Monday, June 29, 2026

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"You couldn't relive your life, skipping the awful parts, without losing what made it worthwhile. You had to accept it as a whole--like the world, or the person you loved."

— Stewart O'Nan

Hubble Spies Starry Chandelier

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Source: NASA

globular clusters in our galaxy, though there may be others still undiscovered, hidden from view by dust or densely packed fields of stars. This globular cluster, NGC 6723, sometimes called the Chandelier Cluster, is much like its namesake because it sparkles with countless lights. However, each ‘lightbulb’ in this chandelier is an individual star 27,000 light-years away in the constellation Sagittarius (the Archer). Globular clusters like NGC 6723 contain some of the oldest stars in our galaxy. These clusters have ages that often exceed 10 billion years old, and some are nearly as old as the universe itself. Astronomers think globular clusters are some of the first structures that formed in our galaxy, coalescing potentially billions of years before the thin disk of stars in which our Sun orbits. The details of how globular clusters formed, however, are not yet certain. Astronomers initially thought that all stars in a globular cluster formed at the same time in a single flourish of star formation. This would mean that all stars in a globular cluster would be the same age and made of the same mixture of chemical elements. Now, thanks to observations from telescopes like Hubble, researchers know that these seemingly simple stellar populations have more complex histories than originally thought. Hubble first observed NGC 6723 as part of an ambitious survey dedicated to demystifying the properties of globular clusters in our Milky Way galaxy. In this observing program (# 10775 , PI: Sarajedini), researchers used Hubble to study 65 globular clusters in our galaxy in visible and near-infrared light . That data allowed researchers to study everything from the ages of globular clusters to the process through which

Source: NASA

massive stars sink to the center of a star cluster and lower-mass stars drift toward the cluster outskirts. This survey has been immensely scientifically valuable, and these observations have inspired several hundred published research papers. In a later observing program (# 13297 , PI: Piotto), researchers set their sights again on many of these same clusters, including NGC 6723. This time, they used Hubble's unique sensitivity to ultraviolet light to detect the subtle variations in chemical composition between the stars of globular clusters and determine the age spread among the clusters' stars. For NGC 6723, researchers found evidence of two closely-spaced periods of star formation, the second occurring within 634 million years of the first. ('Closely-spaced' is relative; 634 million years is a blink of an eye for a star cluster that is more than 10 billion years old!) Thanks to these findings, astronomers are on the path to understanding how and when globular clusters formed — and Hubble observations of celestial chandeliers like NGC 6723 are lighting the way. Text Credit: ESA/Hubble Facebook logo @NASAHubble @NASAHubble Instagram logo @NASAHubble Media Contact : Claire Andreoli NASA's Goddard Space Flight Center , Greenbelt, MD claire.andreoli@nasa.gov Share Details Last Updated Jun 26, 2026 Editor Andrea Gianopoulos Location NASA Goddard Space Flight Center Related Terms Hubble Space Telescope Astrophysics Astrophysics Division Globular Clusters Goddard Space Flight Center Star Clusters Stars The Universe Keep Exploring Discover More Topics From Hubble Hubble Space Telescope Since its 1990 launch, the Hubble Space Telescope has changed our fundamental understanding of

Source: NASA

the universe. Hubble’s Star Clusters Hubble e-Books Hubble’s Cosmic Adventure

Source: NASA

What do Yellowstone and the 2026 FIFA Men’s World Cup have in common? Heat maps!

