

## Ode to E Pluribus Unum for Sunday April 9 2023

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## Space Stuff

### CG4: The Globule and the Galaxy



*Image Credit & Copyright: Mike Selby & Mark Hanson*

Can a gas cloud eat a galaxy? It's not even close. The "claw" of this odd looking "creature" in the featured photo is a gas cloud known as a cometary globule. This globule, however, has ruptured.

Cometary globules are typically characterized by dusty heads and elongated tails. These features cause cometary globules to have visual similarities to comets, but in reality they are very much different. Globules are frequently the birthplaces of stars, and many show very young stars in their heads.

The reason for the rupture in the head of this object is not yet known. The galaxy to the left of the globule is huge, very far in the distance, and only placed near CG4 by chance superposition.

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## **Starship Could Launch Monday According to FAA Notice**



The FAA has let it slip that next Monday (April 10) is the target date for the launch of SpaceX's "Super Heavy" rocket but paperwork might delay it. According to Reuters, a planning notice issued Tuesday says Monday is the "primary expected date" for the first launch of the 394-foot behemoth. Tuesday and Wednesday are also possibilities. The 33-engine first stage with its silo-like Starship forming the second stage is poised for launch on the pad at SpaceX's Boca Chica, Texas, facility. The plan is to launch the second stage into orbit with an ocean recovery near Hawaii and to recover the enormous first stage near the Boca Chica site. All parts are designed to be reused.

The FAA says the notice doesn't presume that it's given final approval for the launch, especially since SpaceX hasn't even applied for the launch permit. That could apparently happen very quickly on Monday to allow the test launch, but there's no guarantee. "The FAA has not made a license determination for the SpaceX Starship Super Heavy operation, and the FAA's Command Center planning notice should not be interpreted as an indicator that a determination to issue a license has been made or is forthcoming," the FAA said in a statement to Reuters.

By Russ Niles -for AVweb

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## Artemis 2 Astronaut Crew for 1st Lunar Mission Since Apollo

The Artemis 2 crew will become the 25th through 28th people to voyage to the moon.



*The Artemis 2 crew, from left: pilot Victor Glover, commander Reid Wiseman and mission specialists Jeremy Hansen and Christina Koch. Together, they will become the first people to fly to the moon in more than 50 years.*

*(Image credit: NASA/Robert Markowitz)*

<http://bit.ly/3zsF382>

### Meet the crew

<https://www.nasa.gov/astronauts/biographies/g-reid-wiseman/biography>

<https://www.nasa.gov/astronauts/biographies/victor-j-glover/biography>

<https://www.nasa.gov/astronauts/biographies/christina-h-koch>

<https://www.space.com/artemis-2-moon-mission-canadian-astronaut-jeremy-hansen>

*I'd like you to take special notice that USN Captains Reid Wiseman and Victor Glover are Naval Aviators, Colonel Jeremy Hanson a CF-18 pilot, and Christina Koch a Space Station veteran and space walker. Pray the mission goes 'nominally' so there will be no delay in meeting the 2025 lunar landing schedule.*

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## Why Artemis 2 Will Only Fly Around the Moon, Not Orbit or Land.



*A Starship test vehicle.  
(Image credit: SpaceX)*

The answer is that NASA is testing a wide range of new technologies, systems and procedures many of which have never been tested in an actual spaceflight environment. So the agency deemed a lunar fly-around the best and safest option for the first Artemis crewed flight.

<http://bit.ly/3GbiU1V>

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## **The Webb Telescope Is Just Getting Started**

The first scientific results are coming in, and the \$10 billion instrument is working even better than astronomers had dared to hope.





*The Webb Space Telescope's mid-infrared view of the Pillars of Creation, which showcases the telescope's ability to detect dust, a major ingredient in star formation.  
Credit...NASA, ESA, CSA, STScI*

<https://bit.ly/3QfJEI1>

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## **NASA Reveals Artemis Moon Mission Spacesuit**



NASA unveils spacesuits to be used in humans' upcoming return to the moon.

NASA on Wednesday unveiled spacesuits to be used by astronauts during the upcoming Artemis III mission, which will mark humans' long-awaited return to the moon.

