Communicating Science: Challenges and Rewards

Dan Falk

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@danfalk

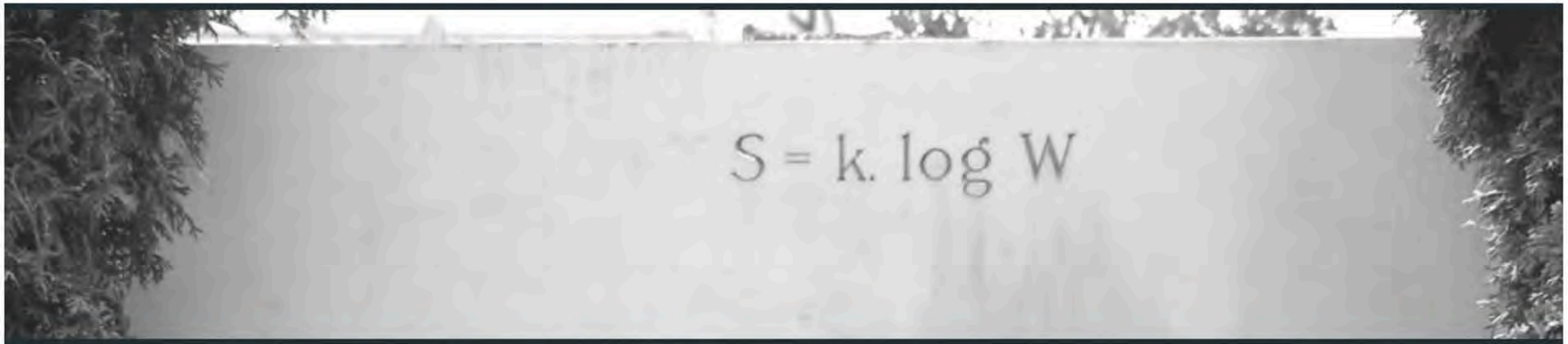
Connaught Summer Institute in Arctic Science
2017


PRESS


PRESS

Sean Carroll

in truth, only atoms and the void



A Response to "On the time lags of the LIGO signals" (Guest Post)

Posted on June 18, 2017 by Sean Carroll

This is a special guest post by Ian Harry, postdoctoral physicist at the Max Planck Institute for Gravitational Physics, Potsdam-Golm. You may have seen stories about a paper that recently appeared, which called into question whether the LIGO gravitational-wave observatory had actually detected signals from inspiralling black holes, as they had claimed. Ian's post is an informal response to these claims, on behalf of the LIGO Scientific Collaboration. He argues that there are data-analysis issues that render the new paper, by James Creswell et al., incorrect. Happily, there are sufficient online tools that this is a question that interested parties can investigate for themselves. Here's Ian:

On 13 Jun 2017 a paper appeared on the arXiv titled "On the time lags of the LIGO signals" by Creswell et

Wednesday, July 19, 2017

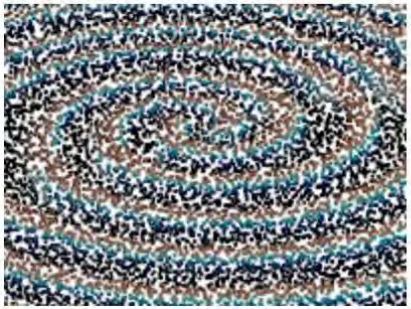
Penrose claims LIGO noise is evidence for Cyclic Cosmology

Noise is the physicists' biggest enemy. Unless you are a theorist whose pet idea masquerades as noise. Then you are best friends with noise. Like Roger Penrose.

> **Correlated "noise" in LIGO gravitational wave signals: an implication of Conformal Cyclic Cosmology**
> Roger Penrose
> arXiv:1707.04169 [gr-qc]

Roger Penrose made his name with the Penrose-Hawking theorems and twistor theory. He is also well-known for writing books with very many pages, most recently "Fashion, Faith, and Fantasy in the New Physics of the Universe."

Penrose doesn't like most of what's currently in fashion, but believes that human consciousness can't be explained by known physics and that the universe is cyclically reborn. This cyclic cosmology, so his recent claim, gives rise to correlations in the LIGO noise – just like what's been observed.



The LIGO experiment consists of two interferometers in the USA, separated by about 3,000 km. A gravitational

Recent Comments

Matti, Sorry about that. It came up in a Google s... - Sabine Hossenfelder

The picture you used. I clicked the link and saw y... - Matti Jansson

One man's noise is another man's signal. Maxwell&... - Rob van Son (Not a physicist, just an amateur)

Arun, That is an interesting observation. I would... - Tim Maudlin

Yes, I've seen it. Haven't read it, but al... - Sabine Hossenfelder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The Wolves of Long Island

OPINION | COMMENTARY

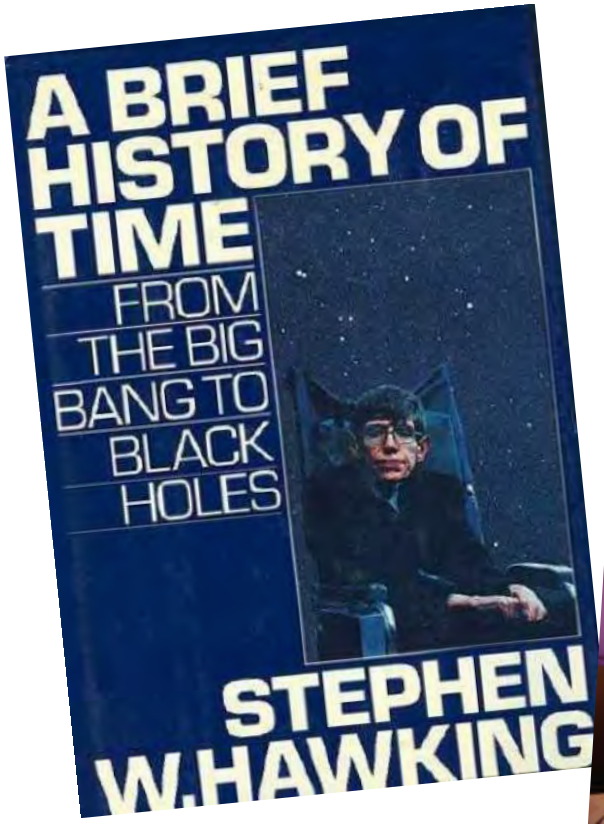
Venus Shines in the Shadow of Mars

The second planet deserves more study because once it may have been like Earth.

By Ray Jayawardhana

June 11, 2017 4:36 p.m. ET

The U.S. has long played favorites with Earth's planetary neighbors. It operates exploration rovers on Mars but has ignored Venus for years. Even Barack Obama and Donald Trump agree on the importance of a human mission to Mars, yet each has remained silent on Venus. Even though Mars is farther from Earth, why has it managed to push Venus off the radar screen?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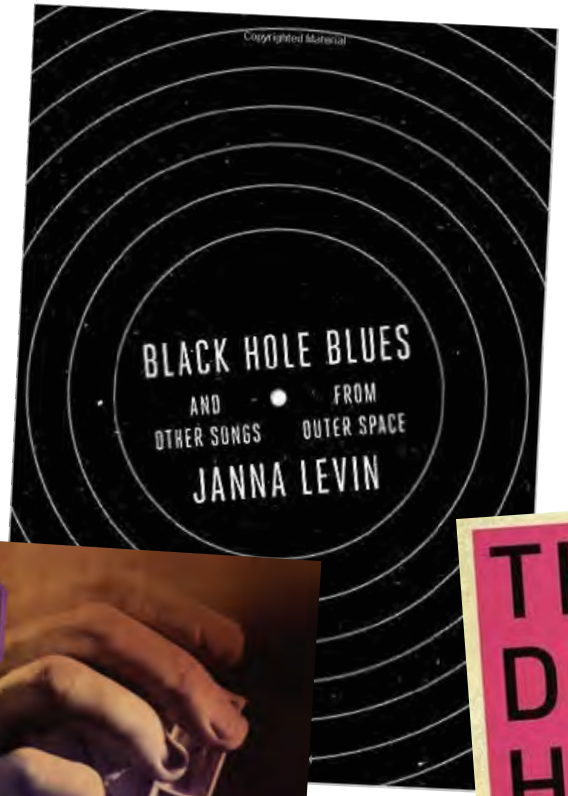
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AND OTHER SONGS FROM OUTER SPACE
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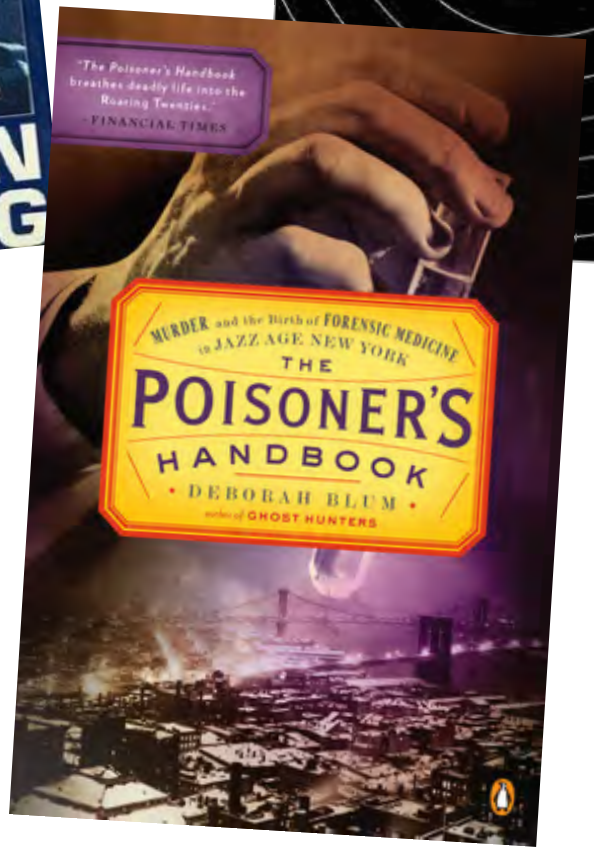
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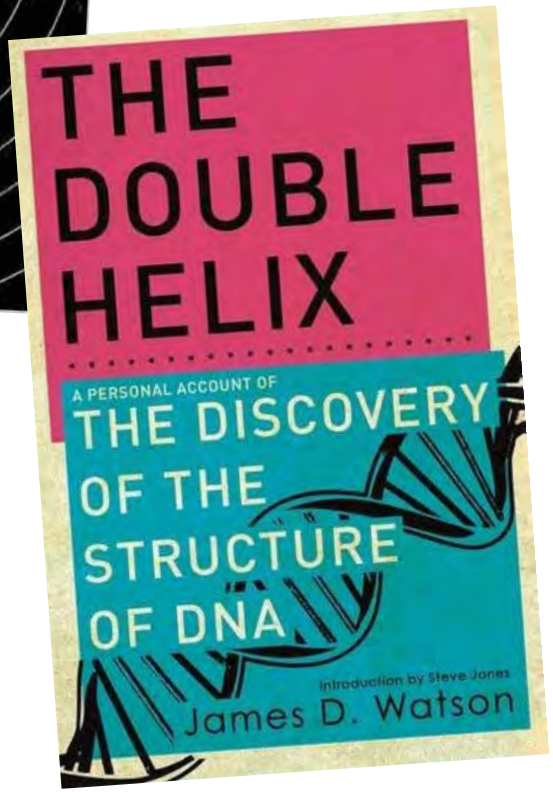
THE POISONER'S HANDBOOK
DEBORAH BLUM
author of GHOST HUNTERS


THE DOUBLE HELIX
A PERSONAL ACCOUNT OF
THE DISCOVERY OF THE STRUCTURE OF DNA
Introduction by Steve Jones
James D. Watson

THE GLOBE AND MAIL

The dawn of life

By Ivan Semeniuk

Researchers from the Royal Ontario Museum are busy drilling, chiselling and carefully dislodging one well-preserved fossil after another at a recently discovered site in the Rocky Mountains. (Courtesy Royal Ontario Museum)

High up in the mountains of British Columbia's Kootenay National Park, the exact location a secret, Jean-Bernard Caron shows me a slab of rock pried from the cliff face where we are standing. I can see something embedded in the surface, that to my untrained eye is little more than a grey-on-grey blob the size of a flattened tennis ball – nothing that I would suspect as having once been alive.

