

Ode to E Pluribus Unum for Sunday June 18 2023

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The Largest Satellites of Earth



Image Credit & Copyright: Tianyao Yang

What's that near the Moon? It's the International Space Station (ISS).

Although the ISS may appear to be physically near the Moon, it is not — it is physically near the Earth. In low Earth orbit and circulating around our big blue marble about every 90 minutes, the ISS was captured photographically as it crossed nearly in front of the Moon.

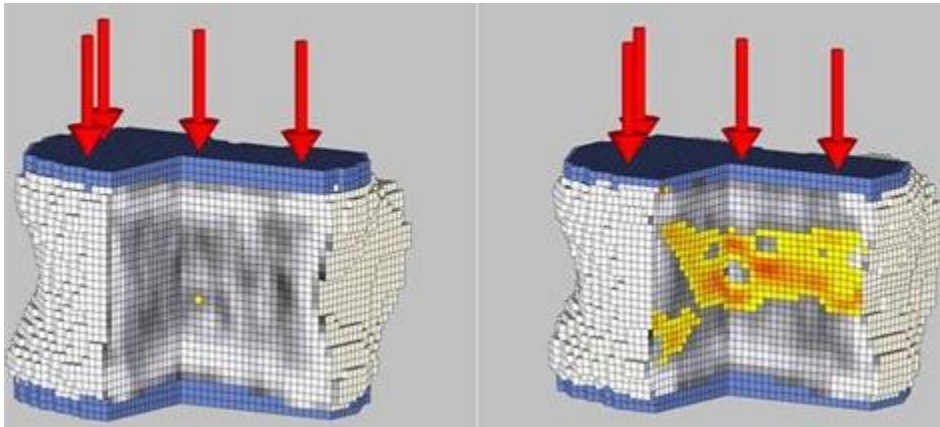
The Moon, itself in a month-long orbit around the Earth, shows a crescent phase as only a curving sliver of its Sun-illuminated half is visible from the Earth.

The featured image was taken in late March from Shanghai, China and shows not only details of Earth's largest human-made satellite, but details of the cratered and barren surface of Earth's largest natural satellite. Over the next few years, humanity is planning to send more people and machines to the Moon than ever before.

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Common Weight-Loss Surgery for Teens May Weaken Their Bones

Sleeve gastrectomies can help teens and young adults lose weight, but the surgery could also poorly affect their bone health.



Two scans of an individual's bone before their sleeve gastrectomy and two years after show that their bones weakened after the procedure.

Radiological Society of North America

The sleeve gastrectomy patients had significantly lower body mass indexes two years out, while the counseled patients' BMIs slightly increased, on average. However, the surgery group had lost bone density in their lower spine and had significantly more fat in their bone marrow, which can weaken overall skeletal strength.

By Kiley Price for Live Science

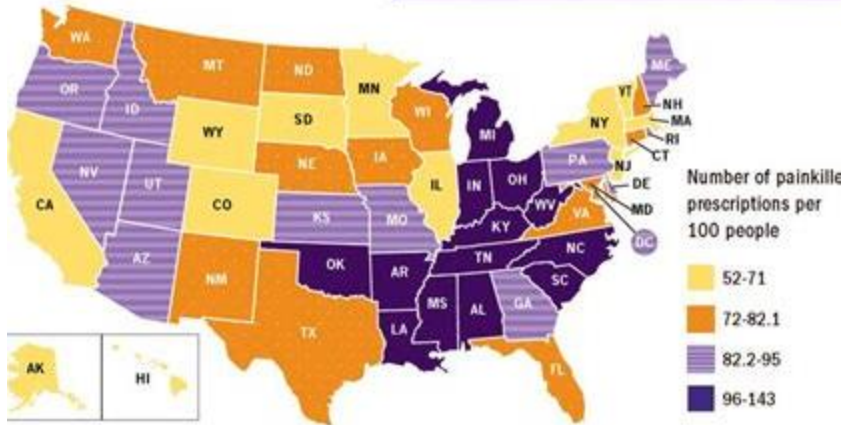
<https://bit.ly/3PmJQRs>

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The Opioid Epidemic in the United States

Over the last 20 years, the ongoing U.S. opioid crisis has claimed tens of thousands of lives. In fact, opioid overdose deaths accounted for nearly 70% of all drug overdose deaths in 2018.

Some states have more painkiller prescriptions per person than others.



SOURCE: IMS, National Prescription Audit (NPA™), 201

<https://bit.ly/3JfBnM4>

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America's Love Affair with Adderall

And what happened when we were forced to live without it.



From 2020 to 2021, Adderall prescriptions rose by more than 10 percent among American adults aged 25 to 44. A nationwide shortage is now wreaking havoc on many of their lives.