What do Yellowstone and the 2026 FIFA Men’s World Cup have in common? Heat maps! Subscribe to receive "Caldera Chronicles" articles via email By Yellowstone Volcano Observatory June 29, 2026 Heat is everywhere—from the boiling hot springs and fumaroles of Yellowstone to the fast-paced action of the 2026 FIFA Men’s World Cup. In both settings, scientists and analysts use heat maps to visualize activity, whether it's geothermal energy or the positions of players on the field. How are these maps made, and what do they reveal about their respective domains? Yellowstone Caldera Chronicles is a weekly column written by scientists and collaborators of the Yellowstone Volcano Observatory. This week's contribution is from R. Greg Vaughan, research scientist with the U.S. Geological Survey. Heat maps are a tool for visualizing where activity is concentrated—whether it is bubbling hot springs in Yellowstone or players speeding down the soccer field (or pitch) at the World Cup. Yellowstone’s thermal areas are powered by geothermal heat from a cooling magma reservoir a few miles beneath the surface and are a constant reminder of the volcanic activity that has shaped the region. These areas also change frequently. Over time, thermal areas expand, contract, migrate, and sometimes new ones appear . Scientists from the Yellowstone Volcano Observatory monitor these dynamic areas and provide information to the

Source: U.S. Geological Survey

National Park Service to help protect park resources and promote visitor safety . In Yellowstone, scientists use remote sensing tools to create heat maps of thermal areas, revealing surface temperatures and variations in geothermal activity, and also highlighting features like hot springs and fumaroles. Thermal infrared imaging is a key technology used to capture the invisible warmth radiating from Yellowstone's dynamic thermal areas. Both satellite and airborne thermal infrared images are used to map, measure, and monitor thermal areas. Because there are some thermal areas that are too subtle to be detected with satellite thermal infrared data, scientists also use higher-resolution visible images from commercial satellites to look for snow-free zones in the wintertime. This technique allows smaller and/or more subtle thermal zones to be identified and mapped. The resulting heat maps highlight areas of more intense geo-thermal activity (higher surface temperatures), helping scientists understand Yellowstone's ever-changing landscape. What does this have to do with soccer (or football, as most of the world outside the USA calls it)? On the soccer field, there are 22 players (11 per team) who are moving almost constantly. It's like a game of chess where all the pieces are free to move in any direction at any time. There are, however, players in certain positions that hold certain tactical roles, and who often have certain specialized skills and abilities. For example, a striker—primarily an attacking player—spends most of their time in their attacking third of the field, close to the opponent's goal; a central defender spends most of their time on the back line, trying to prevent the opponent from creating scoring

Source: U.S. Geological Survey

chances; and of course, goalkeepers position themselves in front of the goal they are protecting and don’t usually venture very far away. (By the way, a FIFA-regulation soccer field is 105 meters by 68 meter (115 yards by 74 yards), which is about the same size as Grand Prismatic Spring , the largest hot spring in Yellowstone National Park and the third largest hot spring in the world!). In soccer, as well as other sports, players can wear trackers (using the same GPS technology that allows scientists to monitor ground deformation) that record their movements on the field. Alternatively, video feeds and optical tracking systems with player recognition software can be used to track each player’s movements throughout a game. These technologies can track player speed, direction, and cumulative distance covered, and ultimately can be used to generate heat maps that show where players spend most of their time—whether they're sprinting down the wing or battling for possession in the midfield. In this case, the heat maps are not showing actual heat, as is the case in Yellowstone, but rather where players spend the most time during a game. Coaches and other team analysts can examine heat maps (for individual players or the entire team) and, combined with other statistics, they can optimize tactical strategies and evaluate player fitness and effectiveness. Heat maps can also be used to educate fans and young athletes about what areas of the field are typically covered by players in different positions, thus enhancing player development, and helping young athletes learn the fundamentals of the sport. Despite their distinct applications, both types of heat maps rely on modern technology, data collection, and visualization