But to Dr. Caron, curator of invertebrate paleontology at the Royal Ontario Museum, the blob is immediately recognizable as *Sidneyia inexpectans*, an ancient species of arthropod that would have looked like a cross between a jumbo shrimp and a sowbug. Dr. Caron points out the traces of feather-like appendages. Then he tells me exactly what it was doing the moment it died.

"Defecating, actually," he says, indicating a darker splotch projecting from what I presume was the creature's rear end. "He was a bit stressed, I guess, during burial."

No kidding. One minute, about 508 million years ago, the hapless

"Every single one of the big existential challenges we face in this century calls for better science, to identify the problems, and better technology, to identify the solutions. But the science won't get done, and the solutions won't get implemented, unless the general public is part of the process. And to be involved in a meaningful way, citizens need accurate information. That's where science and technology writers come in."

-- Wade Roush, MIT Program in Science, Technology, and Society

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Editorial

Nature **458**, 260 (19 March 2009) | doi:10.1038/458260a; Published online 18 March 2009

Filling the void

As science journalism declines, scientists must rise up and reach out.

Top

Scientists at CERN, Europe's particle-physics laboratory near Geneva, Switzerland, opened the wine last week to celebrate the twentieth anniversary of the laboratory's invention of the World Wide Web. The scientists were also joined by around 60 members of the media, who may have been in a less festive mood. Even before the current economic crisis, the web was inflicting much pain on the mass media. Circulations have dropped, advertising has dried up and newspapers have been forced to lay off reporters and scale back coverage. A similar slump has hit the broadcast market, with no end in sight.

Science journalism is one of the numerous casualties in this media meltdown. Many science journalists are losing their jobs, and those who remain are being asked to provide content for blogs, podcasts, online videos and other new media (see page 274). Although it is difficult to know what effect these cutbacks have had on the public's understanding of science, the general feeling is that the quality of science coverage in the conventional media is declining — as is the

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What I actually do…

SCIENCE

Physicists Spot Einstein's Gravitational Waves for the First Time

BY DAN FALK

FEBRUARY 11, 2016

MACH

ENVIRONMENT

Can Hacking the Planet Stop Runaway Climate Change?

As the ravages of climate change become ever more apparent, some scientists are contemplating an array of possible technological fixes – most of which would have sounded like science fiction just a few years ago.

May.02.2017 / 11:39 AM ET

Dan Falk

Twitter

Dan Falk

Contributing Writer

July 19, 2016

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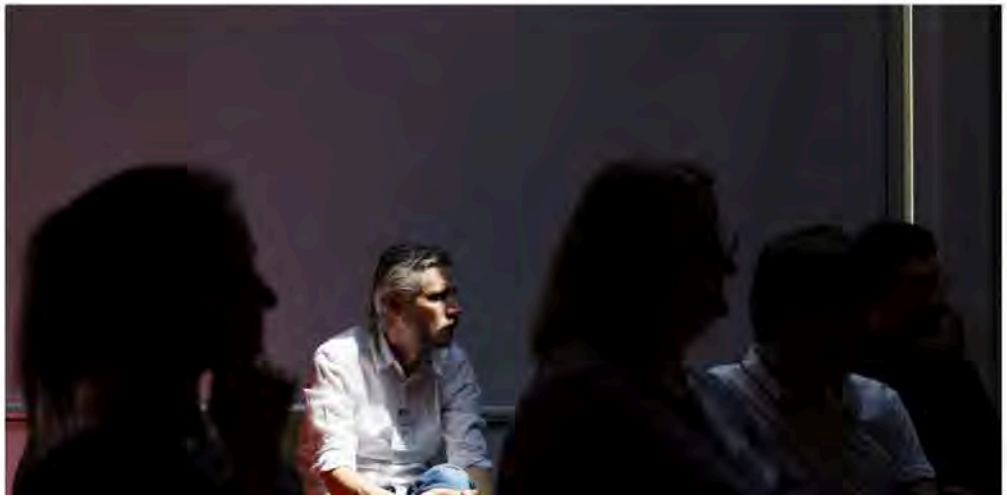
Cosmology
General Relativity Physics
Podcast
Quantum Mechanics
Theoretical Physics
Thermodynamics Time

COSMOLOGY

A Debate Over the Physics of Time

According to our best theories of physics, the universe is a fixed block where time only appears to pass. Yet a number of physicists hope to replace this "block universe" with a physical theory of time.

87



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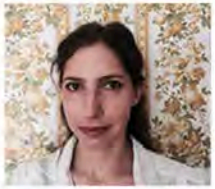

Writing Comedy for Hollywood
How Rebecca Addelman landed a job with the hit show New Girl and wrote her first film
Read more...

FROM THE ARCHIVES

FEATURE / SUMMER 2015

Getting Smarter

A U of T computer scientist is helping to build a new generation of intelligent machines

By Dan Falk

Print This Page ShareThis Comments (6)

Computer science professor Geoffrey Hinton believes artificial intelligence will soon transform almost everything we do. Illustration by Jesse Lenz, based on a photo by Noah Berger.

Geoffrey Hinton has a news bulletin for you: You're not conscious.

U OF T MAGAZINE SHORT STORY AND POETRY CONTEST

Thank you for sending in your entries. We received hundreds! Watch this space for an announcement of the shortlisted stories and poems.

CALENDAR OF EVENTS

Struggle and Story: Canada in Print
Fisher Library exhibit tells the story behind the making of a nation

PHOTO OF THE MONTH

March of the King

UofTMagazine

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FEATURE / SUMMER 2015

Getting Smarter

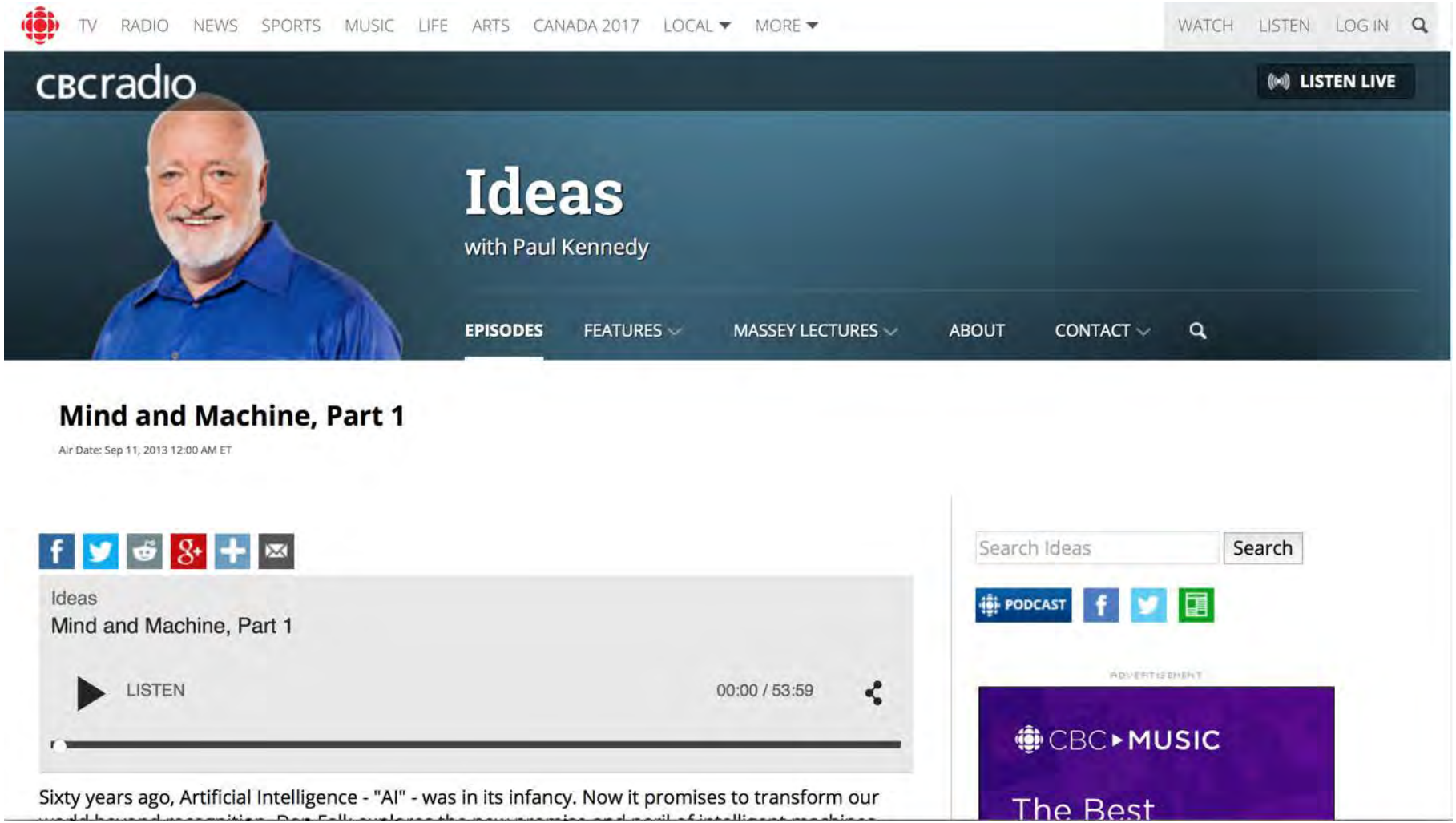
A U of T computer scientist is helping to build a new generation of intelligent machines

By Dan Falk

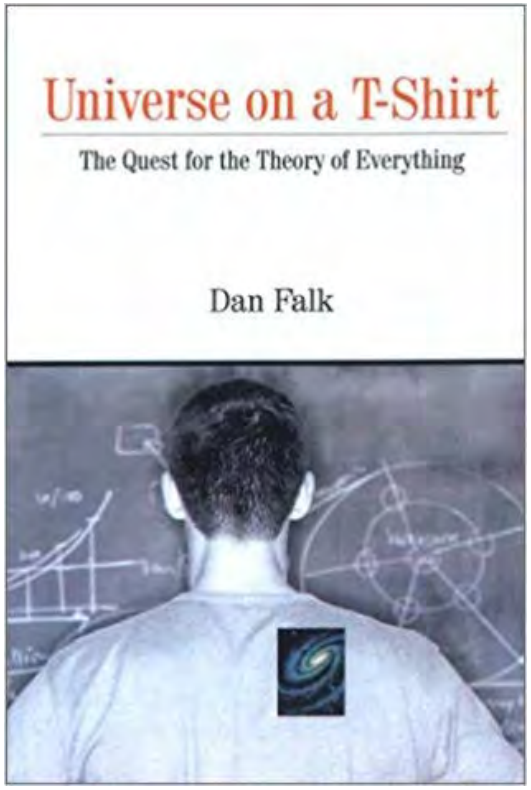
Geoffrey Hinton has a news bulletin for you: You're not conscious.