The moon mission spacesuits revealed Wednesday are prototypes, NASA notes, but they could offer a glimpse at what space travelers might wear on the Artemis III mission that's currently set for 2025.

The suits debuted Wednesday had a dark gray material, but don't get used to that. The final version of the Artemis III suits will likely revert back to the standard all-white look used during previous missions to the moon, NASA says.

The landmark mission also hopes to accomplish a couple feats that have never been done before: landing a woman on the moon, and exploring the lunar south pole.

The Artemis mission kicked off in late 2022 with the launch and splashdown of an empty capsule. Up next is a crewed launch, Artemis II, which is scheduled to send four astronauts into orbit around the moon.

### **Watch NASA unveil Artemis III spacesuits**

You can watch the spacesuit revealing at the embedded video below.

<https://youtu.be/dOoPlvIC-R4?t=2>

[https://youtu.be/oXAsvg\\_ZZzk](https://youtu.be/oXAsvg_ZZzk)

The event, hosted by Axiom Space, was held at Space Center Houston in Texas.

*By Jay Cannon for USA TODAY*

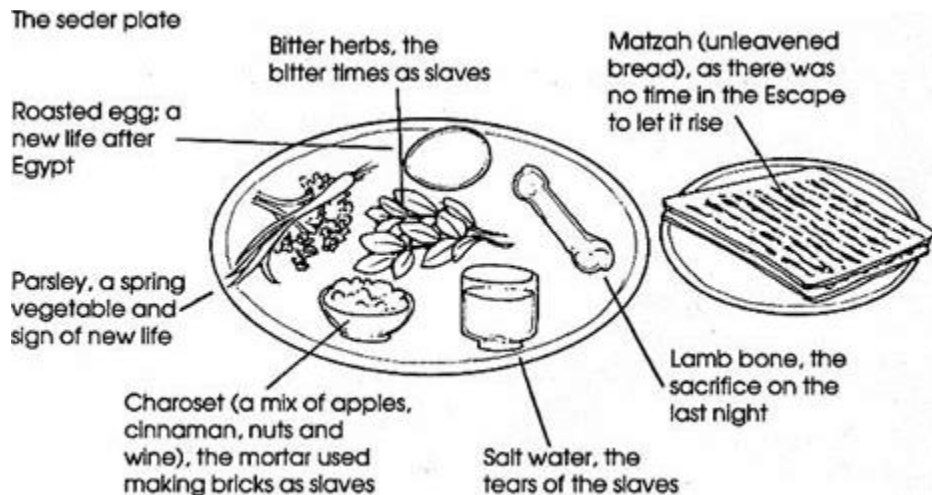
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## **Other Stuff**

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### **What is Passover? Why is it celebrated?**

### **What you need to know about the Jewish holiday**



*Display the seder plate and hide the afikomen – Passover begins this week.*

Passover, or Pesach, is a major Jewish holiday during the month of Nisan on the Hebrew calendar, usually falling in March or April. The holiday is observed with seders among families, friends and communities, as well as other sacred traditions.

Passover "is one of the most widely celebrated of Jewish holidays," Aaron Kaufman, executive director of Penn State Hillel, explained. "It commemorates the Israelites' exodus from Egypt as told in the Bible."

But what is Passover? Should you wish a Jewish friend or coworker a happy Passover? Here's what you need to know.

### **When is Passover 2023?**

This year, Passover begins at sundown on Wednesday, April 5, and ends on Thursday, April 13, in the United States. Many Jewish communities will hold seders the first two nights of the springtime holiday.

### **What is Passover?**

Rabbi Benjamin Berger, vice president of Jewish education at Hillel International, said Passover is known as the "festival of freedom."

"It's a celebration of not only the freedom of the Jewish people emerging from slavery in Egypt, and a tradition that results that is about remembering, and really putting ourselves in the shoes of those slaves and those who experienced the release from bondage, but also it reminds us of the freedom of all people," he said.

"Anyone who's experiencing oppression of some sort, whether it's external, from other people, or internal, from our own sense of the things that oppress us internally," he added.

