THE UNIVERSITY OF MELBOURNE

Occasional Address

Wilson Hall, University of Melbourne, Saturday 18 March 2017, 11.00am

Professor David Jamieson

Professor of Physics, University of Melbourne

'Authority and the Future and Galileo'

Ladies and Gentlemen, scholars, Presiding Chancellor, distinguished colleagues, etc.

I would like to speak to you today of authority and the future. And also of Galileo.

I want to start with reference to the Boyer lectures[1] given a few years ago by our Vice Chancellor, Professor Glyn Davis, in which he describes the "Republic of Learning" otherwise known as the University system. In this Republic, of global reach and membership, there is a relentless quest for innovation and ideas. A free exchange of the best and brightest people and the participation of students young and old.

That would be you.

In my view this Republic of Learning has led to the greatest flowering of civilisation the world has ever seen, at least for those who enjoy the benefits. Never have there been times like this with unprecedented access to power, information and ever more sophisticated and versatile gadgets. I am sure future ages will judge us to be the most fortunate people who have ever lived.

In my own modest contributions to the Republic of Learning I am working with colleagues here in Australia and overseas to develop the technology for the quantum internet of the mid 21st century. This new internet will be required to solve some of the biggest problems that are presently beyond the reach of conventional technology. We can look forward to a secure quantum communication system to control the highly dispersed power grid of the future; quantum computers that can design new drugs, possibly even antibiotics, from the laws of physics instead of the traditional test tubes; new methods for atomic level sensing including of the electromagnetic machinery of life. And more. You can read about this in the national innovation statement for Australia[2].

What is the most important engine of the Republic of Learning that drives all this?

It is none other than thinking! A new way of thinking. A way of thinking developed 400 years ago. In the words of Prof Davis, this new way of thinking: "... replaced a way of thinking based on revealed truth with one grounded in rational inquiry. (Using)... mathematics, systematic observation and later new instruments such as the quadrant and telescope to explore the actual movement of the heavenly bodies."[3] Professor Davis is clearly invoking Galileo.

So let me now return to the first research physicist Galileo Galilei and his revolutionary contributions to the Republic of Learning.

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[1] http://www.abc.net.au/rn/boyerlectures/default.htm

[2] https://www.innovation.gov.au/page/agenda

[3] http://www.abc.net.au/rn/boyerlectures/stories/2010/3034846.htm

Galileo was born in 1564 at a time when the Renaissance was well under way in his part of the world where he lived and spent his career. But when Galileo was born, there were strict boundaries between what could be explained by the emerging discipline of science and what required supernatural intervention.

Yet by the time Galileo died at his house in the hills above Florence in 1642, his discoveries had changed the world and those boundaries were being redrawn. How had he done this?

When Galileo first turned his best telescope to the celestial sphere, over 400 years ago, first starting in November of 1609, he recorded in his notebooks an avalanche of new observations: mountains and valleys on the Moon, sunspots on the Sun, rings around Saturn, and four tiny bright moons orbiting Jupiter. For the first time a human being had seen objects that unquestionably orbited another planet and not the Earth.

At the same time he was developing a great textbook on the laws of Physics. One of these laws, we could call "Galileo's theory of relativity" allowed him to displace the Earth from the centre of the Universe and set it in motion around the Sun. By uncovering the laws of physics by direct observation from experiment he was able to counter the overwhelming evidence of our senses that the Universe revolves around us. As a matter a fact, this is one of the topics I am teaching right now in the lecture theatres of this University.

Let me give you a short highlight that eventually led me to Florence a few years ago. Galileo recorded in his notebook in January 1613, as he had done for many years already, a sketch of Jupiter, its four bright tiny moons and, nearby, two stars that appeared close to Jupiter that month. Stars would drift across the field of view as the planet moved across the backdrop of the stars in its orbit. Galileo labelled these two stars "fixe", short for "fixed star". One of those stars can be identified from modern star charts. The other cannot be identified with any star in any modern star chart. That is because, ladies and gentlemen, it was not a star!

In fact we now know, 234 years before it was officially discovered, Galileo was observing the planet Neptune which resembled a star in Galileo's telescope.

On the night of January 28 1613 he noted something extraordinary. One of these two stars appeared to be further away from the other star compared to the observation from the previous night!

In other words he had seen the star that was actually the undiscovered planet Neptune wander slightly across the backdrop of the other stars over 24 hours, something only planets do. A wandering star! The word planet derives from the Greek word wanderer.