OK, you're conscious as opposed to being unconscious – such as when you fall asleep at night, or when you get knocked out during a boxing match or when a doctor administers a general anesthetic before surgery. But you don't have some intangible mental quality that worms or daffodils – or toasters, for that matter – lack.

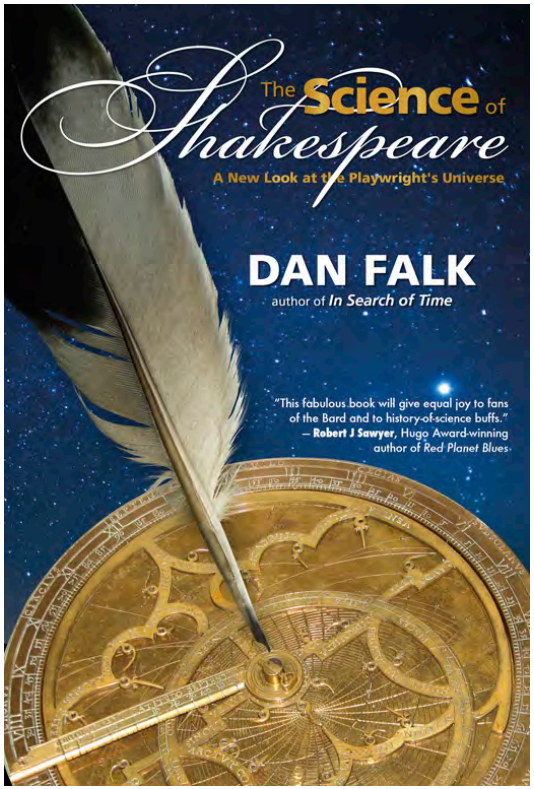
"Consciousness is a pre-scientific term," says Hinton, as we sit in the lounge down the hall from his office in the department of computer science. (Actually, Hinton remains standing, explaining that it's easier on his back; to show me something on his laptop, he kneels.) He draws an analogy to how we conceived of the notion of "life" a hundred years ago. Back then,



Sixty years ago, Artificial Intelligence - "AI" - was in its infancy. Now it promises to transform our world beyond recognition. Dan Falk explores the new promise and peril of intelligent machines.


Universe on a T-Shirt
The Quest for the Theory of Everything
Dan Falk


IN SEARCH OF TIME
JOURNEYS ALONG A CURIOUS DIMENSION
DAN FALK


The Science of Shakespeare
A New Look at the Playwright's Universe
DAN FALK
author of In Search of Time
"This fabulous book will give equal joy to fans of the Bard and to history-of-science buffs."
– Robert J Sawyer, Hugo Award-winning author of Red Planet Blues

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PAGE 7A: Two Panthers make TSWA teams
DAYTON NEWS
PAGE 14A: Lakewood takes championship
BAY AREA
THE CITIZEN
PAGE 10A: Howdy Party set for July 24
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THIS WEEK
JULY 14, 2016
HERE

Shut down (or greatly diminished):

The Detroit Free Press
The Detroit News
The Rocky Mountain News
The Philadelphia Inquirer
The Seattle Post-Intelligencer

Shut down (or greatly diminished):

The Detroit Free Press
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The Rocky Mountain News
The Philadelphia Inquirer
The Seattle Post-Intelligencer

Seemingly doing ok:

The New York Times
The Washington Post

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Seemingly doing ok:

The New York Times
The Washington Post

New(ish) kids on the block:

Nautilus *
Quanta
Mental Floss
NBC MACH
Space.com
…

NUMBERS | ARTIFICIAL INTELLIGENCE

The Man Who Tried to Redeem the World with Logic

Walter Pitts rose from the streets to MIT, but couldn't escape himself.

The Man Who Tried to Redeem the World with Logic

Walter Pitts rose from the streets to MIT, but couldn't escape himself.

BY AMANDA GEFTER
ILLUSTRATION BY JULIA BRECKENREID
FEBRUARY 5, 2015

Walter Pitts was used to being bullied. He'd been born into a tough family in Prohibition-era Detroit, where his father, a boiler-maker, had no trouble raising his fists to get his way. The neighborhood boys weren't much better. One afternoon in 1935, they chased him through the streets until he ducked into the local library to hide. The library was familiar ground, where he had taught himself Greek, Latin, logic, and mathematics—better than home, where his father insisted he drop out of school and go to work. Outside, the world was messy. Inside, it all made sense.

Things that can go wrong…

THE SCIENCE NEWS CYCLE


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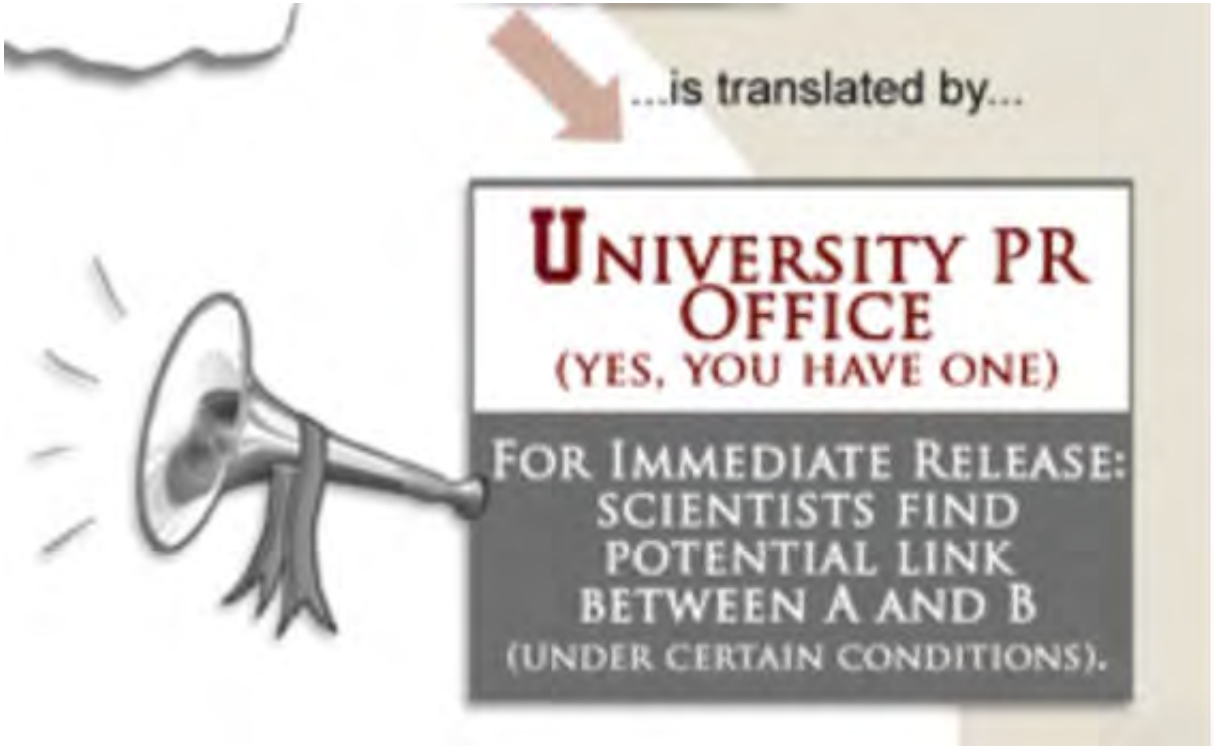
Conclusion: A is correlated with B (ρ=0.56), given C, assuming D and under E conditions.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FOR IMMEDIATE RELEASE:
SCIENTISTS FIND POTENTIAL LINK BETWEEN A AND B
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...which is then picked up by...

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A CAUSES B, SAY SCIENTISTS.


THE INTERNETS
...who are read by ...
dingding
Scientists out to kill us again.
POSTED BY RANDOM DUDE
Comments (377)
OMG! i kneeew it!!!
WTH???????


...and caught on ...
CNC Cable NEWS
A=B
We saw it on a Blog!
A causes B all the time
What will this mean for Obama?
BREAKING NEWS BREAKING NEWS BREA
...then noticed by...


WHAT YOU DON'T KNOW ABOUT "A"... CAN KILL YOU! MORE AT 11...
A: KILLER AMONG US??
LOCAL EYEWITLESS NEWS
4
LOCAL EYEWITLESS NEWS
...and caught on ...
A=B


I'M WEARING THIS TO WARD OFF "A"
YOUR GRANDMA
...eventually making it to...

Let’s talk about the great macaroni and cheese scare of 2017…

WELL | EAT

The Chemicals in Your Mac and Cheese

By RONI CARYN RABIN JULY 12, 2017

Potentially harmful chemicals that were banned from children's teething rings and rubber duck toys a decade ago may still be present in high concentrations in your child's favorite meal: macaroni and cheese mixes made with powdered cheese.

The chemicals, called phthalates, can disrupt male hormones like testosterone and have been linked to genital birth defects in infant boys and learning and behavior problems in older children. The chemicals migrate into food from packaging and equipment used in manufacturing and may pose special risks to pregnant women and young children.

The Food and Drug Administration has not banned their presence in

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APRIL 22, 2015

Boston Bob 9 hours ago
Who needs science when you've got innuendo?

Federico 19 hours ago
Having not lived in the U.S. for 17 years now, I find it difficult to understand why processed food in the U.S. is as popular as it is. Here...

ms 1 day ago
Two problems with this article, both related to hype and clickbait:1) This is the 2nd article in 2 weeks that NY Times has published based...

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What chemicals are in your mac and cheese?

By Nadia Kounang, CNN

Updated 11:16 AM ET, Mon July 17, 2017

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6 months in, Trump's presidency is teetering on the brink of...

Police in Saudi Arabia detain woman in miniskirt video

Courtesy of Kraft

FOOD AND DRINK

Most Macaroni and Cheese Products Contain These Chemicals, Study Finds

Kate Samuelson
Jul 14, 2017

TIME Health

For more, visit TIME Health.

A new study finds that most mac and cheese products contain phthalates: chemicals that make plastics more flexible and are found in things like

By Earthjustice
13 July

Popular →

jeepersmedia / Flickr

Toxic Industrial Chemicals Found in 10 Types of Macaroni and Cheese Powders

Laboratory testing of 10 varieties of macaroni and cheese products has revealed toxic industrial

Food TOXINS

Your Favorite Mac & Cheese Probably Contains Toxic Chemicals. Here's Everything You Need To Know.

JULY 17, 2017 By DANA LEIGH SMITH

Prevention Recommends

Powdered mac and cheese contains harmful gender-bending chemicals banned from use in rubber ducks

- Phthalates were found in 10 varieties of mac and cheese mixes including organic
- The chemicals leak from packaging and have been linked to a host of diseases
- These include heart disease, type 2 diabetes, obesity, and birth defects
- Levels in processed cheese mixes were four times higher than in block cheese

PHOTO: THINKSTOCK/CNNMONEY

Please Don't Panic Over the Chemicals in Your Mac and Cheese

A recent *New York Times* story raised concerns but missed some key facts.

By Susan Matthews

BAD SCIENCE

You (Probably) Don't Need to Worry About the Chemicals in Your Macaroni and Cheese

By **Jesse Singal**

July 18, 2017
1:00 pm

TOP STORIES

The Psychological Explanation for When You Feel Like You're Being Watched

What Your Therapist *Really* Thinks: 'Am I Normal?'

Finally, My Case of 'Chemo Brain' Is Vindicated

It’s not just macaroni: This phenomenon -- the wacky/ shocking thing, followed by a skeptical debunking of the wacky/shocking thing – is now commonplace.

