in school science is, in effect, a filtered form of science that represents the most stable body of knowledge, concepts and ideals that we have. Where we do present 'controversy', it is not necessarily the controversy of the metaphysical versus the physical.

Managing creationism in the science classroom

The teaching of evolution can create problems for students who have strong religious beliefs. Challenges to the orthodoxy of evolution as a tried and tested element of scientific knowledge are not uncommon. Even in the UK and Europe, where creationism does not present the major challenges evident in other countries, challenges to teachers are not uncommon (Cleaves and Toplis, 2007; Blancke *et al.*, 2011). In dealing with such challenges, teachers need to be careful. Students may not react well to evolution teaching and some will actively wish to discuss the challenges to evolution posed by creationism. A delicate and considerate handling of challenges to creationism is needed in the science classroom. The role of the science teacher should not, in my view, be to challenge a religious worldview, but to present the evidence that science currently accepts for evolution and how the process of science validates that evidence as scientifically correct.

Conclusion

'*Do you believe in evolution?*' is a loaded question. As such, it facilitates many creationist arguments that can confuse scientific and religious worldviews and sets up a position where those engaged in debate are forced into a 'one or other' outcome. If evolution can be shown to be faulty, then, according to creationists, religion 'wins'. Even if evolution were shown to be false, it doesn't mean that creation is, by default, the correct explanation. Removing belief from discussions of evolution and presenting it as a matter of acceptance can prevent a clash of standpoints or worldviews and the need for one to prevail over another.

Teaching children the process of science – the various methods that different scientists use – and the nature of evidence in science and how scientists arrive at answers to questions does not need recourse to belief in the sense that those who 'believe' in God use the term. Just as there is a vernacular understanding for the term 'theory' in science, so too can 'belief' mean something different when dealing with how certain a scientist is about their results, the outcome of experiments or the validity and reliability of their ideas and explanations. Scientists may use the term '*believe*' to describe their convictions about the science they are performing, but that is different from the *belief* that devout Christians and others may have about their faith and the existence of a God or Gods. Removing the term 'belief' and its derivatives from the terminology surrounding evolution is no different from talking of gravity and atoms without such descriptions. It's time for belief in evolution to end and for acceptance of evolution to become the norm. If, in science education, we can achieve an acceptance of evolution as the best explanation for the evidence we find, then there is no need to challenge belief in a creator God.

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James Williams is a lecturer in science education in the School of Education and Social Work at the University of Sussex. His research interests include science teachers' understanding of the nature of science and the issue of creationism and evolution in science teaching and learning.
Email: james.williams@sussex.ac.uk