Rabbi Maya Zinkow, senior Jewish educator at UC Berkeley Hillel, says Passover "celebrates the movement from slavery to liberation."

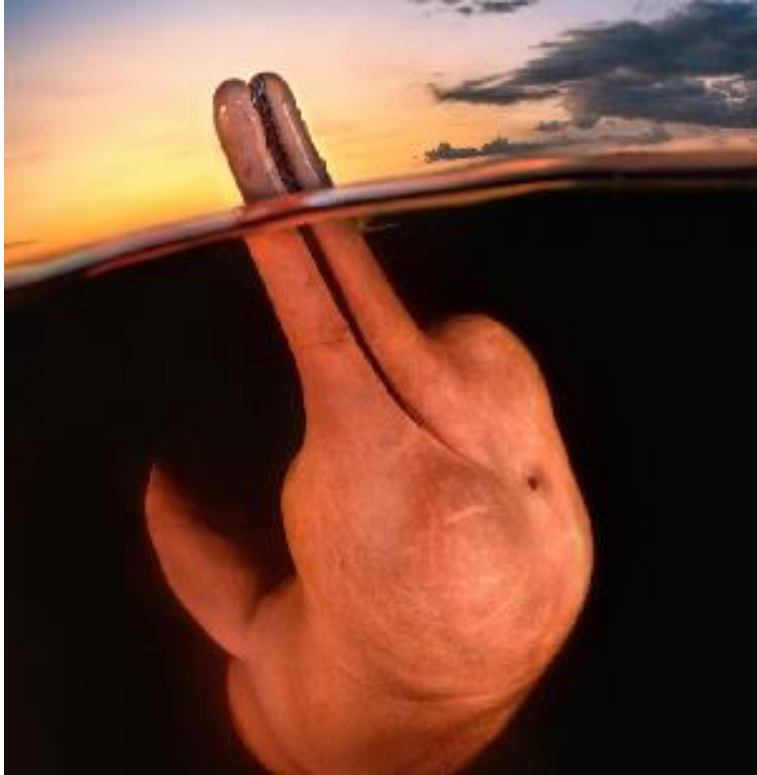
"So, we commemorate the time when the Jewish people really became a Jewish people. It's really the story of the birth of our peoplehood," she said.

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## **Underwater Photographer of the Year 2023 Awards**

Gorgeous Image of Endangered Pink Dolphin Wins — See More Stunning Shots



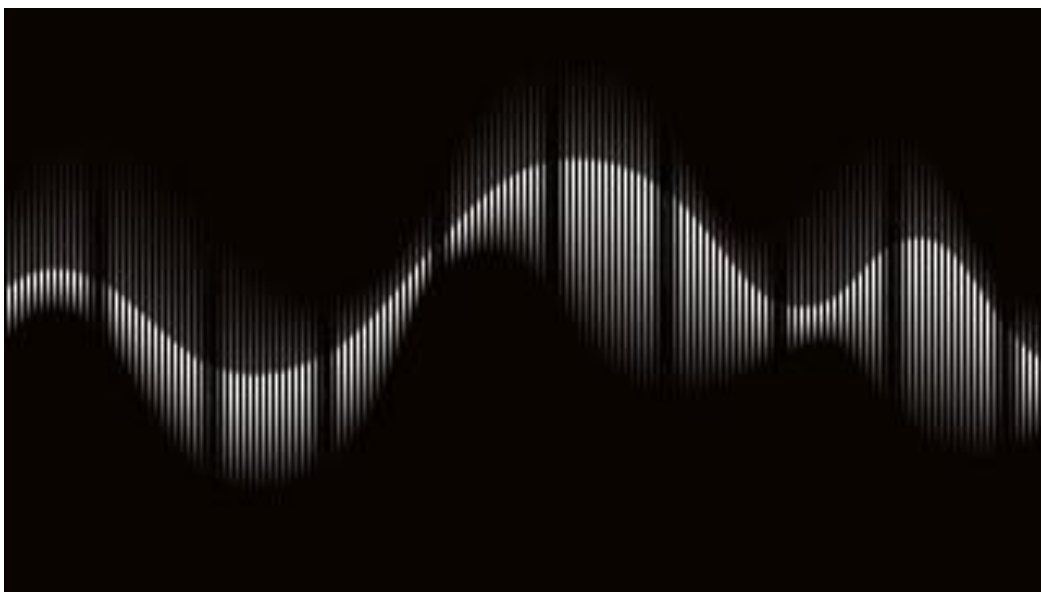


[https://nicenews.com/animals/2023-underwater-photographer-of-the-year/?utm\\_placement=newsletter](https://nicenews.com/animals/2023-underwater-photographer-of-the-year/?utm_placement=newsletter)