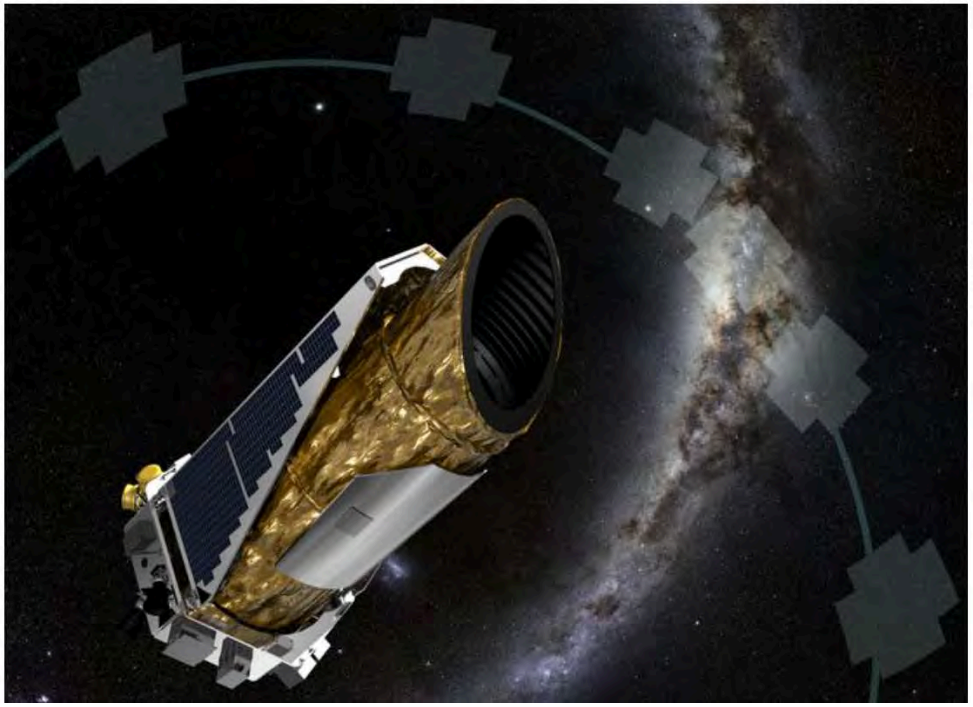
Have We Detected Megastructures Built By Aliens Around A Distant Star?

Or just a cloud of comets? Scientists want to investigate further

By Sarah Fecht *October 13, 2015*

Has the Kepler Space Telescope Discovered an Alien Megastructure?

By By Ian O'Neill, Discovery News | October 15, 2015 12:13pm ET



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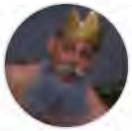
No, Astronomers Probably Haven't Found 'Alien Megastructures'



Ethan Siegel, CONTRIBUTOR

I write about astrophysics, space, and the science of the Universe. **FULL BIO**

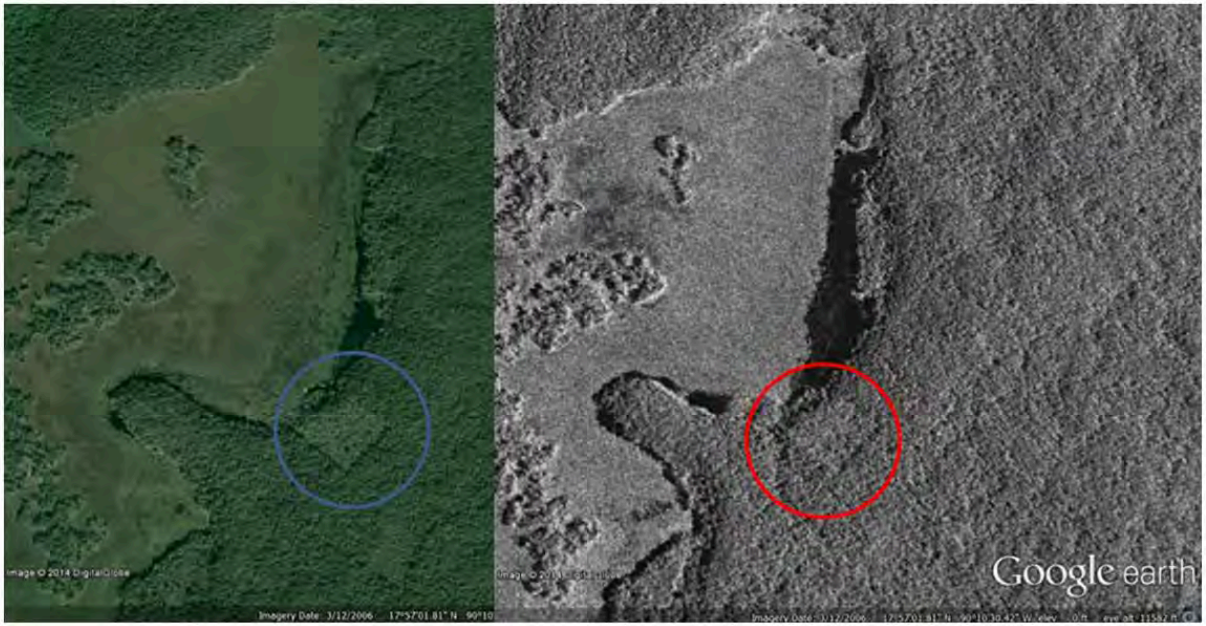
Opinions expressed by Forbes Contributors are their own.

In the hunt for alien worlds, the holy grail would be intelligent alien life: the long-awaited signal that humanity has hoped for since we started dreaming about the stars, the one that tells us we're not alone in this Universe. For more than half a century, the Search for Extra-Terrestrial Intelligence (SETI) has focused on looking for potential *intelligent* signals from other star systems, ranging from patterns in radio pulses to optical, X-ray or transiting signatures.

This last option -- transiting signatures -- got a whole lot more interesting when NASA launched the Kepler spacecraft, a dedicated observatory that would view some 150,000 stars at once, measuring the light from them and noting whenever the flux from any given star took a dip. In most cases, a drop in how luminous a star appeared would be temporary, as it would get restored to its initial value after a short time, and that dip would re-occur periodically: evidence that there was a planet (or other light-blocking object) in orbit around that star.

SARAH ZHANG SCIENCE 05.10.16 05:27 PM

THAT LONG-LOST MAYAN CITY A TEEN FOUND ISN'T LOST ... OR A CITY



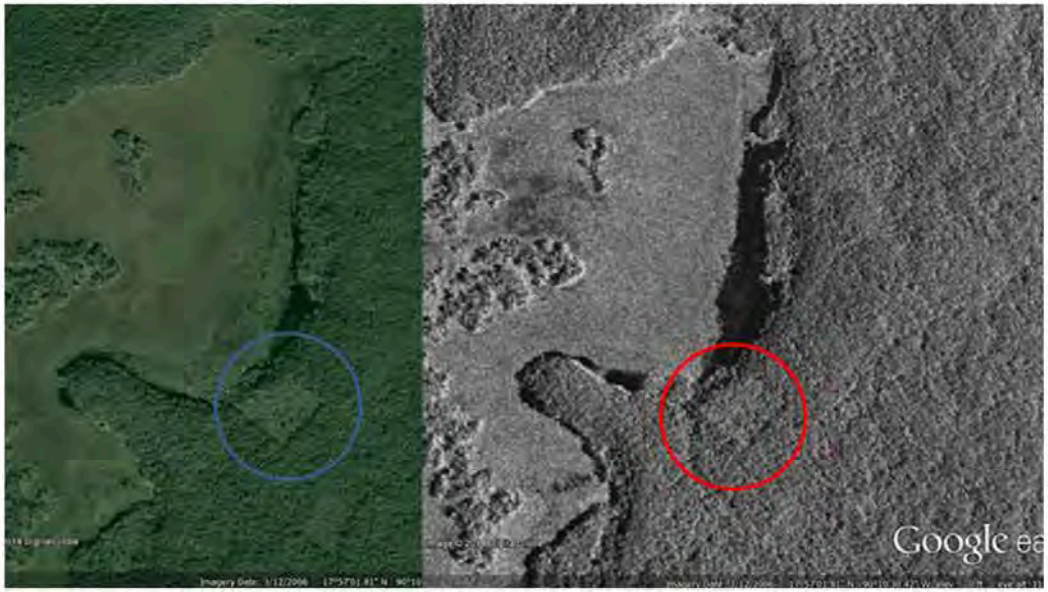
CANADIAN SPACE AGENCY

NEWS

That 15-Year-Old Kid Probably Didn't Discover a Hidden Mayan City

PATRICK LEJTENYI

May 11 2016, 4:00pm



Star Trek's Warp Drive Might Become A Reality

Starts With A Bang

The Universe is out there, waiting for you to discover it **FULL BIO**

Opinions expressed by Forbes Contributors are their own.

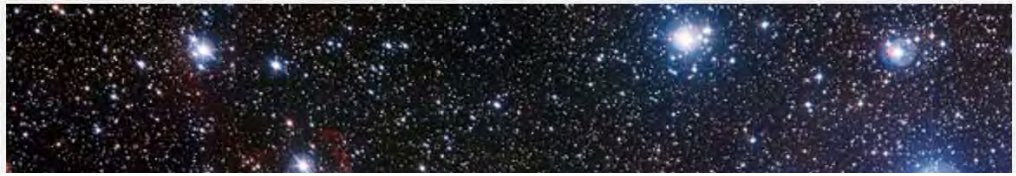
Ethan Siegel, Contributor

The starship Enterprise in the Star Trek: The Next Generation episode, The Hunted, Season 3, episode 11. [+]

No, NASA is not building a warp drive starship!

BY ADMIN – JUNE 13, 2014
POSTED IN: CONCEPT SPACECRAFT

There has been a lot of excitement over reports that NASA is developing a faster than light starship propelled by a warp drive capable of making journeys to nearby stars in mere weeks. There are even very pretty artist's impressions of the hypothetical craft. Is a wonderful space operatic future among the stars lying just ahead of us?



Welcome to Astronotes

Hello, I'm Samantha, welcoming you to Astronotes, the Planetarium's official blog. Here you will find the latest news and views from the fascinating worlds of astronomy and space exploration. We hope you will come here to learn what is hot and exciting, profound or even weird from worlds beyond ours . So that's the introduction out of the way, now on with the Universe!

