

Science

Putting Einstein first: It's time to stop lying to our children about physics



OPINION

ABC Science By David Blair for [Ockham's Razor](#)

Einsteinian physics gives us our best understanding of the natural world, so why are we still hung up on Newton? (Pixabay CC: David Mark)

Isaac Newton is a physics icon, but he was wrong.

Sure, three hundred years ago, his discoveries about gravity and the laws governing motion revolutionised the world.

And yes, sure, those discoveries led to an incredibly useful mechanistic, deterministic view of the universe – in which one thing causes another.

It's the story we all still learn in school. But Einstein proved it was wrong a century ago.

What did Newton get wrong?

While Newton saw time and space as absolute, Einstein proved that **time is relative** – it depends on height and speed.

And space? Einstein said that space is curved by matter. So parallel lines will always cross, because space is never flat.

It's mind blowing. And it's not what we're taught in school.

Our kids still learn that time is absolute. And parallel lines never meet. In fact every bit of geometry you learn at school is approximate, because Newton's fundamental assumption about the fixed nature of space was false.



David Blair teaching Einsteinian physics to school students. (Supplied: UWA Einstein-First team)

But it doesn't stop there.

When Einstein showed that light comes as little packets of energy (that we now call photons), he also predicted the physics of solar panels.

Louis de Broglie extended Einstein's hypothesis, and proposed that everything, whether a cricket ball, an electron or a photon of light, combines both 'bulletiness' (the momentum you feel when you catch a heavy ball) with 'waviness' (like the ripples on a pond).

Einstein's physics for kids



Listen to David Blair talk about whether kids can understand relativity and quantum physics.

A consequence of all this is that our universe is far from mechanistic and deterministic. In fact, everything in the universe is statistical.

Reality is governed by strange but precise statistical rules. Reality is ... fuzzy.

Einstein himself hated this conclusion and struggled to prove the absurdity of it. Famously saying: "God does not play dice."

But God and dice aside, physicists went on to prove that reality is indeed fuzzy.

Richard Feynman described it like this: "The rules are so strange ... the rules are so screwy that you can't believe them!"

But this is the truth we all have to get used to. "If you don't like it," he said, "go somewhere else ... to another universe!"

Physicists and chemists have been using these rules of the quantum world for decades to invent transistors, computers, lasers, nuclear reactors, cameras, mobile phones, whole body MRI scanners, drugs and medicines.

But kids are still learning the old stuff in school. The Newtonian world view — the lies.

Teachers are still teaching Newton's physics because of a combination of Einstein's physics being seen as too hard, and teachers themselves being more comfortable with the Newtonian physics they were trained in.

I believe that we owe it to our kids to stop the lies, and to teach them our best understanding of the universe.

Can kids handle the quantum truth?



Learning about the geometry of curvy spacetime with a wok. (Supplied: UWA Einstein-First team)

Six years ago my team set out to discover if it was actually possible. We designed programs that we have tested from year 3 to year 12. They are fun and interactive, based on models and analogies.

We converted the maths of the quantum world into the maths of arrows. We tested to see if kids could grasp what it means for space to be curved, and whether they could appreciate the weirdness of the quantum world.

The evidence is overwhelming: the kids enjoy it, ask for more, and wish all their science could be so engaging. They all know that they

have been learning old stuff.

Girls who normally start with a less positive attitude to science than boys, respond more strongly to our approach and come out equal with the boys.

And while adults respond to the ideas, with "Wow, you must be a genius to understand this science", the children just take it in their stride. They are learning a new common sense.

Putting Einstein first

Following our first trials, we have been funded for a five-year program in which we are developing an integrated school curriculum called **Einstein-First**. It is designed for all students, not just the academically talented.

EXTERNAL LINK: [Einstein-First Program - UWA](#)

Our goal is that university lecturers will never again have to say "forget all that stuff you learnt in school". We want everybody to feel comfortable in the modern world where nearly everything is powered by Einstein's physics.

But why is this important?

In the world today a few scientists and technologists speak one language of reality, and everyone else, the consumers of Einsteinian technology, whether they be prime ministers, lawyers, primary school teachers or farmers speak the obsolete Newtonian language of reality.

“Imagine a world without mobile phones, solar panels, cameras, nuclear reactors, black holes or gravitational waves. That's the world we're preparing our kids for. These things don't exist in the Newtonian world we teach.”

Neither does climate change. Tiny traces of carbon dioxide in the air make a heat blanket around earth because of the Einsteinian physics of photons interacting with CO2 molecules.

And high-energy photons like X-rays and UV can damage molecules like DNA, causing cancer. But low energy photons like those used for radios and mobile phones cannot.

Understanding the physics of our world allows us to make better, more informed decisions. Without the language of Einsteinian physics all our technology may as well be magic. And we are beholden to whoever makes the strongest sales pitch.

Our creation story



Einsteinian physics has given us the story of the Big Bang creation of the universe. (NASA)

Beyond understanding things around us, humans have always yearned to understand our place in the universe. And our best understanding is 100 per cent Einsteinian.