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<https://bit.ly/468OjNV>

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Falco



Johann "Hans" Hölzel, better known by his stage name Falco, was an Austrian singer and musician. His "Rock Me Amadeus" reached No. 1 on the Billboard charts in 1986,

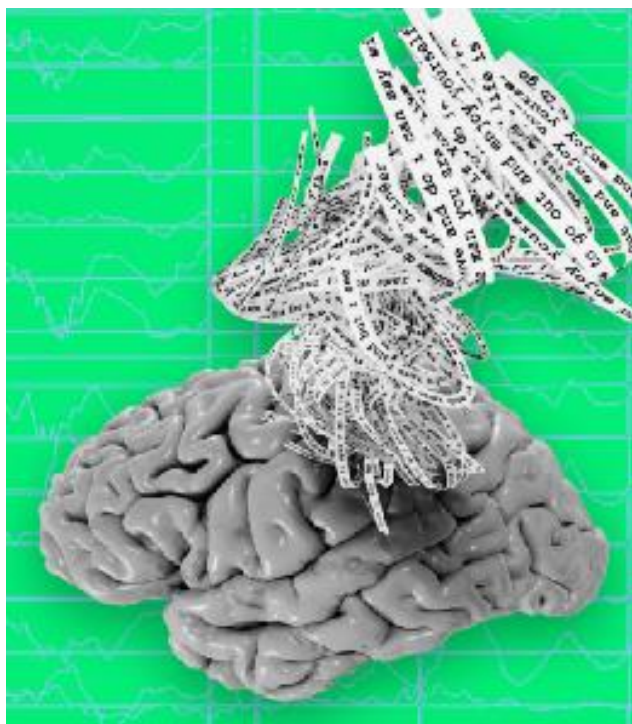
making him the only artist in history to score a number-one hit with a German language song in the United States.

Falco recorded "Rock Me Amadeus" inspired in part by the Oscar-winning film Amadeus, and the song became a worldwide hit in 1986. It reached No. 1 in over a dozen countries, including the US, UK, and Japan, bringing the success that had eluded him in markets a few years earlier.

Rock Me Amadeus https://www.youtube.com/watch?v=cVikZ8Oe_XA

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Semantic Decoder



Researchers have revealed a new artificial intelligence system capable of translating a person's brain activity into a continuous stream of text in a noninvasive way for the first time. New research from the [University of Texas at Austin](#) shows the brain-computer interface can generate word sequences that recover the meaning of perceived speech, imagined speech, and brain responses while watching silent videos.

Unlike previous [language-decoding systems](#), the new decoder doesn't rely on surgical implants. The study focused on three participants whose brain activity was measured using an fMRI scanner, which utilizes [changes in blood flow](#) to produce brain scans, as they listened to podcasts, thought about stories, and watched short silent films.

[A large language model](#), similar to OpenAI's GPT-4 and Google's Bard, then matched patterns in the participants' brains to words and phrases they heard and translated the brain's response to hearing new words into corresponding text. The decoded text is not a word-for-word transcript but rather a gist of a person's thoughts.

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The Speculative Economics of Super-Aged Whiskies

How do you put a price on a 72-year-old Scotch?



A bottle of Gordon & MacPhail 1949 from Milton Distillery

<https://bit.ly/3BCltav>

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The 11 Most Beautiful Post Offices Around the World

From Algeria to Arizona, at these unique buildings you can drop off packages in architectural wonders.



Kolkata, India

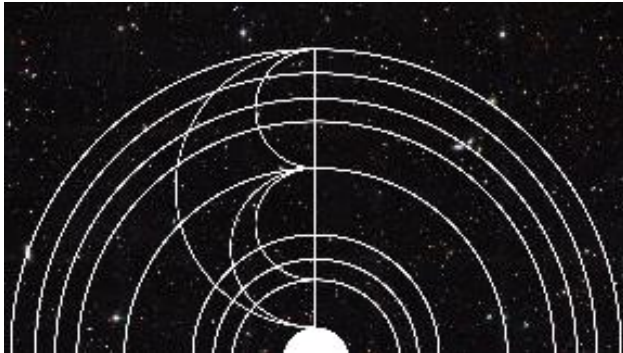
Photo: sudiproypography/Getty Images

<https://bit.ly/3BA8qGy>

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How Pythagoras Turned Math into a Tool for Understanding Reality

The 'music of the spheres' was born from the effort to use numbers to explain the universe



The Pythagoreans believed that the motions of the heavenly bodies, with just the right ratios of their distances from a central fire, made pleasant music — a concept that evolved into the "music of the spheres."

NASA, ESA, The Goods Team, And M. Giavalisco (University Of Massachusetts, Amherst)/T. TibbittS

<https://bit.ly/3CzcRIG>

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New Discoveries Bring the World of Pterosaurs to Life

The latest clues hint at where the flying reptiles came from, how they evolved, what they ate and more



*Pterosaurs may have evolved from small ground-dwelling reptiles similar to *Scleromochlus taylori*, which was about as long as a dinner fork, during the late Triassic Period.*

Gabriel Ugueto

<https://bit.ly/437xG2B>

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Aaron Copland - Zion's Walls (1954)



“Zion’s Walls” is the second song in Aaron Copland’s Old American Songs, Set 2, a revivalist song with words and music credited to John G. McCurry.