KATIE M. PALMER SCIENCE 05.06.15 07:00 AM

THAT NASA WARP DRIVE? YEAH, IT'S STILL POPPYCOCK

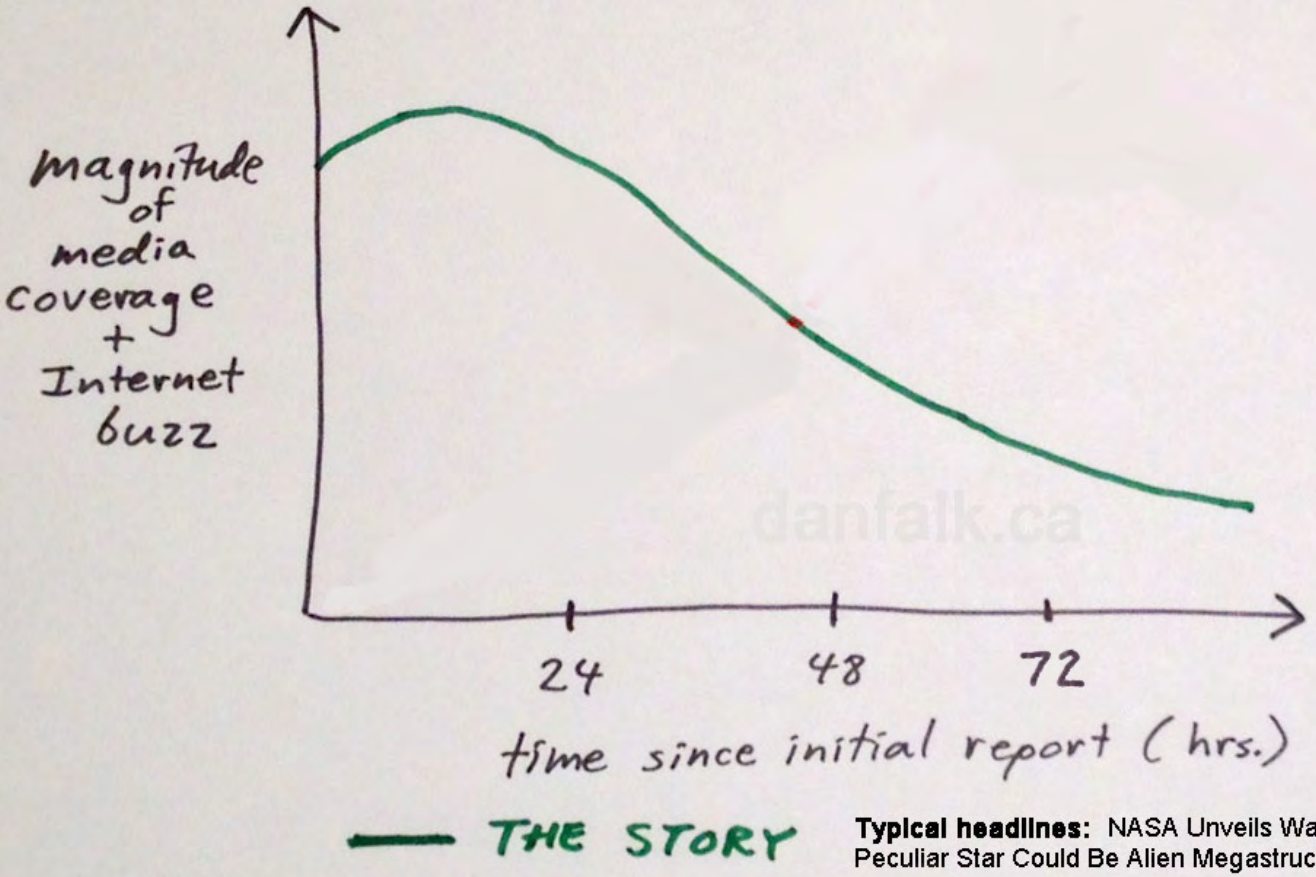
A WEEK AGO, in a far-off corner of the Internet, a little website called NASAspaceflight.com published a story about a futuristic propulsion drive that produces thrust without propellant. Amazing! said the rest of the Internet. A drive that can run without heavy propellant opens up travel to the farthest reaches of space. Not only that, but the NASA-based group testing the drive had detected a slight spatial distortion around it—a warp, in other words. As in "warp speed" and "warp drive." Not only could humans get to deep space unencumbered by fuel, but they could even travel faster than the speed of light!

Does that sound too good to be true? Excellent. This isn't the first time that this theoretical drive—tested by a small lab called Eagleworks, based at NASA's Johnson Space

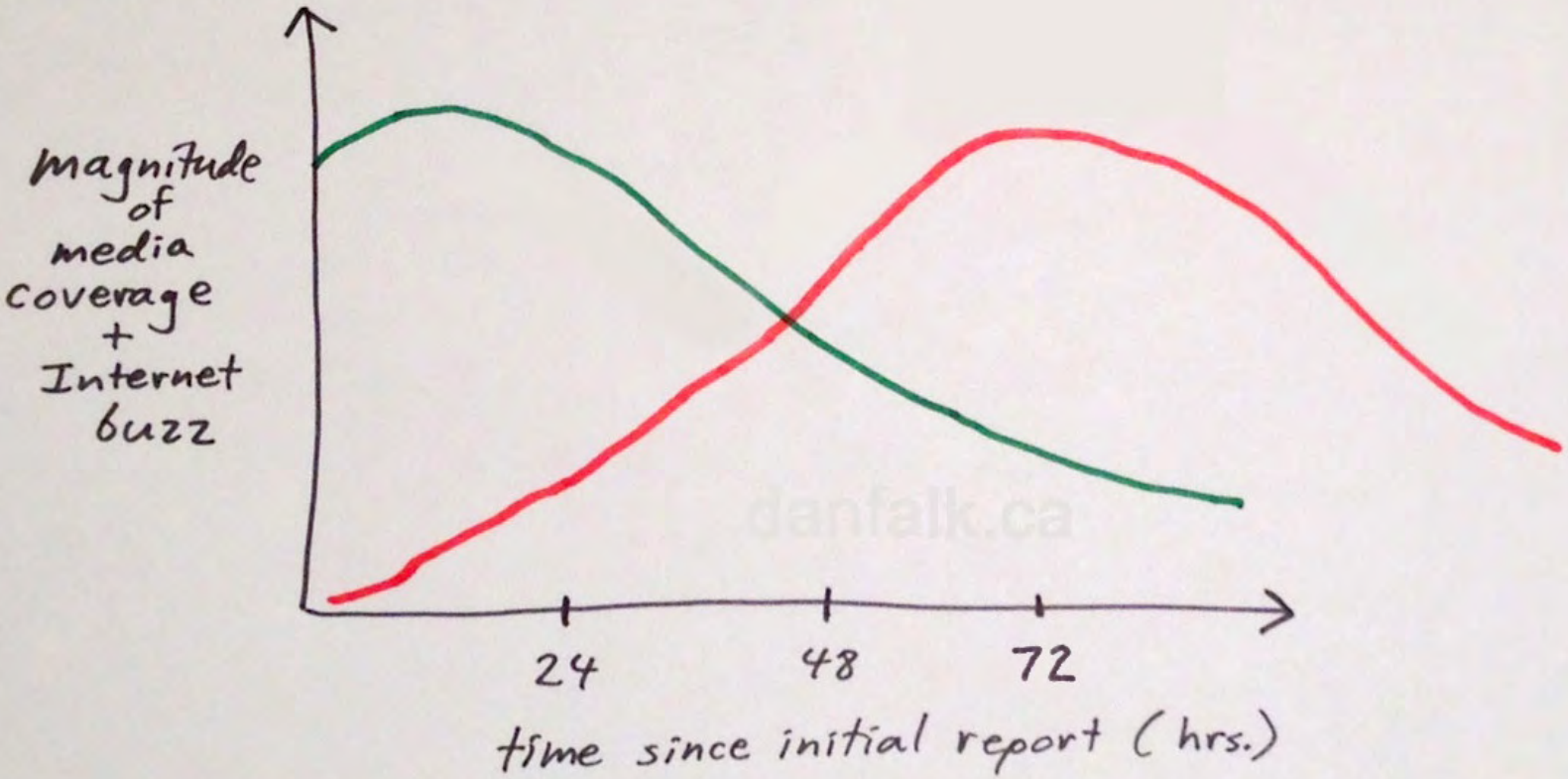
The Painful Truth About NASA's Warp Drive Spaceship From A Physicist

Jason Torchinsky
6/16/14 12:00pm • Filed to: SPACELOPNIK

I'll be honest — this is not the post I wanted to write. When NASA released their new renders of a hypothetical future faster-than-light spaceship, I wanted to believe that such a craft was mere decades away from reality. Then I made the

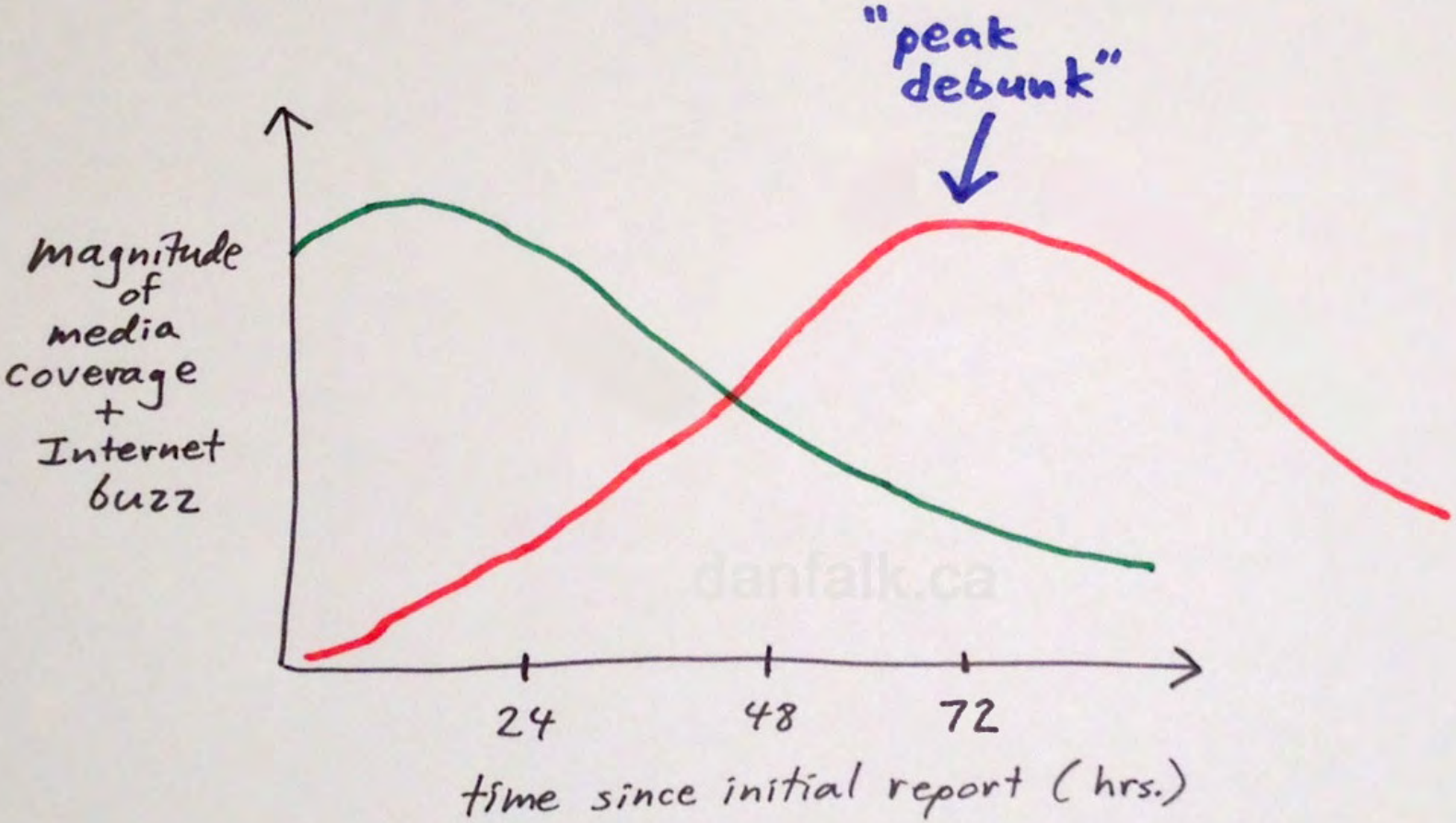


Typical headlines: NASA Unveils Warp Drive /
Peculiar Star Could Be Alien Megastructure / Boy Discovers Lost Mayan City



Typical headlines: NASA Unveils Warp Drive / Peculiar Star Could Be Alien Megastructure / Boy Discovers Lost Mayan City

Typical headlines: No, NASA Hasn't Unveiled a Warp Drive / No, Peculiar Star isn't an Alien Megastructure / No, Boy Hasn't Discovered Lost Mayan City



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“I want to be sure I’ve got this right – I better call a Nobel Laureate…”

successful in their Charter chal-

Alfonso Caruana was born into

AIDS created in Western labs, Nobel laureate says

Peace Prize recipient alleges conspiracy

A Canadian AIDS group said yesterday it is unfortunate that the winner of the Nobel Peace Price, Kenyan environmentalist Wangari Maathai, had depicted the deadly virus as a biological weapon invented by the West to wipe out Africans.