Source: U.S. Geological Survey

techniques that transform complex activity into accessible insights. In Yellowstone, heat maps guide scientific investigation and aid in safety. In soccer, they inform strategy and performance evaluation. Whether charting the unpredictable flux of geothermal energy or the dynamic plays of world-class athletes, heat maps illuminate hidden stories at the surface. So, next time you see a heat map of Yellowstone's thermal areas or a player's heat map during the World Cup, remember that both are windows into worlds of energy and motion that are revealed by science and technology. Related News Items per page 6 12 Label Hydrothermal hats and visitor safety: Walking in the boots of the Yellowstone National Park Geology Team September 8, 2025 Hydrothermal hats and visitor safety: Walking in the boots of the Yellowstone National Park Geology Team Ever wonder who collects hats blown into Yellowstone hot springs, repairs damage to bacterial mats or thermal ground, and monitors the health of... Read Article Yellowstone's Spectacular Spring: The Story of Grand Prismatic and the Little Dipper November 13, 2023 Yellowstone's Spectacular Spring: The Story of Grand Prismatic and the Little Dipper Grand Prismatic Spring is one of the most visited sites in Yellowstone National Park. The feature has amazing story to tell about extreme lifeforms... Read Article Using high-resolution commercial satellite images to help map and monitor Yellowstone's thermal areas September 18, 2023 Using high-resolution commercial satellite images to help map and monitor Yellowstone's thermal areas Thanks to a newly funded project from NASA's Commercial SmallSat Data Scientific Analysis Program, and an

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Source: U.S. Geological Survey

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was designed to do something else September 17, 2018 One of scientists' best tools for tracking ground deformation was designed to do something else More often than not, unforeseen outcomes are bad news. Requiring a complex password is intended to make your password more secure. And it is – unless... Read Article Studying Yellowstone's thermal areas from the air September 10, 2018 Studying Yellowstone's thermal areas from the air In a previous Yellowstone Caldera Chronicles article, we discussed using satellite thermal infrared remote sensing to study the thousands of thermal... Read Article Taking Yellowstone's Temperature…From Space! March 5, 2018 Taking Yellowstone's Temperature…From Space! A lot of heat is released from Earth's surface at Yellowstone. The evidence of this heat flow includes thermal features like hot springs, geysers, mud... Read Article

Source: U.S. Geological Survey

Mid-Atlantic Fishery Management: Science, Stewardship, and Shared Successes

One of the most innovative aspects of the Magnuson-Stevens Act was the establishment of eight regional councils to manage fisheries. Across the country, regional councils are tackling their own unique challenges, each shaped by their local coastal communities and united under a shared framework. In celebration of 50 years of the Act , we're presenting this eight-part series to highlight the landmark work of each region. Fisheries management decisions often involve difficult tradeoffs between conservation goals, economic pressures, and the needs of fishing communities. The Mid-Atlantic region became an early example of how collaborative, science-based management could work across state and federal waters. That commitment to collaboration helped shape early approaches to fisheries management that evolved into today's continued efforts. After Congress passed the Magnuson-Stevens Act in 1976 , eight newly formed regional councils became the foundation for fisheries management in the United States. In 1977, the Mid-Atlantic Fishery Management Council was one of the first councils to implement science-based fishery management plans in partnership with NOAA Fisheries, state agencies, fishermen, and scientists. Their first fishery management plan—covering both Atlantic surfclam and ocean quahog —marked the beginning of decades of innovation in fisheries science and management in the region.

Source: NOAA Fisheries

Building a Foundation for Sustainable Fisheries Management Today, the Mid-Atlantic Council manages fisheries for 15 species under seven fishery management plans. The Council’s fishery management plans designate more than 50 forage species and species groups as "ecosystem components." The Council works closely with NOAA Fisheries, the Atlantic States Marine Fisheries Commission , the New England Fishery Management Council , fishermen, researchers, coastal communities, and others to balance conservation goals with economic opportunities. “Industry are the ones who are on the water day in and day out. They have real-world experience and knowledge that complements any science. By listening and responding to industry feedback, we’re able to continue to develop trust and confidence in the work being done.” — Scott Curatolo-Wagemann, Senior Educator, Cornell Cooperative Extension A hallmark of the Mid-Atlantic region is its collaborative approach between federal and state managers. The Council and the Commission jointly manage several important fisheries across state and federal waters, including commercial and recreational fisheries for summer flounder , scup , black sea bass , and bluefish . This level of coordination across jurisdictions is relatively uncommon nationally, and has been an effective approach for cooperative fisheries management of interconnected resources. More on cooperative research efforts with the fishing industry Summer Flounder Summer flounder, also known as fluke, is one of the most valuable commercial and recreational flatfish fisheries along the Atlantic coast. In 2024, recreational and commercial landings totaled 5.5 million and 8.9 million pounds,

