

Science, certainty and ambiguity

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Thank you for this opportunity to reflect a little on academic life. It is good to acknowledge achievement, not just academia. I hope we can reflect a little on what one is hoping to gain from a university education. I think a primary value is learning to think for oneself, learning to evaluate critically what one is learning and one's environment. A friend of my wife and mine recently told us that it was only in her third year at university that she actually learnt to think for herself. In her first two years, she just memorised material and regurgitated it in exams, and passed.

So what should we evaluate critically? We are all immersed in a culture--indeed, many subcultures: the culture of modern Australia, the culture of Queensland, the culture of university life. You are all immersed in the undergraduate culture, the culture of college life, and then the culture of specific disciplines and courses. A great value and privilege of college life is meeting and interacting with people from different courses.

So what is culture? A definition I like is "culture is a set of assumptions that are shared by a group of people and not questioned".

Please indulge me in some over-simplified sociological analysis. I would suggest that broadly there are three different academic cultures present in a modern Australian university:

- i. the arts and humanities;
- ii. the sciences;
- iii. the professions—engineering, medicine, vet, law, physiotherapy, etc.

How are they different? They have had interesting and contrasting perspectives on certainty and ambiguity.

In the subculture of the sciences, a prevailing assumption is that we can know the truth. Furthermore, scientific truth is the most reliable and important. The focus is on certainty and not ambiguity. Consider the following statement by the very famous theoretical physicist, Stephen Hawking. This is the concluding sentences of his best-selling book, *A Brief History of Time*, and it concerns the prospect of string theory being the grand theory of all the forces of nature:

If we do discover a complete theory, it should in time be understandable in broad principle by everyone, not just a few scientists. Then we shall all, philosophers, scientists, and just ordinary people, be able to take part in the discussion of why it is that we and the universe exist. If we find the answer to that, it would be the ultimate triumph of human reason—for then we would truly know the mind of God.

In the Arts and Humanities, one encounters a very different perspective. The focus is on ambiguity and not certainty. Increasingly, due to the rise of postmodernism, the consensus seems to be that we cannot really know anything. Truth is just a cultural construct.

Professional courses such as law, vet and engineering often seem to have a different subculture again. The goal of a university education is admission to a profession. This is fine and good. But the goal of understanding and thinking can become subservient to the goal of passing. Sometimes it doesn't matter

what grade you get as long as it is 4 or higher! Questions of truth--of analysis--are not of primary importance.

So what assumptions should we each re-evaluate? What opportunities are we missing because we uncritically accept the assumptions of the subculture in which we are immersed?

One uncontested assumption that you will encounter at some point in the university is that Christianity and the Bible are irrelevant to modern life--particularly to intellectual life. Being a scientist and a Christian are incompatible. Yet this is not so for me or for some of my colleagues. Each Thursday morning I meet with several other men to read the Bible and pray together. We are all senior academics in science and engineering at the University of Queensland. One of the most significant things I think I do each week is to teach religious education to Grade 2 and Grade 7 students at the local state school. It is a great privilege to get to know them and teach them basic truths about Jesus and the Bible.

It is easy to dismiss out of hand Biblical events such as miracles and the resurrection of Jesus. But should we? One thing we have learned from modern science is that things that sometimes what we think 'makes sense' or what we may intuitively think is 'rational' or 'reasonable' can actually be false. Sir Arthur Eddington was the most influential astronomer in the early 20th century. J.B.S. Haldane was an incredibly influential geneticist and evolutionary biologist. Both are credited with saying that "the Universe is not only queerer than we suppose, but queerer than we can suppose".

Yet it is striking to me that this statement was made so long ago. The universe is indeed even stranger than what Haldane and Eddington knew 50 years ago. This was before we had to grapple with the most bizarre properties of quantum physics or the recent finding that 96% of the universe may be composed of dark matter and dark energy, which is completely unlike the matter and energy of which we are made and encounter in our daily lives.

Quantum theory is one of my passions. When I went to university, I thought if I understood quantum theory, I would understand the meaning of life. I was so young and naive. Quantum theory raises more questions than it answers. It is the most successful theory in all of science. It can explain properties of everything--from quarks to atoms to DNA. It can predict the outcome of experiments to an accuracy of 10 decimal places. Its resounding success challenges many claims in the Arts and Humanities about the absence of absolute truth, and about knowledge just being a social construct.

Yet there is no consensus on the interpretation of the most successful theory in all of science. There are an abundance of different interpretations of quantum theory. They go by names such as: Copenhagen, consistent histories, decoherence, no interpretation, many-worlds--and so on. And these interpretations cannot even agree on how many universes there are--nor whether external reality even exists! So we have both certainty and ambiguity in science.

My wife generally doesn't share my passion for quantum physics. Yet Robin does like Schrödinger's cat! It is simultaneously dead and alive. It could be either, and it is only after you look to see which that it dies or lives. So looks can kill!

The possible existence of such a being as this cat is the logical outcome of the most successful theory in all of science. This should humble us. We don't have all the answers. But there are some things which science does very well. And there are other things it does not do very well.

I hope that hearing about certainty and ambiguity in science will make us a little more hesitant about our assumptions--about our pre-conceived ideas about how the world should be. Maybe we need to revise some of our life goals, and question some of the assumptions we are bombarded with our own little cultures. I hope you will make the most of this time at the University of Queensland.

So what *does* matter? What kind of knowledge should we value? The motto of Cromwell College is "Where there is spirit, there is freedom". This refers to a verse in the Bible: 2 Corinthians 3:17, "Now the Lord is the Spirit, and where the Spirit of the Lord is, there is freedom".

Who is this LORD? What does the LORD value? There is a particular passage from the Bible--from the book of Jeremiah--that I find challenging:

This is what the LORD says:

"Let not the wise man boast of his wisdom
or the strong man boast of his strength
or the rich man boast of his riches,
but let him who boasts boast about this:
that he understands and knows me,
that I am the LORD, who exercises kindness,
justice and righteousness on earth,
for in these I delight,"
declares the LORD.

(Jeremiah 9:23-24)