After accepting her Nobel, Ms. Maathai repeated a conspiracy theory on the weekend that is not uncommon in Africa: that AIDS was produced in a Western laboratory as part of a plot against blacks. She made similar allegations in August.

"Yes, I've heard that before, I've heard people claiming that," said Michael O'Connor of the Ottawa-based Interagency Coalition for AIDS and Development. "It's not widely held scientifically, and it's certainly not helpful to the debate about addressing this."

See IDEA on Page A12

Another Nobel debate, FP17

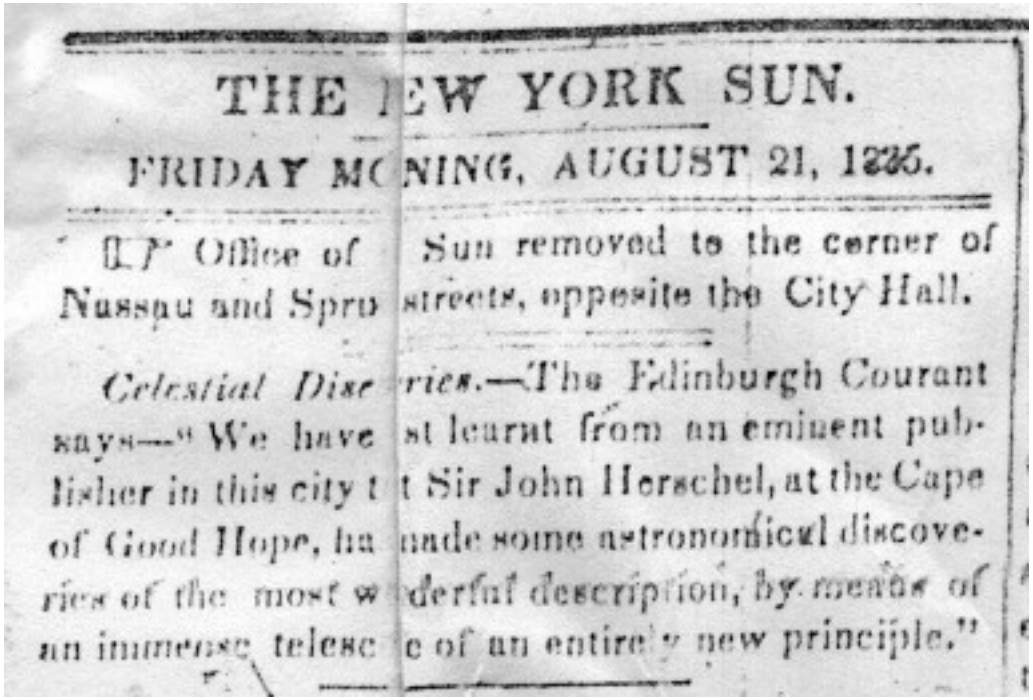
By the way, “fake news” isn’t new…

The Great Moon Hoax (1835)

The *New York Sun* newspaper

← Aug. 21

Aug. 25 ↓



THE EW YORK SUN.

FRIDAY MO NING, AUGUST 21, 1835.

[illegible] Office of Sun removed to the corner of Nassau and Spru streets, opposite the City Hall.

Celestial Dise ries.—The Edinburgh Courant says—"We have st learnt from an eminent publisher in this city t t Sir John Herschel, at the Cape of Good Hope, ha nade some astronomical discoveries of the most w derful description, by means of an immense telesc e of an entirely new principle."

THE SUN.

Number 815.] NEW YORK, TUESDAY MORNING, AUGUST 25, 1835. [Price One Cent.

GREAT ASTRONOMICAL DISCOVERIES.

BY SIR JOHN HERSCHEL, L.L.D. F.R.S. &c.

At the Cape of Good Hope.

This was the headline on the first article:

GREAT ASTRONOMICAL DISCOVERIES
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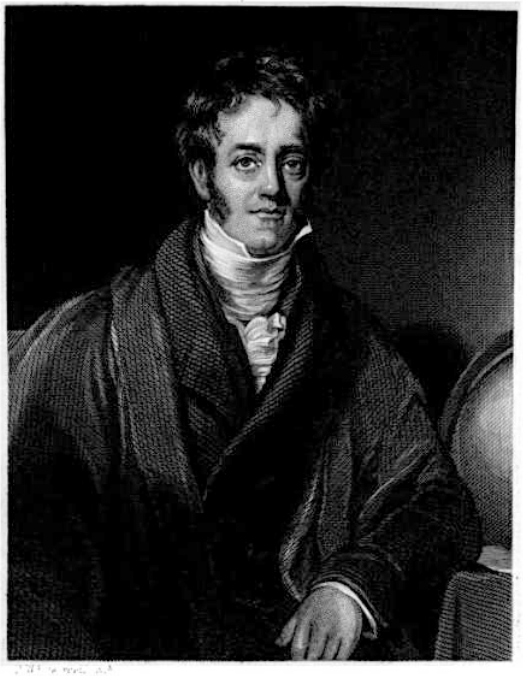
[From Supplement to the Edinburgh Journal of Science]



SIR JOHN FREDERICK WILLIAM HERSCHEL, BART F.R.S.

Sir John Herschel
astronomer and natural philosopher
(1792-1871)

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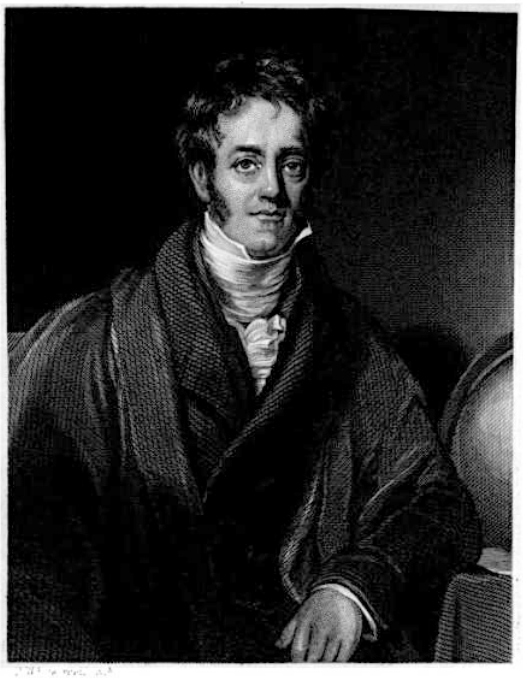

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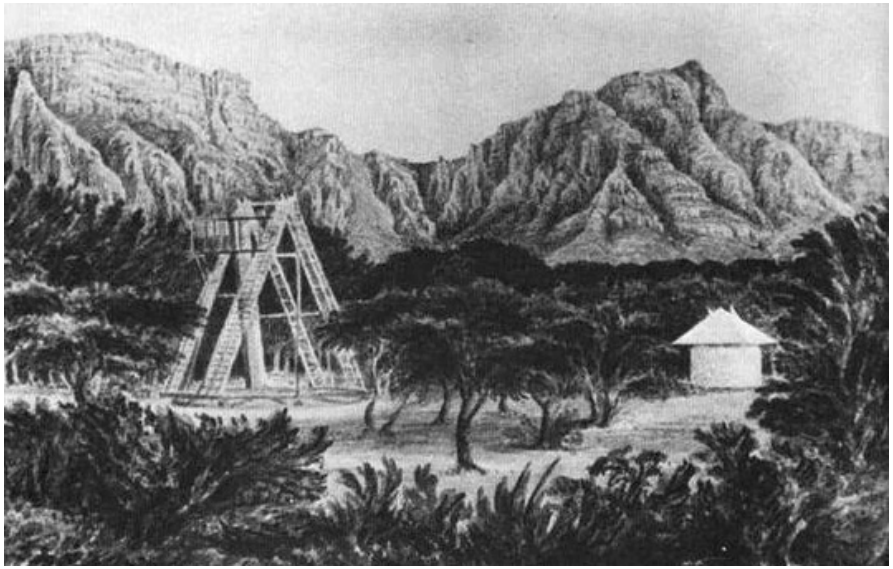


Herschel's telescope, near
Cape Town, South Africa

Feeling blue? Today - January 19, 2009 - is the most depressing day in HISTORY, say experts

By DAILY MAIL REPORTER

UPDATED: 02:02 GMT, 19 January 2009

If you woke up feeling blue today then the chances are you are not alone. For Monday, January 19, 2009 is going to be the most depressing day in history, according to experts.

Cold weather, fading Christmas memories and broken New Year resolutions mean this period is usually miserable, but the effects of the economic downturn makes this year worse than ever.

Millions will feel so glum they will decide to stay in bed and up to a quarter of workers are expected to call in sick, research suggests. Psychologist Dr Cliff Arnall has devised a mathematical formula that pinpoints today as Blue Monday.

Be careful with numbers…

United Nations General Assembly.

Among them would be a tax on newspapers. A mere one-tenth of a cent levy on each of the 63,546,000 papers read each day in the United States would yield almost $23.2-billion a year. Brazil and Argentina envisage taxing readers in all member countries of the Organization for Economic Co-operation and Development.

X=(fl+n°)/p: All you need to know to be funny

By

From now on, all jokes will be funny. At least, all those that follow a formula developed by British scientists who claim to have the mathematical recipe for the perfect joke.

The formula is x=(fl+n°)/p, where 'f' refers to funniness of the punchline, a factor that is multiplied by the 'l', or length of buildup. That total is added to 'n' – which represents how much an audience doubles over.

The 'n' factor has an exponent of "o", referring to the 'ouch element' or degree of human pain and embarrassment. All of this is divided by 'p' or the number of puns, which are known among comedic circles to reduce the degree of funniness. Each factor has a maximum score of 10.

The formula's creators, Timandra Harkness and Helen Pilcher – a stand-up comic and a neuroscientist –are behind The Comedy Research Project in Britain, which aims to prove science can be funny.