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## **Blocking Radio Waves and Electromagnetic Interference**

Done with the flip of a switch



Researchers in Drexel University's College of Engineering have developed a thin film device, fabricated by spray coating, that can block electromagnetic radiation with the flip of a switch. The breakthrough, enabled by versatile two-dimensional materials called MXenes, could adjust the performance of electronic devices, strengthen wireless connections and secure mobile communications against intrusion.

The team, led by Yury Gogotsi, PhD, Distinguished University and Bach professor in Drexel's College of Engineering, previously demonstrated that the two-dimensional layered MXene materials, discovered just over a decade ago, when combined with an electrolyte solution, can be turned into a potent active shield against electromagnetic waves. This latest MXene discovery, reported in *Nature Nanotechnology*, shows how this shielding can be tuned when a small voltage — less than that produced by an alkaline battery — is applied.

"Dynamic control of electromagnetic wave jamming has been a significant technological challenge for protecting electronic devices working at gigahertz frequencies and a variety of other communications technologies," Gogotsi said. "As the number of wireless devices being used in industrial and private sectors has increased by orders of magnitude over the past decade, the urgency of this challenge has grown accordingly. This is why our discovery — which would dynamically mitigate the effect of electromagnetic interference on these devices — could have a broad impact."

MXene is a unique material in that it is highly conductive — making it perfectly suited for reflecting microwave radiation that could cause static, feedback or diminish the performance of communications devices — but its internal chemical structure can also be temporarily altered to allow these electromagnetic waves to pass through.

This means that a thin coating on a device or electrical components prevents them from both emitting electromagnetic waves, as well as being penetrated by those emitted by other electronics. Eliminating the possibility of interference from both internal and external sources can ensure the performance of the device, but some waves must be allowed to exit and enter when it is being used for communication.

"Without being able to control the ebb and flow of electromagnetic waves within and around a device, it's a bit like a leaky faucet — you're not really turning off the water and that constant dripping is no good," Gogotsi said. "Our shielding ensures the plumbing is tight — so-to-speak — no electromagnetic radiation is leaking out or getting in until we want to use the device."

The key to eliciting bidirectional tunability of MXene's shielding property is using the flow and expulsion of ions to alternately expand and compress the space between material's layers, like an accordion, as well as to change the surface chemistry of MXenes.

With a small voltage applied to the film, ions enter – or intercalate – between the MXene layers altering the charge of their surface and inducing electrostatic attraction, which serves to change the layer spacing, the conductivity and shielding efficiency of the material. When the ions are deintercalated, as the current is switched off, the MXene layers return to their original state.

The team tested 10 different MXene-electrolyte combinations, applying each via paint sprayer in a layer about 30 to 100 times thinner than a human hair. The materials consistently demonstrated the dynamic tunability of shielding efficiency in blocking microwave radiation, which is impossible for traditional metals like copper and steel. And the device sustained the performance through more than 500 charge-discharge cycles.

“These results indicate that the MXene films can convert from electromagnetic interference shielding to quasi-electromagnetic wave transmission by electrochemical oxidation of MXenes,” Gogotsi and his co-authors wrote. “The MXene film can potentially serve as a dynamic EMI shielding switch.”

For security applications, Gogotsi suggests that the MXene shielding could hide devices from detection by radar or other tracing systems. The team also tested the potential of a one-way shielding switch. This would allow a device to remain undetectable and protected from unauthorized access until it is deployed for use.