Source: NOAA Fisheries

respectively, with the commercial harvest valued over $28 million. But in the mid-1980s, the stock had become overfished. Managers were concerned fishing pressure would continue to increase as fishermen sought alternatives to depleted groundfish fisheries in New England. Given fluke's distribution across both inshore and offshore habitats, the Council and the Commission recognized the need for coordinated management across state and federal waters. They developed a joint management plan that was implemented in 1988. The plan implemented science-based catch limits, rebuilding schedules, size limits, reporting requirements, and other measures. Over time, those measures helped rebuild the stock and created a coordinated management system between state and federal partners. In 1996, the plan was amended to include black sea bass and scup, and in 2012 NOAA Fisheries formally declared summer flounder rebuilt. Management of the fishery remains challenging today, as environmental conditions, species distribution ranges, and harvesting methods continue to evolve. But the fishery is often cited as an important example of successful, long-term rebuilding of a stock through cooperative management. "The future needs mutual trust. Both fishermen and managers can fall into rigid ways of thinking, and having an open mind is important for fostering collaboration." — Captain Mark Phillips, F/V Prevail, New York Video: Summer flounder resting on an oyster cage Atlantic Surfclam and Ocean Quahog One of the region's most influential management efforts stemmed from Atlantic surfclam and ocean quahog fisheries. By the late 1980s, managers had implemented strict controls to prevent overfishing.

Source: NOAA Fisheries

Those measures—including permit limits, harvest quotas, and trip restrictions—protected the shellfish, but they also created a highly competitive system for fishermen. Vessels raced to catch as much as possible before quotas were met, flooding markets with product, reducing profitability, and encouraging unsafe fishing practices. In 1990, the Mid-Atlantic Council implemented the nation's first Individual Transferable Quota program—also known as a catch share system —for surfclams and ocean quahogs. Under the program, fishermen receive a share of the annual quota that they can harvest, lease, or sell. The system allows fishermen greater flexibility in deciding when and how to fish while keeping total harvest within scientifically-established limits. Supporters of catch share programs highlight improvements in safety, efficiency, profitability, and long-term business stability. By reducing competitive pressure, fishermen can operate in safer conditions and better match supply with market demand. However, critics have raised concerns that quota ownership can consolidate over time, potentially making it harder for smaller operators or new fishermen to enter the fishery. The council plans to work with the industry over the next several years to address these concerns. Today, catch share systems are used in nearly every U.S. fishery region. The surfclam and ocean quahog program helped demonstrate how science-based catch limits and industry flexibility could work together to support both conservation and economic stability. NOAA and partners conduct Atlantic surfclam research An Ecosystem Approach to Fisheries Management As scientists and managers learned more about how species

Source: NOAA Fisheries

and their habitats are connected, the Mid-Atlantic Council has worked to transition beyond managing fisheries one species at a time. They are moving toward an approach that manages fisheries within a broader ecosystem context. In 2015, the Council became the first in the nation to exercise new authority —granted under the Magnuson-Stevens Act—to protect deep-sea coral habitat from fishing impacts. Using NOAA coral exploration data , the Council designated more than 41,000 square miles of federal waters as the Frank R. Lautenberg Deep-Sea Coral Protection Area . The specific boundaries of the deep-sea coral protection area were developed cooperatively by members of the Council's advisory panels, deep-sea coral experts, fishing industry members, and other stakeholders, resulting in a broad consensus. The protections limit the use of bottom-tending fishing gear in sensitive coral habitats that support marine biodiversity and ecosystem health. In 2016, the Council expanded its ecosystem approach by designating more than 50 unmanaged forage species as "ecosystem components." This allows them to establish possession and landing limits to prevent new directed fisheries for those species in the region. Forage species—which tend to be small, short-lived fish and invertebrate species—play a critical role in the marine food web. They are prey for larger fish, seabirds, marine mammals, and other predators. Previously, many forage species were not actively managed or monitored. The Council's Forage Amendment took steps to protect these species and the broader ecosystem as scientists continue to work to improve our understanding of their role in ecosystem health. Together,