See HUMOUR on Page A10

Sample jokes, Page A10

X = (FL + N) / P: PUTTING THE FORMULA TO WORK

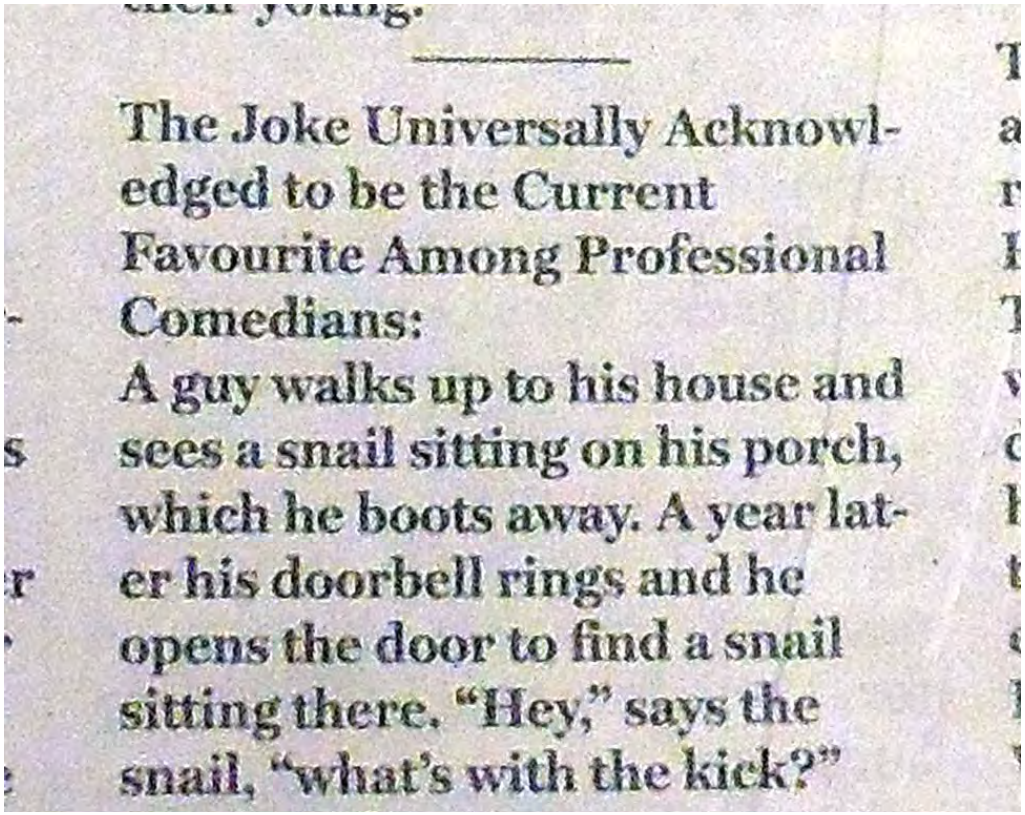
The National Post ran a popular Canadian joke through the Comedy Research Project formula, comparing it against three other famous examples.

Man walks into a Chinese restaurant. In the lobby are two large lobster tanks, one with a cover, one without. "I see you have lobster," says the man to the maître d'. "Oh yes," the maître d' replies. "Why," asks the man "are they in two different tanks." The maître d' explains that one tank contains lobster caught in American waters — the one with the cover — while the other is for lobster caught in Canadian waters. "Why," the man asks, "does the American lobster tank have a lid." The maître d' explains this is because they try to climb out. "But doesn't the Canadian lobster do the same?" the man asks. "Yes," the maître d' replies, "but when the Canadian lobster climbs out, the others pull it back in."
Humour Quotient:
x=(9x8+5 to the power of 2)/0.
x=97
While a longer build-up and clever punchline help, this joke wins for its 'ouch' factor — the suggestion that Canadians eat their young.

The Joke Universally Acknowledged to be the Current Favourite Among Professional Comedians:
A guy walks up to his house and sees a snail sitting on his porch, which he boots away. A year later his doorbell rings and he opens the door to find a snail sitting there. "Hey," says the snail, "what's with the kick?"
Humour Quotient:
x=(10x7+0)/0.
x=70.
The strong punchline is what wins this joke points in the stand-up world.

The Joke Universally Known to be The Worst in the World:
Q:What's brown and sticky?
A: A stick.
x=(8x1+0)/0.
x=8.
Though the punchline is cleverly unexpected, its short build-up costs points.

The World's Funniest Joke according to the LaughLab research at the University of Hertfordshire:
Two hunters are out in the woods when one of them collapses. He doesn't seem to be breathing and his eyes are glazed. The other guy takes out his phone and calls emergency services.
He gasps: "My friend is dead! What can I do?" The operator says: "Calm down, I can help. First, let's make sure he's dead.' There is a silence, then a gunshot is heard. Back on the phone, the guy says: "OK, now what?"
Humour Quotient:
x=(7x9+0)/0.
x=63.



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How much will you have to explain?)

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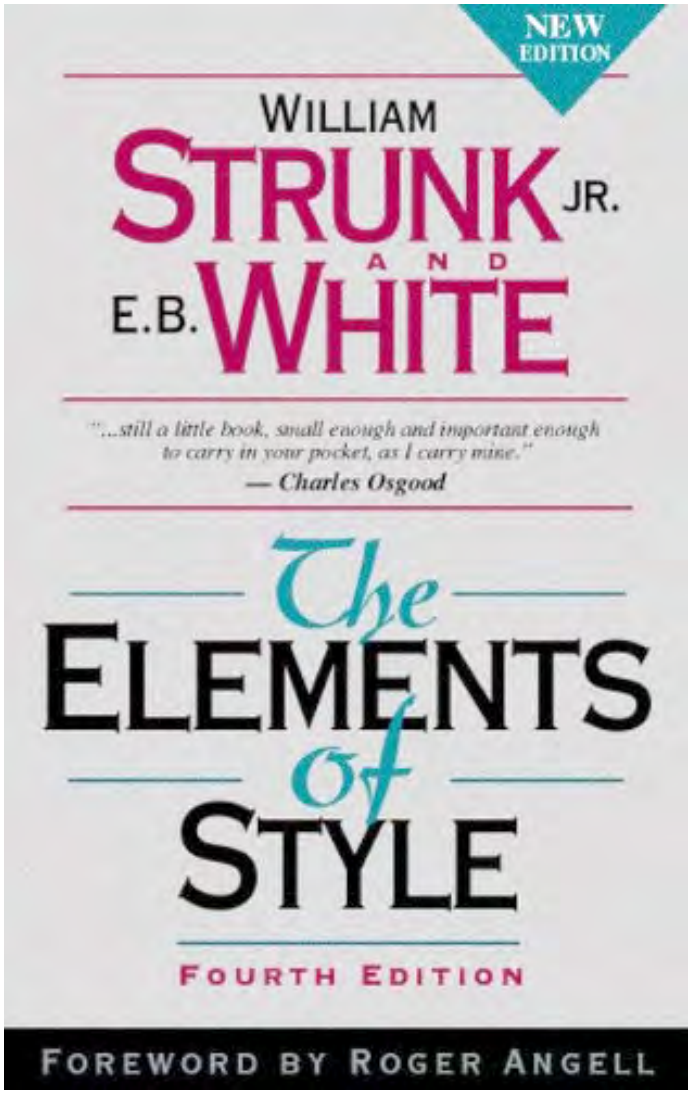
Paragraphs are building blocks for assembling your story.

The more you write, the better you'll get at it.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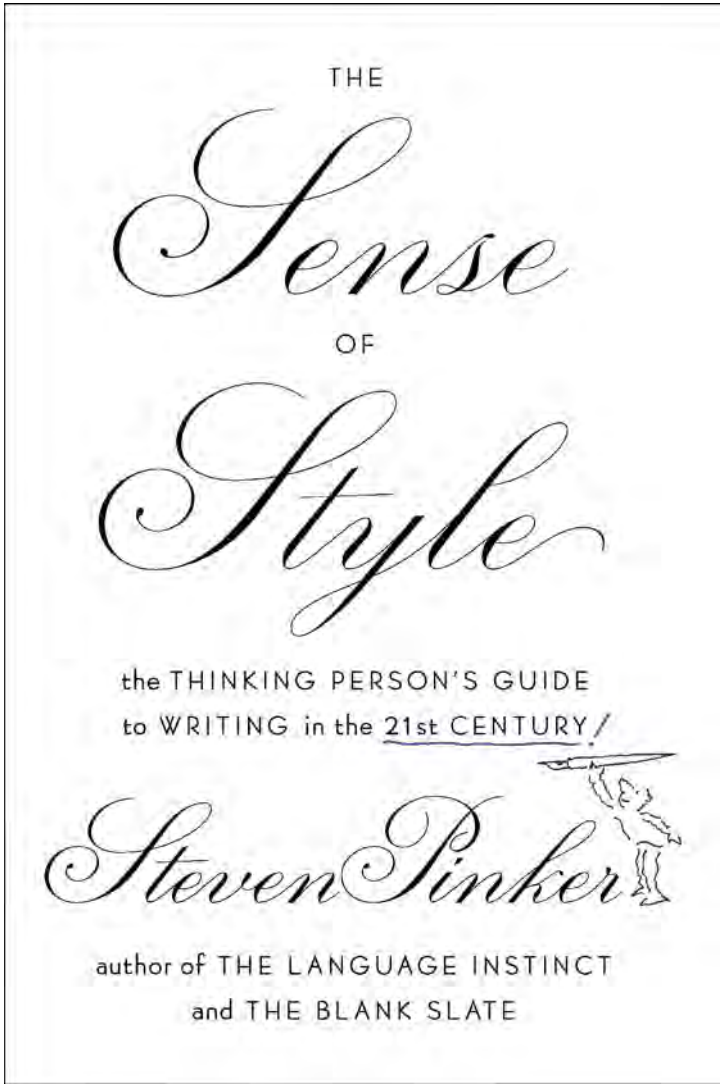
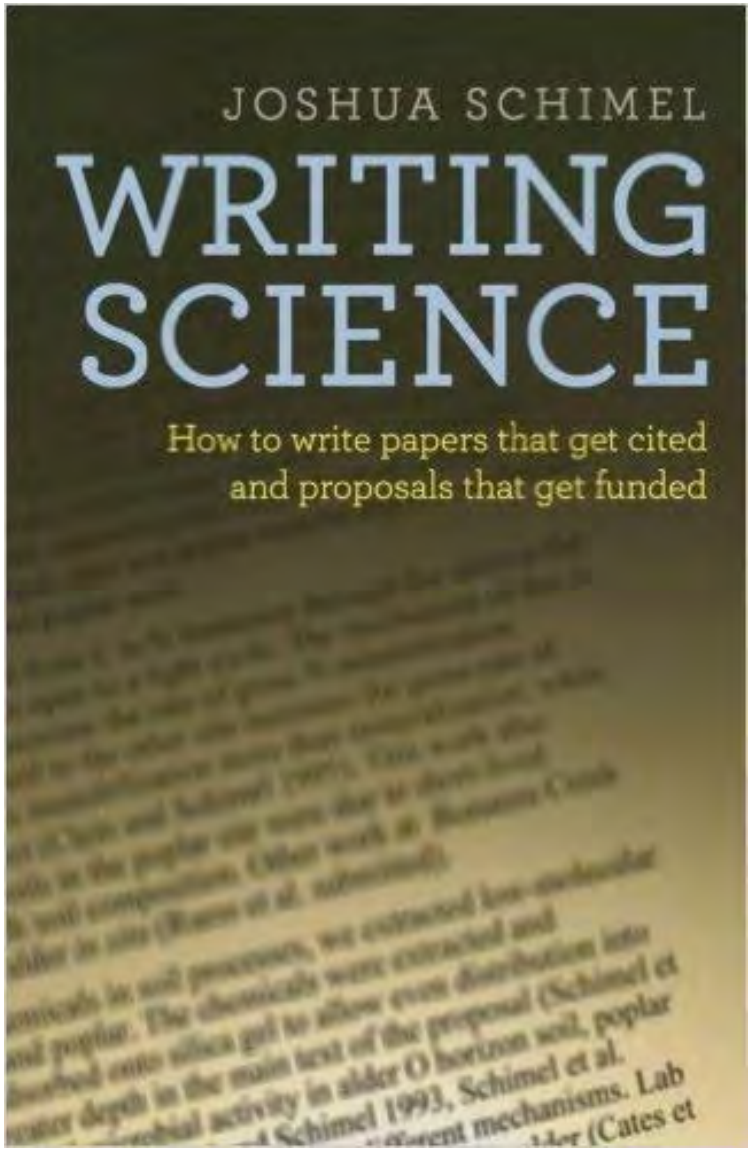
WILLIAM STRUNK JR.
AND
E.B. WHITE
"...still a little book, small enough and important enough to carry in your pocket, as I carry mine."
— Charles Osgood
The ELEMENTS of STYLE
FOURTH EDITION
FOREWORD BY ROGER ANGELL