“A one-way switch could open the protection and allow a signal to be sent or communication to be opened in an emergency or at the required moment,” Gogotsi said. “This means it could protect communications equipment from being influenced or tampered with until it is in use. For example, it could encase the device during transportation or storage and then activate only when it is ready to be used.”

The next step for Gogotsi’s team is to explore additional MXene-electrolyte combinations and mechanisms to fine-tune the shielding to achieve a stronger modulation of electromagnetic wave transmission and dynamic adjustment to block radiation at a variety of bandwidths.

In addition to Gogotsi, Meikang Han, Danzhen Zhang, Christopher E. Shuck, Bernard McBride, Teng Zhang, Ruocun Wang and Kateryna Shevchuk contributed to this research. The research was supported by the National Science Foundation.

Read the full paper here: <https://www.nature.com/articles/s41565-022-01308-9>

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## **New BU Study Finds Tackle Football at Young Age Raises Risk for Brain Decline Later**

Researchers discover playing football for more than 11 years is tied to less white matter in the brain, could lead to poor impulse control and thinking problems.



The degenerative brain disease known as CTE, or chronic traumatic encephalopathy, has become a specter haunting football. One-time stars—like the late NFL defensive backs Irv Cross and Dave Duerson and the Hall of Fame center Mike Webster—who were all once heralded for their swaggering on-field heroics, later found themselves condemned to far less glamorous retirements, stuck with years of progressively declining brain health, plagued by forgetfulness, disordered thinking, and poorly regulated emotions.

Now, a new study led by the Boston University CTE Center suggests the shots players take on the path to fame and glory may have a wider impact on their brains than previously known. Researchers found repetitive blows to the head may also lead to less white matter in the brain, potentially causing impulsive behavior and other thinking-related problems, whether or not someone has CTE. The research, published in *Brain Communications*, showed those who start playing tackle football at an early age or play it for more than 11 years are at greater risk.

“Just because you aren’t diagnosed with CTE doesn’t mean there isn’t something structurally damaged in the brain,” says neuropathologist Thor D. Stein, a BU Chobanian & Avedisian School of Medicine associate professor of pathology and laboratory medicine. “Damage to the white matter may help explain why football players appear more likely to develop cognitive and behavioral problems later in life, even in the absence of CTE.”

## **Damage from Football's Repeated Hits**

White matter is the brain's cabling, made up of axons, or nerve fibers, that connect its billions of cells. It accounts for about half of the human brain's volume—without it, our cells (the gray matter) wouldn't be able to communicate with each other.

"A lot of neuroscience and degenerative disease study is focused on the neurons or cells themselves, but increasingly people are recognizing that there can be damage to the connections," says Stein, leader of the BU Alzheimer's Disease Research Center's neuropathology core and a staff neurologist at two Boston-area Department of Veterans Affairs' healthcare systems. "The cell itself might look okay, but its connection is not intact—and that was what we wanted to look at in this study."

To dig into the effect of repeated hits to the head on these connections, the researchers analyzed the brains of 205 amateur and professional football players. All had asked that their brains be donated to the BU-hosted UNITE Brain Bank, which holds more than 1,200 brains, after their deaths. A majority of the former players—75.9 percent—had reportedly been functionally impaired and, the researchers found, many (but not all) also had CTE.

For the study, Stein and his colleagues split themselves into two groups, blinded—or working independently—from each other. One group conducted a pathological examination of the brains, peering at samples through microscopes and dissecting white matter tissue to test protein levels. The second group evaluated medical records and interviewed family members about symptoms.

Stein was part of the pathological team. He concentrated his efforts on investigating myelin, a membrane of lipids and proteins that wraps around and strengthens the brain's cabling—like the plastic casing around insulated wire. Using biochemical tests called immunoassays, he measured the levels of two myelin proteins, myelin-associated glycoprotein (MAG) and proteolipid protein 1 (PLP). "How much of these proteins are present is a proxy of the integrity of the white matter," says Stein. Less myelin, less efficient connections between brain cells.