It has given us the story of the Big Bang creation of the universe, the formation of galaxies and stars, the making of the elements, the evolution of solar systems and the future death of the Sun.

It is the most fantastic, wonderful and awe-inspiring story. Everyone could share it if we all spoke the Einsteinian language of reality. Don't our kids deserve the opportunity to share this story?

ABC Science on YouTube



Want more science — plus health, environment, tech and more? [Subscribe to our channel.](#)

Now I don't want you to get the idea that Einsteinian physics is the end of the road that all our questions have been answered. It is just our best understanding of the natural world to date.

Major mysteries like dark matter and dark energy remain. Explaining them may lead us to another revolution. Our young people will be best able to make the next advances from the vantage point of Einsteinian physics, while using their knowledge of to help solve the problems facing humanity.

In Europe, the USA and Asia huge quantum initiatives have been announced with major emphasis on education.

We need leadership from education ministers to enable Australian children to benefit from learning a new common sense based on our best understanding of the truth.

David Blair is an Emeritus Professor at the University of Western Australia and the Outreach Leader at the ARC Centre of Excellence for Gravitational Wave Discovery. This is an edited version of his [Ockham's Razor talk on ABC RN on Sunday 8 December.](#)

Want more science from across the ABC?

- [Like us on Facebook](#)
- [Follow us on Twitter](#)
- [Subscribe on YouTube](#)

Science in your inbox

Get all the latest science stories from across the ABC.

Related articles

- [How does the 'Bible' of quantum physics work?](#)
- [Quantum physics rules nature](#)
- [100 years of general relativity — and why it matters](#)

Topics [Science and Technology](#) [Physics](#)

TOP SCIENCE STORIES >

1. [Most distant object ever seen helps us understand origin of our planet](#)
2. [Tropical snakes left with nothing to eat after a fungus wiped out their prey](#)
3. [Scientists achieve 'spooky action' over 50km in quantum breakthrough](#)
4. [More and more people can afford to waste food — and that's a problem, scientists warn](#)
5. [Normally, this animal's biggest problem is too much sex. Now it has climate change to deal with](#)

TOP STORIES

- ['I'm a nobody with nothing': How ordinary Australians got hoodwinked into becoming company directors](#)
- [First West Australian diagnosed with coronavirus after test on cruise ship](#)
- [Beijing is willing to punish Australia economically, US admiral warns](#)
- [Jane had to endure her father's photos and her half-brother's 'games' after her voice was silenced](#)
- ['It's spreading': Crew member on coronavirus cruise ship begs for rescue](#)
- **SPORT** [Auditor-General 'blows out of the water' PM's sports grants evidence, Labor says](#)
- ['You know nothing about the process': What to do when someone dies suddenly at home](#)
- [Peter Dutton defends Government's coronavirus travel ban amid Chinese criticism](#)
- ['It doesn't get much worse': More than 100 charges dropped against Blue Mountains family](#)
- [Analysis: Trump's number one campaign boast doesn't hold up if you look at the numbers](#)
- [Kathmandu founder facing criminal charges over Bellamy's shareholding](#)
- [Weinstein's lawyer attacks accusers, #MeToo movement in closing argument](#)
- [Not the 'tip of an iceberg': WHO downplays China's coronavirus spike](#)
- [Analysis: The Maddy Prespakis Era has arrived, and that's great news for AFLW](#)
- [High Court sets hearing date for George Pell's appeal against child sex abuse convictions](#)
- [Thousands of women have fallen in love with me. But I'm not who they think I am](#)
- [Liberal MP to face court over alleged Christmas party bad behaviour](#)
- [Analysis: The trouble is just beginning for Scott Morrison but he remains a powerless observer as the Nationals implode](#)
- [In five weeks on this historic mountain trail, Patrick didn't see another hiker. But he wasn't alone](#)
- [Boat capsized, 25m trees down as Cyclone Uesi smashes Lord Howe Island](#)
- [Thousands of maremmas have needed rehoming after the success of Oddball](#)
- [Analysis: Australian consumers may never see a fourth player in Australia's mobile market, so are we worse off?](#)
- [Rain to ease, but flood watch continues on a steamy Valentine's Day](#)
- [The rain has brought relief. But now there's another problem](#)
- [Coronavirus is now called COVID-19. Here's why that's important](#)
- [Most distant object ever seen helps us understand origin of our planet](#)

Get the headlines to
your mobile.
NEWS on Messenger



CONNECT WITH ABC NEWS



News Podcasts
Catch up with ABC
News programs.



GOT A NEWS TIP? >

If you have inside knowledge of a topic in the news, [contact the ABC](#).

ABC BACKSTORY >

ABC teams share the story behind the story and insights into the making of digital, TV and radio content.

EDITORIAL POLICIES >

Read about our editorial guiding principles and the standards ABC journalists and content makers follow.