THE
Sense
OF
Style
the THINKING PERSON'S GUIDE
to WRITING in the 21st CENTURY
Steven Pinker
author of THE LANGUAGE INSTINCT
and THE BLANK SLATE


JOSHUA SCHIMEL
WRITING SCIENCE
How to write papers that get cited and proposals that get funded

RESEARCH ARTICLE QUANTUM MECHANICS

Experimental nonlocal and surreal Bohmian trajectories

Dylan H. Mahler[1,2,*], Lee Rozema[1,2], Kent Fisher[3], Lydia Vermeyden[3], Kevin J. Resch[3], Howard M. Wiseman[4,*] and Aephraim Steinberg[1,2]

[1]*Centre for Quantum Information and Quantum Control, Department of Physics, University of Toronto, 60 Saint George Street, Toronto, Ontario M5S 1A7, Canada.*

[2]*Canadian Institute for Advanced Research, 180 Dundas Street West, Suite 1400, Toronto, Ontario M5G 1Z8, Canada.*

[3]*Institute for Quantum Computing and Department of Physics and Astronomy, University of Waterloo, 200 University Avenue West, Waterloo, Ontario N2L 3G1, Canada.*

[4]*Centre for Quantum Dynamics, Griffith University, Brisbane, Queensland 4111, Australia.*

↵*Corresponding author. E-mail: dmahler@physics.utoronto.ca (D.M.); h.wiseman@griffith.edu.au (H.W.)

+ See all authors and affiliations

Science Advances 19 Feb 2016:
Vol. 2, no. 2, e1501466
DOI: 10.1126/sciadv.1501466

Peer Reviewed

Abstract

Weak measurement allows one to empirically determine a set of average trajectories for an ensemble of quantum particles. However, when two particles are entangled, the trajectories of the first particle can depend nonlocally on the position of the second particle. Moreover, the theory describing these trajectories, called Bohmian mechanics, predicts trajectories that were at first deemed "surreal" when the second particle is used to probe the position of the first particle. We entangle two photons and determine a set of Bohmian trajectories for one of them using weak measurements and postselection. We show that the trajectories seem surreal only if one ignores their manifest nonlocality.

wave functions are subsequently allowed to overlap, as in the experiment proposed by Braverman and Simon (*11*).

EXPERIMENT

Here, we perform an experiment using the spin of particle 2 as carrier of the Welcher Weg information, as per the above theory. We determine the trajectories of particle 1 in an operational manner that does not rely on a particular interpretation of quantum mechanics (9), as realized by Kocsis *et al.* (*7*), using weak measurements of velocity post-selected on the positions of the particles. The particles in this article

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Let’s take a look at some of your abstracts…

(don’t panic; I’m going to say good things about them ☺)

Impact of ocean heat fluxes pathway on sea ice decline in CESM1-LE

Gabriel Auclair[1] and B. Tremblay[1]

[1]Department of Atmospheric and Oceanic Sciences, McGill University, Montreal, Canada

A significant decrease in the minimum sea ice extent has been observed since the beginning of the satellite era in the late seventies. Several climate models simulate drastically different future evolution of the minimum sea ice extent. For instance, the Community Climate System Model Version 3 (CCSM3) predicts rapid sea ice declines leading to a seasonally ice free Arctic that could happen as soon as 2040 (Holland et al, 2006)[1]. On the other hand, the CCSM4 predicts a much more gradual decline of the summer sea ice leading to a seasonal ice free Arctic by the end of the century without rapid decline.

In this study, we use output diagnostics from the RCP8.5 run of the Community Earth System Model Large Ensemble (CESM1-LE) to verify if the pathway of ocean heat flux entering the Arctic has an impact on the presence or absence of rapid sea ice declines. Our hypothesis is that ocean heat fluxes on the shallow Barents Sea shelf interact with the sea ice cover before joining at depth the Fram Strait branch and could have a significant impact on the sea ice melt. More heat entering in the Arctic through the Barents Sea Opening than the Fram Strait could therefore be linked to rapid sea ice declines. Further analyses will include models from the Coupled Climate Model Intercomparison Project Phase 5 (CMIP5) in which advective ocean heat fluxes

Monitoring trace gases in downtown Toronto using open-path Fourier transform infrared spectroscopy

Brendan Byrne[1], Orfeo Colebatch[1], Pierre Fogal[1], Erik Lutsch[1], Richard Mittermeier[2], and Kimberly Strong[1]

[1]Department of Physics, University of Toronto, Toronto, Ontario
[2]Environment and Climate Change Canada, Downsview, Ontario

In-situ measurements are commonly used to monitor trace gas concentrations in urban settings, however, it is unclear how representative these measurements are in inhomogeneous urban environments. Open-Path Fourier Transform Infrared Spectroscopy (OP-FTIR) measurements offer spatial averaging and continuous measurements of several trace gases simultaneously in the same airmass. We have set up an open-path system in downtown Toronto to monitor trace gases in the urban boundary layer. Our system consists of a globar source, retroreflector, telescope, and Bruker 125M FTIR spectrometer. Trace gas concentrations are derived from atmospheric absorption spectra recorded over a two-way atmospheric open path of 320 m using non-linear least squares fitting. This presentation will describe the open-path system and report some initial measurements.

Dimethyl sulfide in the Arctic atmosphere

Roya Ghahreman[1] and Wanmin Gong[1]

[1]Environment and Climate Change Canada, Toronto, Canada

Climate change in the Arctic is faster and more severe than at lower latitudes. The average surface temperature increase in the Arctic is roughly twice as large as the global mean. This phenomenon, the Arctic amplification, is attributed to conditions specific to the Arctic which distinguish this area from the rest of the world, but may affect the climate globally. The Arctic Ocean moderates Arctic climate and is an important source of atmospheric gases (e.g. Dimethyl sulfide-DMS_g) and aerosol particles (such as sea salt, organic and biogenic particles). Aerosols drive significant radiative forcing and influence climate by scattering short/long wave radiation and by changing the number and/or size of cloud droplets and altering precipitation efficiency. Despite the importance of these particles in Arctic climate change, there is a lack of information in the estimation of their effects and sources. We focus on the main biogenic source of sulfur aerosol in the Arctic, DMS_g.

DMS_{aq} is produced by oceanic phytoplankton and bacteria and transported to the atmosphere via turbulence, diffusion and advection. DMS_g emissions may play an important role in remote areas with low aerosol concentrations, such as in the Arctic. Sulfur compounds, from DMS_g oxidation, may condense on pre-existing aerosols and/or form new particles in the atmosphere, and if

Differences in the spatial pattern of anthropogenic aerosol impacts between CMIP5 models

Haruki Hirasawa[1] and P.J. Kushner[1]

[1]Department of Physics, University of Toronto, Toronto, Ontario, Canada

There are many different aspects to the human impact on the global climate. Different chemicals emitted by human activity have diverse impacts on the climate. In addition to greenhouse gases, which warm the planet, human activity also releases chemicals that are or form aerosols: small particles with diameters on the order of nano- to micrometers. There are many different types of anthropogenic (human made) aerosols. The most important of theses are sulphate, which form out of sulfur dioxide emissions, and black carbon, which are emitted by incomplete combustion of fuel. These particles can scatter or absorb radiation and interact with clouds by acting as nuclei for cloud droplets. Sulphate tends to cool the atmosphere, while black carbon tends to warm the atmosphere. It is widely agreed that the combined impact of all anthropogenic aerosols have a net cooling effect on the climate that offsets some of the warming due to anthropogenic greenhouse gases. However, the magnitude of the effect that aerosols have on the climate is difficult to determine and is one of the most uncertain aspects of the human impact on the climate. This uncertainty is in part due to the difficulty of representing aerosol-cloud interactions in models. As a result, the representation of aerosols can vary considerably between global coupled models (GCMs), complicating any analysis of the aerosol impact on the climate.

Development of a Balloon-borne Laser Absorption Spectrometer

William Knee-Walden[1], Kaley A. Walker[1], P.F. Fogal[1], J.G. Murphy[2], and W. Jäger[3]

[1]Department of Physics, University of Toronto, Toronto, Canada
[2]Department of Chemistry, University of Toronto, Toronto, Canada
[3]Department of Chemistry, University of Alberta, Edmonton, Canada

There is great importance in pursuing scientific exploration of the atmosphere with balloon-borne instruments to obtain distributions of traces gases and assess their changes due to human activity. Here we present the development of CALASET (Canadian Atmospheric Laser Absorption Spectrometer Experiment Test-bed), a balloon-borne laser absorption spectrometer capable of measuring vertical profiles of trace gas concentration in the troposphere and stratosphere. Gas concentrations will be measured by performing laser absorption spectroscopy on a balloon gondola using a sample cell that is open to the atmosphere. Our instrument is efficiently controlled by a low cost, credit card-sized computer with software written in the Python programming language, and contains an architecture that allows for collecting more than a hundred analog (sinusoidal) or digital (square wave) voltage signals from various sensors including a GPS. Our software has the flexibility to control the rate at which sensor measurements are recorded during flight, as well as how often messages are exchanged to the ground using a system called ZeroMQ, all on a timescale of a second to several minutes.

The engineering challenges of conducting measurements in the stratosphere are significant since

Microlayer source of oxygenated volatile organic compounds in the summertime marine Arctic boundary layer

Emma L. Mungall[1], J.P.D Abbatt[1], J.J.B. Wentzell[2], A.K.Y. Lee[3], J.L. Thomas[4], M. Blais[5], M. Gosselin[5], L.A. Miller[6], T. Papakyriakou[7], M.D. Willis[1], and J. Liggio[2]

[1]Department of Chemistry, University of Toronto, Toronto, Canada
[2]Air Quality Processes Research Section, Environment and Climate Change Canada, Toronto, Canada
[3]Department of Civil and Environmental Engineering, National University of Singapore, Singapore
[4]Laboratoire Atmosphères, Milieux, Observations Spatiales, Institut Pierre Simon Laplace, Paris, France
[5]Institut des Sciences de la Mer de Rimouski (Québec-Océan), Université du Québec à Rimouski, Rimouski, Canada
[6]Institute of Ocean Sciences, Fisheries and Oceans Canada, Sidney, Canada
[7]Centre for Earth Observation Science, Faculty of Environment, Earth and Resources, University of Manitoba, Winnipeg, Canada

Aerosol particles, which allow cloud droplets to form, control properties of clouds such as brightness and the probability of precipitation. Above the Arctic Ocean in summer, there are very few aerosol particles. One consequence of this is that the addition of more particles could have profound effects on the clouds. We are interested in figuring out how those aerosol particles form, so that cloud properties can be predicted. We know that one way for aerosol particles to form and grow in the atmosphere is by the condensation of organic (carbon-containing) molecules, but we don't know very much about the sources of those molecules in the summer Arctic. To investigate this question, we measured the atmospheric levels of some organic molecules while aboard the Canadian research icebreaker, the CCGS Amundsen, in the Canadian

Thank You!

Dan Falk

Science Journalist

www.danfalk.ca dan@danfalk.ca

@danfalk

Connaught Summer Institute in Arctic Science
2017