Come fathers and mothers,
Come sisters and brothers,
Come join us in singing the praises of Zion.
O fathers, don’t you feel determined
To meet within the walls of Zion?
We’ll shout and go round
The walls of Zion.

UNT A Cappella Choir <https://youtu.be/RTCIVsxVlbI>

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New Implant Offers Promise for the Paralyzed



A system developed by Grégoire Courtine and Jocelyne Bloch now enables patients with a complete spinal cord injury to stand, walk and even perform recreational activities like swimming, cycling and canoeing.

A portable computer decodes the brain's electrical signals and relays them to a spinal pulse generator, resulting in the perception that lower body movements are voluntary. Combined with regular therapy, the procedure allows the patient to walk and climb stairs with a natural gait aided by a walker, at times without the digital bridge activated.

<https://bit.ly/3NemVoO>

For a detailed presentation of the epidural stimulation process, go to <https://www.nature.com/articles/s41586-023-06094-5>

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Study Shows Hair Dyes Are Heavily Associated with Cancer

Now is a great time to go platinum.



[Photo: Ashton Bingham/Unsplash]

You know how you don't see very old people with dyed hair? There may be a reason for that: Hair dye is heavily associated with cancer.

A study published last Tuesday in the Journal of Cancer tracked 46,709 women ages 35-74 over eight years. The results are particularly harrowing for black women: those who used permanent dyes at least every 5-8 weeks had a 60% higher risk of developing breast cancer than those who did not; white women were 8% more likely to develop breast cancer.

Chemical straighteners also proved problematic: Women who used straighteners every 5-8 weeks were 30% more likely to develop breast cancer. Straighteners are much more commonly used among black women. (In the study, 74% of black women had, versus 3% of white women.)

This, of course, creates an immediate grooming crisis for those feeling career pressure to look eternally young. You can see helpful photos of people with their hair both dyed and gray (hint: the gray-heads look fine!), and [here's how to go gray](#).

Hair dyes have long been known to “contain endocrine-disrupting compounds and carcinogens,” say the researchers, who hypothesize that the formulations used on black hair may include more hormonally active compounds, and that thicker, coarser hair may absorb more dyes.

“While it is too early to make a firm recommendation, avoiding these chemicals might be one more thing women can do to reduce their risk of breast cancer,” says coauthor Dale Sandler, chief of the NIEHS Epidemiology Branch.

By Arianne Cohen for [The Journal of Cancer](#)

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Inside The Space Hotel Scheduled to Open in 2025



CMV

Waking up in a chic hotel room with a view of the solar system could be the future of travel, at least if space company Orbital Assembly has anything to say about it.

The US-based company has revealed new information and concepts for its space hotel idea, designs for which have been orbiting since 2019.

<https://bit.ly/467yRBu>

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Satisfying Machines & Ingenious Tools



https://youtu.be/_mAdk9fy42Q

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Saguaro



Photos by Bear Guerra

For the O'odham peoples of the Sonoran Desert, Ha:san, or Saguaro, are considered respected members of the community. In portraits that capture their strength,

longevity, and diversity, photographer Bear Guerra illuminates the enduring personhood of these cacti, standing in their desert home.

<https://bit.ly/3WNZ5EL>

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You Can Go Home
Again If You Want To

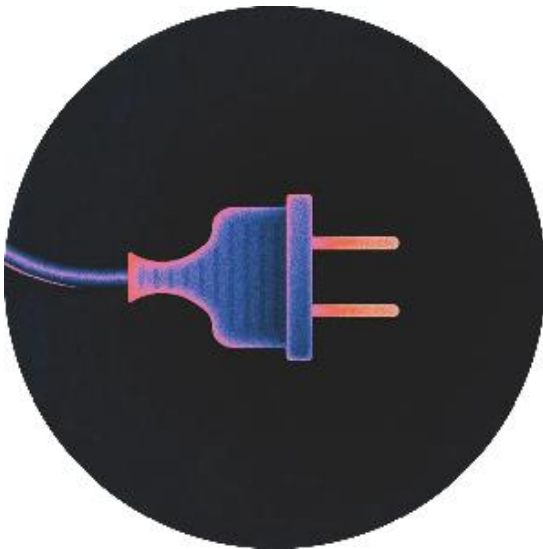


Maybe just not to Asheville

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Can Quantum Mechanics Pull Energy out of Nothing?

The quantum energy teleportation protocol was proposed in 2008 and largely ignored. Now two independent experiments have shown that it works.



Quanta

<https://bit.ly/3qjtejf>

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I wonder how this marriage turned out



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AI Helps Find a Drug to Combat Drug-Resistant Infections



*The machine-learning algorithm identified a compound that kills *A. baumannii*, a bacterium that lurks in many hospital settings.*

Using an artificial intelligence algorithm, researchers at MIT and McMaster University have identified a new antibiotic that can kill a type of bacteria that is responsible for many drug-resistant infections.