Surely Galileo must have deduced that this wandering star was a new, undiscovered, planet?

But after making this entry in his notebook, Galileo did not observe the new planet again. Nor has there ever been any evidence yet found that he knew he had seen the first new planet to be discovered by humanity since deep antiquity! What a sensational discovery! A new planet with no prior mention in any ancient text! Could this knowledge have been dangerous? Perhaps because he could not find the faint planet again in the sky to confirm his discovery, he took the secret to his grave to leave others to renew the discovery.

Well, now my journey to Florence. A few years ago I came up with a somewhat fanciful theory that physical evidence in the ink in Galileo's notebook, or perhaps a coded anagram, of which Galileo was very fond, could be found in the pages as evidence he did realise what he had seen. Word of my fanciful theory went a little viral on the internet. I did live radio interviews in Columbia. The BBC did a program on Neptune, interviewed me, and

employed an actor to say in English with a bad Italian accent what I though Galileo might be thinking on those fateful nights when he observed the wandering star.

All this led to a complex sequence of events. I was invited to Florence, went to the National library, was escorted through the public areas, through the closed areas, enduring the glares of the old greybeards up their eyebrows in dusty books, and into the ancient and rare manuscripts section out the back. And into my shaking hands the head librarian placed the greatest artefact of our Republic of Learning, indeed of our scientific civilisation: Galileo's actual astronomical notebooks from 1609 to 1617.

Well, somewhat overwhelmed, I had 2 hours to search through the notebooks looking for evidence not recognised until now that Galileo knew he had discovered a new planet.

The forceful nature of Galileo's personality was immediately evident from the bold strokes of his handwriting, the impatient crossing out of observations "made doubtful by cloud" and the frequent splatters of ink and other substances. To say nothing of the faint whiff of cooking fires from four centuries past.

Sadly, I did not find what I was looking for. There was too much material and not enough time. Later perhaps I will return to this quest.

In any case, would Galileo's authority have been enough to convince a sceptical world of his discovery especially if it could only be seen through his telescope? I suspect the world of 1613 was not ready for this news.

These days we have seen the rise of "Fake News". This can originate from those without authority seeking to undermine well-established science and cast doubt where it suits their agenda. In much the same way doubt was cast on the Earth being in orbit around the Sun. A commentator on the BBC calls for Schools to train students on how to recognise fake news[4]. He goes on: "Distinguishing what is true from what is not true is a critical judgement," and "… you have to question, think critically - that's a very important task."

I call on you to rise to this challenge. I call on you to use the authority you have obtained from your studies to decide on your future. To discriminate between those who speak with authority from those who do not.

The future of the planet will depend on the choices you make as you shape your future.

Today the scope of human knowledge is vast and deep and we face many challenges crying out for new revolutions. Are there opportunities to make breakthroughs as profound as those made by Galileo 400 years ago. A revolution so profound that 400 years from now someone will be interested in our laboratory notebooks, email records, opinion pieces in the newspapers, on Facebook, and will quote from them in graduation ceremony addresses of the year 2417?

Perhaps it is impossible for there to be another Galileo?

But I would entreat you to prove me wrong.

On behalf of you all, many thanks to all the parents and support people who helped get you to where you are today. You are very special (and patient!) people.

To all the new graduates, my best wishes for your future careers.

[4] http://www.bbc.com/news/education-39272841

THE UNIVERSITY OF MELBOURNE

Vice-Chancellor's Introduction

Presiding Chancellor, ladies and gentlemen:

This afternoon we are fortunate to be addressed by Professor David Jamieson. David is both a professor of Physics at the University of Melbourne, and a graduate of this university, having completed his PhD in physics here in 1985.

In a distinguished career in physics research David has published over 280 papers with Australian and international collaborators, and has served as President of the Australian Institute of Physics, and Head of the School of Physics at the University of Melbourne.

He has been a finalist in Australia's national awards for university teaching, and convened the group that developed the Decadal Plan for Physics in Australia.

David is a chief investigator of the Victorian node of the Australian Research Council's Centre for Quantum Computation and Communication Technology – a centre working on new ways of storing and processing information using the laws of quantum mechanics.

David is also one of the first academics to engage closely with the issues around climate change, introducing the topic into his university lectures as long ago as 1990.

He is an engaged scholar keen to expand public understanding of science, and particularly the discipline of physics.

It's a pleasure to invite him to speak this afternoon. Please welcome Professor David Jamieson.