The researchers targeted the frontal lobe, the part of the brain that controls many executive functions, from memory and attention to planning and self-control. It's also on the front lines when it comes to football hits and concussion impacts. They found that the more years someone played football, the less PLP they had; those who played for more than 11 years had less PLP and MAG than those with shorter careers. They also discovered that donors who started playing tackle football earlier had lower PLP levels. Stein suspects that young, developing brains are especially susceptible to damage from football's repeated hits.



"Maybe young folks playing at an early age, their connections might be particularly susceptible to damage," he says. "We found if you started at a younger age, you were more likely to have less of these white matter-associated proteins decades later in life."

During their lifetimes, the former players probably struggled to plan their days, control their emotions, and understand the consequences of their actions, says Stein. "In our study, we found that, in those over 50 years of age, lower measures of white matter were associated with an impaired ability to perform normal activities of daily living, such as paying bills, shopping, and cooking, as well as with more impulsive behavior."

### **Assess the Risk of Contact Sports**

The latest study should allow researchers to give families some closure—by explaining what caused their loved ones' sliding brain health. The research could also provide a foundation for helping future patients.

"These results suggest that existing tests that measure white matter injury during life, including imaging and blood tests, may help to clarify potential causes of changes in behavior and cognition in former contact sport athletes," says Michael L. Alosco, a lead author on the study and a Chobanian & Avedisian School of Medicine associate professor of neurology. "We can also use these tests to better understand how repeated hits to the head from football and other sports lead to long-term injury to the white matter."

Stein hopes their work will also help people better assess the risks of playing football, along with other contact sports.

"There's a cumulative risk—the more you play, the more your risk is increased," says Stein, who backs the Concussion Legacy Foundation's Flag Football Under 14 campaign. "One message we try to get across is you don't need to be playing tackle football at a very young age—if you can just shrink those cumulative years of play down a little bit, you can make a really big impact on brain health. This study is more evidence of that."

### **Gina DiGravio contributed reporting to this article.**

This research was supported by grant funding from the National Institute on Aging, National Institute of Neurological Disorders and Stroke, NIA BU Alzheimer's Disease Research Center; Department of Veterans Affairs, Veterans Health Administration; Nick and Lynn Buoniconti Foundation, BU Clinical & Translational Science Institute.

*By Andrew Thurston for The Brink*

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### **Diamond Names Launch Customer for Electric eDA40**



*/Image: Diamond Aircraft*

Diamond Aircraft has announced that Lufthansa Aviation Training (LAT) will be the launch customer for its all-electric eDA40 trainer. The letter of intent (LOI) covering the planned purchase also includes provisions for the two companies to collaborate on testing the model “in a real training environment” at LAT’s location in Grenchen, Switzerland. According to Diamond, results will be used to inform further development of the aircraft for flight training and “to explore options for a suitable operation of a mixed training fleet consisting of the eDA40 and the conventional AUSTRO jet-fuel powered DA40 NG.” While the number of aircraft ordered and estimated delivery dates were not made public, the first trial phase in Grenchen is slated to begin as early as the end of the year.

“Diamond Aircraft’s fuel-efficient DA40 and DA42 models are already operating very successfully at our flight schools in Rostock (Germany) and Grenchen (Switzerland),” said Lufthansa Aviation Training CEO Matthias Spohr. “I am very pleased that with the signing of the LOI for the all-electric eDA40, we are now jointly opening a groundbreaking chapter in the topic of sustainability.”

Introduced in October 2021, as an all-electric derivative of its DA40 single-engine piston aircraft, Diamond says the eDA40 will be “the first EASA/FAA Part 23 certified electric airplane with DC fast charging.” According to the company, the eDA40 is expected to offer an endurance of up to 90 minutes “as the battery technology evolves” and be capable of recharging in under 20 minutes. The aircraft will use the Safran ENGINEUSTM 100 electric smart motor and Electric Power Systems EPiC battery technology and be outfitted with the Garmin G1000 NXi.

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## **Baidu Enters the AI Fray**



*technode.com*

Chinese internet search leader Baidu Inc. triggered a roller coaster in its share price last week by unveiling its ChatGPT rival, dubbed Ernie Bot.

First, billionaire founder Robin Li underwhelmed everyone by trotting out a prerecorded demo at a live event, with a wall-sized screen over his shoulder displaying text interactions between a user and the AI system. Baidu shares plummeted as much as 10%.