If developed for use in patients, the drug could help to combat [Acinetobacter baumannii](#), a species of bacteria that is often found in hospitals and can lead to pneumonia, meningitis, and other serious infections. The microbe is also a leading cause of infections in wounded soldiers in Iraq and Afghanistan.

"Acinetobacter can survive on hospital doorknobs and equipment for long periods of time, and it can take up antibiotic resistance genes from its environment. It's really common now to find *A. baumannii* isolates that are resistant to nearly every antibiotic," says Jonathan Stokes, a former MIT postdoc who is now an assistant professor of biochemistry and biomedical sciences at McMaster University.

The researchers identified the new drug from a library of nearly 7,000 potential drug compounds using a machine-learning model that they trained to evaluate whether a chemical compound will inhibit the growth of *A. baumannii*.

"This finding further supports the premise that AI can significantly accelerate and expand our search for novel antibiotics," says James Collins, the Termeer Professor of Medical Engineering and Science in MIT's Institute for Medical Engineering and Science (IMES) and Department of Biological Engineering. "I'm excited that this work shows that we can use AI to help combat problematic pathogens such as *A. baumannii*."

Collins and Stokes are the senior authors of the new study, which appears today in *Nature Chemical Biology*. The paper's lead authors are McMaster University graduate students Gary Liu and Denise Catacutan and recent McMaster graduate Khushi Rathod.

Drug discovery

Over the past several decades, many pathogenic bacteria have become increasingly resistant to existing antibiotics, while very few new antibiotics have been developed.

Several years ago, Collins, Stokes, and MIT Professor Regina Barzilay (who is also an author on the new study), set out to combat this growing problem by using machine learning, a type of artificial intelligence that can learn to recognize patterns in vast amounts of data. Collins and Barzilay, who co-direct MIT's Abdul Latif Jameel Clinic for Machine Learning in Health, hoped this approach could be used to identify new antibiotics whose chemical structures are different from any existing drugs.

In their initial demonstration, the researchers trained a machine-learning algorithm to identify chemical structures that could inhibit growth of *E. coli*. In a screen of more than 100 million compounds, that algorithm yielded a molecule that the researchers called halicin, after the fictional artificial intelligence system from "2001: A Space Odyssey." This molecule, they showed, could kill not only *E. coli* but several other bacterial species that are resistant to treatment.

"After that paper, when we showed that these machine-learning approaches can work well for complex antibiotic discovery tasks, we turned our attention to what I perceive to be public enemy No. 1 for multidrug-resistant bacterial infections, which is *Acinetobacter*," Stokes says.

To obtain training data for their computational model, the researchers first exposed *A. baumannii* grown in a lab dish to about 7,500 different chemical compounds to see which ones could inhibit growth of the microbe. Then they fed the structure of each molecule into the model. They also told the model whether each structure could inhibit bacterial growth or not. This allowed the algorithm to learn chemical features associated with growth inhibition.

Once the model was trained, the researchers used it to analyze a set of 6,680 compounds it had not seen before, which came from the Drug Repurposing Hub at the Broad Institute. This analysis, which took less than two hours, yielded a few hundred top hits. Of these, the researchers chose 240 to test experimentally in the lab, focusing on compounds with structures that were different from those of existing antibiotics or molecules from the training data.

Those tests yielded nine antibiotics, including one that was very potent. This compound, which was originally explored as a potential diabetes drug, turned out to be extremely effective at killing *A. baumannii* but had no effect on other species of bacteria including *Pseudomonas aeruginosa*, *Staphylococcus aureus*, and carbapenem-resistant *Enterobacteriaceae*.

This “narrow spectrum” killing ability is a desirable feature for antibiotics because it minimizes the risk of bacteria rapidly spreading resistance against the drug. Another advantage is that the drug would likely spare the beneficial bacteria that live in the human gut and help to suppress opportunistic infections such as *Clostridium difficile*.

“Antibiotics often have to be administered systemically, and the last thing you want to do is cause significant dysbiosis and open up these already sick patients to secondary infections,” Stokes says.

A novel mechanism

In studies in mice, the researchers showed that the drug, which they named abaucin, could treat wound infections caused by *A. baumannii*. They also showed, in lab tests, that it works against a variety of drug-resistant *A. baumannii* strains isolated from human patients.

Further experiments revealed that the drug kills cells by interfering with a process known as lipoprotein trafficking, which cells use to transport proteins from the interior of the cell to the cell envelope. Specifically, the drug appears to inhibit LolE, a protein involved in this process.

All Gram-negative bacteria express this enzyme, so the researchers were surprised to find that abaucin is so selective in targeting *A. baumannii*. They hypothesize that slight differences in how *A. baumannii* performs this task might account for the drug’s selectivity.

"We haven't finalized the experimental data acquisition yet, but we think it's because *A. baumannii* does lipoprotein trafficking a little bit differently than other Gram-negative species. We believe that's why we're getting this narrow spectrum activity," Stokes says.