[Learn more](#)

FEATURES

[Two months instead of two years — how the rich are getting faster access to the NDIS](#)



[Will you walk away with the top gong or be left sitting on the sidelines? Find out with our News Quiz](#)



New Jane Austen movie Emma is no Clueless, but it should please newbies and die-hards alike



Loved-up or lovelorn — is relationship self-sabotage affecting your quest for love and happiness?



TOP STORIES

- 'I'm a nobody with nothing': How ordinary Australians got hoodwinked into becoming company directors
- First West Australian diagnosed with coronavirus after test on cruise ship
- Beijing is willing to punish Australia economically, US admiral warns
- Jane had to endure her father's photos and her half-brother's 'games' after her voice was silenced
- 'It's spreading': Crew member on coronavirus cruise ship begs for rescue
- **SPORT** Auditor-General 'blows out of the water' PM's sports grants evidence, Labor says
- 'You know nothing about the process': What to do when someone dies suddenly at home
- Peter Dutton defends Government's coronavirus travel ban amid Chinese criticism
- 'It doesn't get much worse': More than 100 charges dropped against Blue Mountains family
- Analysis: Trump's number one campaign boast doesn't hold up if you look at the numbers

JUST IN >

- 'Sophisticated' zero-proof spirits a botanical boon for growing sober-curious market
- Weinstein's lawyer attacks accusers, #MeToo movement in closing argument
- First West Australian diagnosed with coronavirus after test on cruise ship
- Liberal MP to face court over alleged Christmas party bad behaviour
- Trump says US is 'very close' to peace deal with Taliban
- Councillors quit as City of Casey faces the sack over developer donation scandal
- 'It doesn't get much worse': More than 100 charges dropped against Blue Mountains family
- Second road death in as many days as 56yo hit by car in Wollongong
- Trump confidante Hope Hicks to return to White House
- **ANALYSIS** **SPORT** The Maddy Prespakis era has arrived, and that's great news for AFLW

MOST POPULAR

- 'I'm a nobody with nothing': How ordinary Australians got hoodwinked into becoming company directors
- Sydney dam overflowing after massive downpour, as RFS confirms all bushfires contained
- Why the formation of a giant iceberg in Antarctica is worrying scientists
- Auditor-General 'blows out of the water' PM's sports grants evidence, Labor says
- Why does Rose McGowan think Natalie Portman's Oscars dress was 'offensive'?
- Beijing is willing to punish Australia economically, US admiral warns
- Thousands of women have fallen in love with me. But I'm not who they think I am
- 'It's spreading': Crew member on coronavirus cruise ship begs for rescue
- 'Tsunami of sewage' pours into man's pool, garage and workshop after Sydney downpour
- Xi Jinping faces big dilemma as coronavirus threatens China's showpiece political event

ANALYSIS & OPINION

- **SPORT** The Maddy Prespakis era has arrived, and that's great news for AFLW
- Australian consumers may never see a fourth player in Australia's mobile market, so are we worse off?
- Trump's number one campaign boast doesn't hold up if you look at the numbers

- [As the Nationals' leadership crisis continues, three possibilities lie ahead](#)
- **SPORT** [Lisa Alexander became a victim of her own success with the Diamonds](#)
- [Xi Jinping faces big dilemma as coronavirus threatens China's showpiece political event](#)
- [Why Bernie Sanders is surging, but the sharks are circling for Joe Biden](#)
- [When WA last hiked fines to stop drivers using mobile phones, it had the opposite effect](#)
- **SPORT** [Despite Australia's tri-series struggles, the World Cup is still there for the taking](#)
- [Barnaby Joyce and his band of rebels want more coal and this battle is not just about cheap power](#)

SITE MAP

SECTIONS

- [ABC News](#)
- [Just In](#)
- [World](#)
- [Business](#)
- [Health](#)
- [Entertainment](#)
- [Sport](#)
- [Analysis & Opinion](#)
- [Weather](#)
- [Topics](#)
- [Archive](#)
- [Corrections & Clarifications](#)

LOCAL WEATHER

- [Sydney Weather](#)
- [Melbourne Weather](#)
- [Adelaide Weather](#)
- [Brisbane Weather](#)
- [Perth Weather](#)
- [Hobart Weather](#)
- [Darwin Weather](#)
- [Canberra Weather](#)

LOCAL NEWS

- [Sydney News](#)
- [Melbourne News](#)
- [Adelaide News](#)
- [Brisbane News](#)
- [Perth News](#)
- [Hobart News](#)
- [Darwin News](#)
- [Canberra News](#)

MEDIA

- [Video](#)
- [Audio](#)
- [Photos](#)

SUBSCRIBE

- [Podcasts](#)
- [Newsletters](#)

CONNECT

- [Contact Us](#)

AEDT = Australian Eastern Daylight Savings Time which is 11 hours ahead of GMT (Greenwich Mean Time)

Terms of Use	Privacy Policy
Accessibility	ABC Help
Contact the ABC	© 2020 ABC