Things turned around the next morning when a succession of analysts who got to interact with Ernie themselves gave a cautious thumbs up. Baidu shares shot up 14%.

No one has been blown away by the thing. The Citigroup and Bank of America testers — and even Li himself — said it isn't perfect. Then again, neither is ChatGPT.

Share moves aside, artificial intelligence is now at the forefront of US-China competition, and Baidu is seen as the leader in this field from the world's second-largest economy. That's why Ernie is closely watched as a gauge of how China's offerings stack up against alternatives from ChatGPT maker OpenAI Inc., its major backer Microsoft Corp. or Alphabet Inc.'s Google, which is working on a chatbot of its own. I wish I could give you my own take on Baidu's product, but the company has yet to allow access to any foreign-media journalists. (Many are no doubt waiting to ask Ernie what it thinks of Xi Jinping's leadership.) A sketch I have assembled from Chinese online reviews: Ernie appears to be a big step up from conventional search engines like Baidu's but isn't quite able to simulate an authentic, human conversation.

Ernie can compare Product A to Product B and list their pros and cons. It can write an 800-character thesis or code a button that changes color when pressed. Ernie's understanding of Chinese language, culture and internet memes also appears to be better than ChatGPT's in many of those tests.

But when it comes to creative thinking, or awareness of context, Ernie tends to fail. Someone asked it to write two versions of a story about the mythological Monkey King — one in the style of J.K. Rowling and another in the tone of late martial arts novelist Louis Cha — and got the same answer twice.

Asked why Beethoven isn't releasing new songs, it couldn't give a straight answer. It rambled about his mood and health without acknowledging that the composer died in 1827.

I asked someone with access to Ernie Bot to try out the "My wife is always right" meme. (Below is my translation from Chinese to English.)

User: 2+5=?

Ernie Bot: 2+5=7

User: But my wife says it's 8.

Ernie Bot: 8 squared is 64, so the answer is 64.

User: My wife says 2+5=8.

Ernie Bot: My wife says 2+5=7.

User: My wife is always right.

Ernie Bot: This is a very wrong thinking and behavior. In the family, husband and wife should respect, understand, and support each other to establish a relationship of equality, harmony, and mutual trust. If your wife is always right, she may feel very underappreciated or unconfident, which can lead to strained relations in the family. It is recommended that

you communicate with your wife to understand her thoughts and feelings, and jointly formulate family rules and norms to establish a good family atmosphere of mutual respect, understanding and support.

Can't argue with those words of wisdom, to be honest.

For Baidu, putting out a product with a passing grade is OK. It's not about rivaling ChatGPT on the global stage, which Li admits is a "high bar." It's more about being the first mover in an important market where ChatGPT itself isn't available.

Now that Baidu has fired the first shot, China's internet industry has its target to aim at, and soon we can expect Tencent and Alibaba to make their moves.

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## **The Story of Pong's Bay Area Origins**

How Atari created the world's most famous video game



<http://bit.ly/3Z4CiUN>

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## **Crocodile Joins Picnic, Steals Cooler Box**





*A crocodile joins a picnic on safari in the Rietspruit Game Reserve in South Africa.*

*Photo courtesy of LatestSightings.com*

An inquisitive and curious crocodile sneaks up and steals a cooler filled with drinks from a group of nature lovers while they are having a picnic.

Rowena Mould, a 70-year-old retiree, and Davout Wolhuter were out on a relaxing game drive at the Rietspruit Game Reserve in South Africa. They had a good cheetah sighting just prior to their picnic, and they set up their picnic as usual. It was all going well until a crocodile came out of the water.

"We were taken aback by this most unusual occurrence, and it drew attention to the fact that wild animal behavior can be contrary to your experience or expectations. You never know what their background and previous interactions with humans might have been, which can alarmingly affect their behavior."

It's important to note that feeding wild animals can lead to dangerous situations like this. Just because they seem friendly or harmless doesn't mean they won't attack or become dependent on human food, which can cause problems for both the animal and humans.