Stokes' lab is now working with other researchers at McMaster to optimize the medicinal properties of the compound, in hopes of developing it for eventual use in patients.

The researchers also plan to use their modeling approach to identify potential antibiotics for other types of drug-resistant infections, including those caused by *Staphylococcus aureus* and *Pseudomonas aeruginosa*.

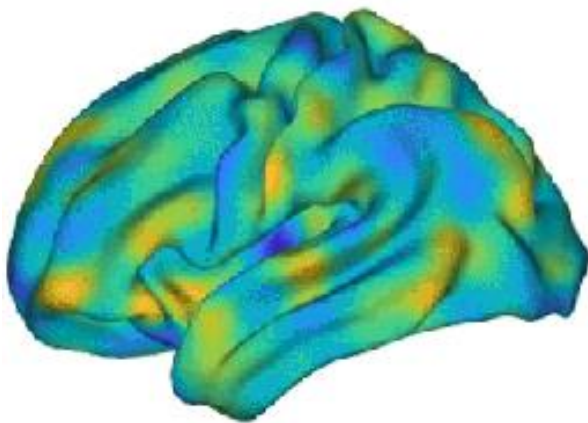
The research was funded by the David Braley Center for Antibiotic Discovery, the Weston Family Foundation, the Audacious Project, the C3.ai Digital Transformation Institute, the Abdul Latif Jameel Clinic for Machine Learning in Health, the DTRA Discovery of Medical Countermeasures Against New and Emerging Threats program, the DARPA Accelerated Molecular Discovery program, the Canadian Institutes of Health Research, Genome Canada, the Faculty of Health Sciences of McMaster University, the Boris Family, a Marshall Scholarship, and the Department of Energy Biological and Environmental Research program.

Anne Trafton for MIT News

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The Human Brain's Wrinkles Help to Drive How it Works

A model of the brain's geometry better explains neuronal activity than a model based on the 'connectome'.



*Waves of electrical activity spread across the resting brain in this simulation.
J. C. Pang et al./Nature*

The wrinkles that give the human brain its familiar walnut-like appearance have a large effect on brain activity, in much the same way that the shape of a bell determines the

quality of its sound, a study suggests¹. The findings run counter to a commonly held theory about which aspect of brain anatomy drives function.

The study's authors compared the influence of two components of the brain's physical structure: the outer folds of the cerebral cortex — the area where most higher-level brain activity occurs — and the connectome, the web of nerves that links distinct regions of the cerebral cortex. The team found that the shape of the outer surface was a better predictor of brainwave data than was the connectome, contrary to the paradigm that the connectome has the dominant role in driving brain activity. "We use concepts from physics and engineering to study how anatomy determines function," says study co-author James Pang, a physicist at Monash University in Melbourne, Australia. The results were published in *Nature* on 31 May¹.

Brain chatter

'Exciting' a neuron makes it fire, which sends a message zipping to other neurons. Excited neurons in the cerebral cortex can communicate their state of excitation to their immediate neighbours on the surface.

But each neuron also has a long filament called an axon that connects it to a faraway region within or beyond the cortex, allowing neurons to send excitatory messages to distant brain cells. In the past two decades, neuroscientists have painstakingly mapped this web of connections — the connectome — in a raft of organisms, including humans.

Famous 'homunculus' brain map redrawn to include complex movements

The authors wanted to understand how brain activity is affected by each of the ways in which neuronal excitation can spread: across the brain's surface or through distant interconnections. To do so, the researchers — who have backgrounds in physics and neuroscience — tapped into the mathematical theory of waves.

Natural phenomena include many types of wave, from the seismic waves that constitute earthquakes to the electromagnetic waves of light. But all of these phenomena are captured by the same simple mathematical equation. This equation enables researchers to calculate the patterns of waves across a surface based exclusively on its geometry. These patterns can be broken down into fundamental components called modes, which are affected by an object's geometry.

Good vibrations

For waves of vibrations propagating across a sphere, for example, the basic modes include a bulge moving back and forth from the top hemisphere to the bottom one and another travelling from left to right. But a bell lacks a lower hemisphere and therefore has modes different from those of a sphere. An object's geometry also affects its modes' characteristic frequencies and relative loudness.

The brain's neuronal excitation can also come in waves, which can spread across the brain and travel back in periodic oscillations.

The researchers calculated the modes of brainwave propagation for the cortical surface and for the connectome. As a model of the connectome, they used information gathered from diffusion magnetic resonance imaging (MRI), which images brain anatomy. They then looked at data from more than 10,000 records of functional MRI, which images brain activity based on blood flow.

The analysis showed that brainwave modes in the resting brain as well as during a variety of activities — such as during the processing of visual stimuli — were better explained by the surface geometry model than by the connectome one, the researchers found.

David Van Essen, a neuroscientist at Washington University in St. Louis, Missouri, who leads a connectome project, says that the diffusion MRI data the team used has well-documented drawbacks that make the comparison “not fair”. The team should have also looked at brain activity from simple stimuli that activate only local regions of the cortex, according to Van Essen. “It is extremely unlikely that the travelling wave model favoured by the authors could replicate such patterns,” he says.

Pang says that it would be interesting to test their models with such stimuli, and that the analyses he and his co-authors have done so far were a “proof of principle”.

For their study, the authors modelled an idealized brain structure, but the walnut-like convolutions of the cortex are known to vary in shape from one person to the next. The authors' techniques could help to explore how such variations affect the corresponding modes.

Davide Castelvecchi for Nature

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Researchers Identify Brain Marker Indicating Future Suicide Risk



Study pinpoints differences in brain connections that could be used in prevention and may lead to new treatments to reduce suicide risk

Every day in the United States, an average of 130 people take their own lives. In 2021, 12.1 million Americans seriously considered suicide, according to the Centers for Disease Control and Prevention; 3.5 million of them even made a plan. For the loved ones left behind after a suicide, grief is often clouded with regret and guilt: Why didn't they know things were so bad? Could they have stopped it?

Although many of suicide's risk factors are well known—depression, chronic pain, family violence, presence of guns—it's not always clear why some people, and not others, slip from ideation to planning to attempt. But new research has uncovered a clue, or marker, in the brain that could be used to identify people at a higher risk of ending their life.

In a paper published in the *Journal of Affective Disorders*, researchers from Boston University and the VA Boston Healthcare System found important connections in the brain differed among veterans with a history of suicide attempts—even before they tried to end their lives—and those with similar levels of psychiatric symptoms, but without a suicide history. The differences were in the functional connectivity between brain networks involved in cognitive control (adjusting our behavior or choices to fit a certain task or goal) and self-referential thought processing (reflecting on what we've done today or something embarrassing that happened years ago or thinking about what we need to do tomorrow).

"Our study provides evidence that this brain connectivity marker may be identifiable before a suicide attempt, suggesting that it could help identify those at risk for suicide," says Audreyana Jagger-Rickels, a Boston University Chobanian & Avedisian School of Medicine assistant professor of psychiatry and lead author on the paper. "This could also lead to new treatments that target these brain regions and their underlying functions."

To look for indicators of suicide risk in the brain's inner workings, researchers turned to post-9/11 veterans who'd been exposed to trauma. Participants were given a resting functional MRI scan, which tracks communication between brain regions and networks when no specific task is being performed—a common way of mapping the brain and how different areas interact. Researchers then zeroed in on those who reported a suicide attempt at a one- to two-year follow-up assessment, but who had not reported any prior attempts. They examined brain connectivity before and after the suicide attempt and compared it to a matched control group of veterans with equivalent symptoms of depression and posttraumatic stress disorder (PTSD), but no reported suicide attempts.

The comparison revealed that brain connectivity between cognitive control and self-referential processing networks was dysregulated in veterans in the suicide attempt group, who were all part of a VA Boston Translational Research Center for Traumatic Brain Injury and Stress Disorders (TRACTS) longitudinal study measuring brain, cognitive, physical, and psychological health. Critically, this brain connectivity signature was present both before and after the attempt, suggesting that the marker may be a novel suicide-specific risk factor.

Jagger-Rickels says the findings may eventually help clinicians overcome one of the major challenges in suicide risk assessment—its reliance on self-reporting.

“Interventions to reduce suicide risk are limited to people who feel comfortable enough to disclose—self-report—suicidal thoughts and behaviors,” she says. “Identifying measures that do not require self-disclosure of suicidal thoughts and behaviors may help us identify people who are overlooked and may also aid in the development of novel treatments targeting the brain mechanisms underlying suicidal thoughts and behaviors.”

The study also indicated that connectivity of the right amygdala, a brain region important for fear learning and trauma, differed between the suicide attempt and the control groups, but only after the reporting of a suicide attempt.

“This suggests that there are brain changes that occur after a suicide attempt, which could be related to the stressors surrounding a suicide attempt or due to the trauma of the suicide attempt itself,” says Jagger-Rickels, who’s also a principal investigator in the National Center for PTSD at the VA Boston Healthcare System. “This would indicate that suicide attempts themselves impact the brain, which could increase future suicide risk.”

By Gina Digravio Andrew Thurston for Boston University's The Brink

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General Eric Smith Picked to Head the Marine Corps



Joe Biden wants Gen. Eric Smith, currently the Marine Corps' assistant commandant, to replace Gen. David Berger as the top officer for the service. If approved by the chamber, Smith will succeed Berger at a pivotal time for the service's transformation.

Eric Smith is from Plano, Texas. Smith was commissioned as a second lieutenant in the Marine Corps in 1987 through the Naval Reserve Officers Training Corps program at Texas A&M University. During his time at A&M, he was Commander of *the Fightin' Texas Aggie Band* in the Texas A&M University Corps of Cadets.