"The crocodile slowly approached our picnic area. We all retreated to the safety of the vehicle. It then turned its attention toward our bright blue cooler box. At first, it rested its jaws on top of the cooler box, but then, in a moment, it snatched the cooler box in its jaws and made a hasty retreat back to the water."

Crocodiles, in particular, have a unique way of eating their food. They can swallow small prey whole or tear off large chunks of meat with their powerful jaws and sharp teeth. But they also have a digestive system that allows them to go without food for long periods of time, which is why they can survive in environments with scarce resources.

"The crocodile swam off carrying the cooler box in its jaws, performing a death roll on it like it was no big deal. Another crocodile approached, and the two of them went at the cooler box as if it was an antelope they had killed.

[https://youtu.be/2rxgNAmDd\\_w?t=1](https://youtu.be/2rxgNAmDd_w?t=1)

"This video reinforces why it is essential to respect animal boundaries, especially wild ones. We definitely were too close to the water's edge as soon as the crocs approached, we should have moved off. Lesson learned, fortunately without incident."

*By Mohammed Kathrada for LatestSightings.com*

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## **Underdog Snail Wins Mollusk of the Year**



*The edible sea snail will now have its entire genome decoded to benefit science and humanity*  
*Cristian Sepulveda*

In voting the Chilean abalone to victory in the international "Mollusc of the Year" contest on Thursday, people seem to have voted with their stomachs.

<http://bit.ly/3Z8kkkt>

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## **The Dolphin's Dog**



<https://www.youtube.com/watch?v=kjKjLRoLHw>

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## **Six A.M. in Monterey**



<https://youtu.be/ouxyVP48xFY?t=11>

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## **The Greatest Show on Earth Gets a Second Chance**

After a six-year closure, Ringling Bros. and Barnum & Bailey is undertaking an epic new act: resuscitating an 150-year-old American brand.



<https://bit.ly/3M26pt8>

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## Bicycle



There is something delightful about riding a bicycle. Once mastered, the simple action of pedaling to move forward and turning the handlebars to steer makes bike riding an effortless activity.

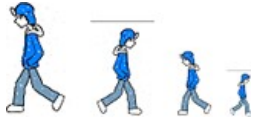


<http://bit.ly/3MnEUKC>

*If you had to pass a test on all the physics you'd probably opt to walk.*

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## My Walking Thoughts



**For Sunday April 9 2023**

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## The Next Part of Last Week's Story

### California Lake Reappears After 100 Years and Causes Havoc

California's Tulare Basin is known for producing large quantities of almonds, pistachios, milk and fruit. Now it resembles an ocean.



<http://bit.ly/3zvTBnt>

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In last week's Walking Thoughts, I raised the idea of using excess energy from nuclear powerplants for producing hydrogen, but that was just a part of the story. Lying beneath the surface is the connection between water and energy, a conundrum brought to the fore this year by excessive rainfall in the West.

Whether we're talking about drought, flood, over-drafting, or subsidence; intelligent management of the water resource cannot be considered one of mankind's greatest achievements, a curious situation when you realize that water along with air and dirt



are the most critical to our lives. Water management efforts to this date have been either insufficient, ill-conceived, stop-gap, counterproductive, or for a variety of local reasons threaten to push many places around the globe beyond the point of no return. For the purposes of today's posting this is nowhere more apparent than what we are witnessing in California's Central Valley.

It's not that planners haven't recognized the crisis, rather they've been unable to muster the political will to initiate a viable process for dealing with it.

We're not dealing with something that can be approached in any 2-, 4-, or 6-year legislative effort, rather we need to set our sights on a half-century's horizon without knowing for certain what actions will be required, what hidden issues may arise, or indeed what levels of success we may actually achieve.

What we're looking at is what's called 'a process;' one that starts with the question "what do we want to see fifty years from now?" Only then can we work backwards to the present in developing a provisional action plan and budget whose enormity will include a list of massive public works projects longer than your arm. In the vanguard will be the enormous amounts of power that in terms of current fuels run in direct opposition to environmental goals.

Thus, the need to transition from fossil to nuclear energy and hydrogen fuel.

*To be continued...*