Has he been handpicked to write the epitaph of The Corps? Time will tell.

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VW Bus Returning to North American Market After 20 Years



FRANKFURT (Reuters) - Volkswagen will start selling battery-powered versions of its VW bus in North America from 2024 onwards, the carmaker said on Friday, in what marks the reintroduction of the iconic model after a two-decade hiatus.

The introduction of the fully electric ID. Buzz will also include an extra-long version that can seat up to seven passengers and features a larger 85 kilowatt hour (kWh) battery to increase range.

"With the T4 generation, the VW bus left the USA and Canada 20 years ago. But the microbus – as the VW bus is called between New York and San Francisco – has retained its cult status right up to the present day," Volkswagen said in a statement.

All ID. Buzz vehicles for the North American market will be built at Volkswagen's plant in Hanover, Germany, the company said, adding batteries could be charged from 10%-80% in 25 minutes at available rapid charging stations.

Is it time to invest in the bumper sticker business?

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How Humans Breathe Without Thinking About It



study.com

We breathe without thinking about it thanks to the body's respiratory system and autonomic nervous system, which controls vital functions. Breathing transports oxygen to the body's cells to keep them working and clears the body of carbon dioxide. Key structures and organs that make this possible include the brain, nose, mouth, trachea, diaphragm, bronchi, and lungs. Watch this video to learn more about how breathing occurs and why humans usually don't have to give it a second thought.

<https://youtu.be/8NUxvJS-0k?t=1>

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Las Vegas Magician, Mac King



<https://youtu.be/RsDZ7Qvul-E>

Words aren't necessary, so how about another one?

The rope trick <https://youtu.be/xmI9uwYzH9o>

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Pachelbel's Canon (Canon in D) Performed by 7-16 Year Olds



<https://youtu.be/eW-bDcqQgrI?t=4>

Look at these kids and think. Does that tell you something?

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What are the Smallest Observed Particles.



The smallest observed particles in the known universe are elementary particles, which are the building blocks of matter. These particles include:

Quarks: Quarks are fundamental particles that combine to form protons and neutrons, which are the building blocks of atomic nuclei.

Leptons: Leptons are another type of elementary particle, which includes electrons, muons, and neutrinos. Electrons are familiar particles that orbit atomic nuclei, while neutrinos are extremely light and have no electric charge.

Gauge Bosons: These particles mediate the fundamental forces in nature. They include photons (which mediate the electromagnetic force), W and Z bosons (which mediate the weak nuclear force), and gluons (which mediate the strong nuclear force).

Higgs Boson: The Higgs boson is a particle associated with the Higgs field, which gives mass to other particles.

These particles have been observed and studied extensively in particle accelerators like the Large Hadron Collider (LHC). However, it is important to note that the size of elementary particles is not a physical size in the way we think of macroscopic objects. Instead, their size is often described in terms of their quantum mechanical properties, such as their wavelength or energy.

As for the possibility of smaller particles, it is a subject of ongoing scientific exploration. The current understanding is that elementary particles are point-like and have no internal structure. However, theoretical physics, particularly in the field of quantum gravity, is actively exploring the idea of substructure within particles or the existence of smaller constituents. These ideas are still speculative and require further experimental evidence to be confirmed.

Give it another ten years and these guys will be dinosaurs.

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'Reanimated' Hearts Can Be Successfully Transplanted



A gold-standard clinical trial suggests that "reanimating" donated hearts is a viable strategy for expanding the pool of potential heart donors.

By Nicoletta Lanese for Live Science

<https://bit.ly/43EXdkl>

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OECD Economic Outlook



According to the Organisation for European Economic Co-operation, global economic developments have begun to improve, helped by lower energy prices, improving business and consumer sentiment, and the reopening of China. However, the OECD Economic Outlook highlights that the upturn is fragile and the recovery is set to remain weak by past standards, with the effects of tighter monetary policy increasingly being felt

<https://bit.ly/3qPGsEH>

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Florida's Property Insurance Is in Crisis.

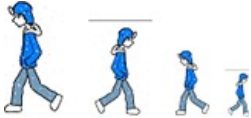


The average home insurance policy in Florida is \$6,000 annually, almost four times the national average. And the skyrocketing rates show no sign of letting up.

<https://bit.ly/3JjtUvL>

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My Walking Thoughts



For Sunday June 18 2023

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Chaos in the Classroom: Sooner and More

This is the first in what I hope will become a Walking Thoughts series on Chaos Theory; looking at what it is, its emerging impact on how we see the world, and eventually why it's important to incorporate its lexicon and visions into our educational DNA quickly and at the lowest possible level.

Before I launch into the task, allow me to join hands with those who will point out that (1) I am anything but an expert on Chaos Theory, either the realms in which it does or doesn't operate, nor where its understandings might lead; and (2) I am not an educator, rather I'm an observer of a revolution taking place that will impact not just mathematics and science, but untold facets of our and our children's lives. As a further thought, I believe that those not familiar with the changes emerging in the development of chaos theory will find themselves walled off from the opportunities that are certain to emerge.

There were hints while I was in school about a hidden world rising to challenge the conventional visions held by scientists and researchers of how things worked, but for the most part either these lay dormant or remained isolated in the bowels of think tanks.

In line with most people in my generation, I viewed the world comfortably from within the bounds of Newtonian, Euclidian, and Pythagorean certainty. Why? Well in retrospect it was because in general the vision worked, and because the system was rigged that way.

In the 1960s while I was running around the skies, inklings of disorder began to emerge, prompting mathematicians and researchers to rethink what they had theretofore dismissed as aberrations or rounding errors in their computations. By the 1970s, it was apparent to all but the most hidebound that disruptive changes were afoot.

The term "chaos theory" was coined by James A. Yorke, a mathematician, in a conference presentation in 1975, who used it to describe the study of deterministic nonlinear systems that exhibit sensitive dependence on initial conditions and unpredictable behavior.

Although Edward Lorenz's work and the concept of chaos predates Yorke's use of the term, it was Yorke who specifically labeled this field of study as "chaos theory." Since then, the term "chaos theory" has been widely adopted to refer to the study of complex and unpredictable systems.

Enough of the gobbledygook for the moment (I'll come back to it in succeeding Walking Thoughts).

As the title suggests, I've got other fish to fry, namely the introduction of chaos theory ideas into primary and secondary curricula...what to everyone with whom I've spoken considers a task whose time has not yet come.

To tell the truth I had reached the conclusion I was on a fool's errand when two things happened this week to renew my quest:

First was a conversation I had with the daughter of a friend who is now a teacher in Boston. After several minutes of looking at the impediments to the scheme, she suggested that one place that might offer a solution would be in teachers' Professional Development' classes held during the summer. It raised some hope.

Then later in the week I came upon an article in [Tech & Learning](#) that added substance to the suggestion...so much so that I'd like to share it in the hope that it will encourage you to comment both as to the approach and to alternative avenues as well.

Tips for Tech-Savvy Professional Development

An award-winning Director of Instructional Technology shares how he's led successful professional development in his district through collaboration, edtech partnerships, and teacher empowerment.



(Image credit: Image by Gerd Altmann from Pixabay)

Mike Arsenault is a self-professed "techie" who shares his passion and enthusiasm for professional development with educators in his district and others. He's worked for 17 years in the Yarmouth Schools district, seven of those as Director of Instructional

Technology. He was honored with the Best Example of Professional Development during the recent Tech & Learning Regional Leadership Summit in Massachusetts.

He shares best practices and strategies for tech-savvy professional development.

The Best PD Is Built On Collaboration

A lot of the focus for Arsenault's team is collaboration. The work he does is possible thanks to the support he gets from the technological integrators with whom he works. "Their role is really about supporting teachers with integrating technology into their classrooms," he says. "So, it's kind of like a coach who supports them and does professional development."

Arsenault's district serves more than 1,700 students, all of whom are part of Maine's one-to-one device initiative, which makes technological integrators' jobs that much more important. He says that his team tries to find ways to bring in the technology to model the types of things they want to see in classrooms.

Empower Teachers

A key to the success Arsenault has had with PD is the way his district empowers teachers. The teachers plan their faculty meetings and lead the PD efforts. However, Arsenault's team plays a crucial role. "Tech integrators are part of the building leadership teams. So as these faculty meetings are getting planned, the integrators are involved with that," he says.

Incentives are provided for teachers to utilize technology in instruction. Each summer, teachers take courses that will help them throughout the upcoming school year. "The summer courses that they take are not just for innovation and implementing something new in the fall," he says. "They also get credit toward tenure and promotion and getting salary increases."

Work With Industry Partners

Arsenault's district is fortunate enough to have relationships with companies such as Canva, Kami, HP Aruba, Apogee, and a host of other organizations that offer software and platforms for educators.

The training provided by solution providers is not limited to teachers as the technology integrators themselves receive training from a variety of industry professionals. "I've been connecting our integrators' group with a number of our vendor partners this year to do some training-the-trainer sessions," Arsenault says. These sessions and similar ones help Arsenault's team identify better ways to utilize tech in classrooms.

Arsenault also hosts "lunch and learn" events during which his team spends half days, or full ones, working with companies in edtech.

Share What You know

Arsenault does not limit the benefits of his work to his district. He is open and sharing with his colleagues throughout the state of Maine. This isn't just the right thing to do, it can also benefit Arsenault's district.

For example, when it seemed as if budgetary constraints would make it impossible to get a coveted keynote speaker for a conference, Arsenault got creative. He asked his superintendent if he could open up the event to other districts. One took them up on their offer, and it was mutually beneficial for teachers to share what they were doing in their classrooms with their colleagues, which extended the PD being offered.

"Sharing is what we do," Arsenault says, adding that there is no competition when it comes to educating children. "Everything is for the betterment of students."

By Ian Peterkin for Tech& Learning

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