Source: NOAA Fisheries

these efforts are part of a shift toward managing fisheries as interconnected parts to a whole, rather than focusing on individual species. Learn more about the Council’s ecosystem approach to fisheries management Looking Ahead The Mid-Atlantic region continues to face new challenges linked to shifting ocean conditions, evolving fisheries practices, and the economic realities facing fishing communities. To adapt, NOAA Fisheries, the Council, and regional partners are working together to: Modernize electronic reporting Update the process for setting recreational management measures Expand cooperative research with fishermen One recent project partnered with the F/V Seacapture and TeemFish to collect video-based length data for golden tilefish , a species that is difficult to monitor through traditional surveys. The project has already generated more than 7,000 length estimates to support future stock assessments. “The next 50 years of fisheries management will certainly look different from the last 50. New technologies, changing ocean conditions, and evolving fisheries will require us to continue to learn and adapt. The Mid-Atlantic Council is well positioned for that future as innovation and collaboration have always been at the core of how we approach our work. These principles will be critical as we prepare for and address the challenges and opportunities ahead.” — Dr. Christopher Moore, Executive Director, Mid-Atlantic Fishery Management Council Looking ahead, long-term science, habitat protections, and collaboration will remain central to sustaining fisheries for future generations in the Mid-Atlantic.

Source: NOAA Fisheries

How Europe ships its waste to Morocco and calls it ‘recycling’

European waste fills Moroccan kilns. Communities near Casablanca are left breathing the fumes Originally published on Global Voices Image by UntoldMag, used with permission By Khalid Bencherif and Federica Rossi This story , by Khalid Bencherif and Federica Rossi, was first published on UntoldMag on June 10, 2026. This edited version is published on Global Voices as part of a content-sharing agreement. Fatima’s eight-year-old son coughed through another sleepless night in Mediouna, a neighbourhood southeast of Casablanca, Morocco, where the air carries something heavier than dust. “I only worry about my child,” she said, unfolding medical records worn soft from handling. “The doctor told me I had to move. But we don't have a place to go.” Morocco’s government has issued 416 permits authorising the import of European waste — clothes, rubber tyres, industrial byproducts — burned as fuel in cement kilns across the Casablanca-Settat region, including within 15 kilometres (9 miles) of her home. European corporations save an estimated USD 52 million a year by shipping their waste here rather than processing it at home. Fatima doesn’t know that; what she knows is that her son can’t breathe, and that some nights the smell reaches dozens of kilometres from the landfill. An investigation drawing on exclusive Basel Action Network trade data, customs records and Freedom of Information responses found that European countries shipped at least 36,611 tonnes of waste to

This story originally appeared on Global Voices

Morocco between September 2024 and September 2025, 93 percent of it classified as “reusable” despite declared values as low as EUR 0.10 (USD 0.11) per kilogram. Industry sale prices for sorted reusable clothing run between EUR 0.50 and EUR 1.50 (USD 0.57 and USD 1.7) per kilogram. At that price, a shipment barely covers sorting and freight. The gap suggests not just different markets but different goods — genuinely reusable clothing commands higher prices, while low declared values indicate material destined for disposal rather than resale. The economics of dumping The arithmetic is brutally simple. Treating waste properly in Europe costs, conservatively, around USD 100 (EUR 88) per tonne . Shipping it to Morocco and burning it in cement kilns costs USD 36 to USD 39 (EUR 32 to EUR 34) . Applied to the 821,500 tonnes Morocco reported importing in 2024, that differential is worth roughly USD 50 million (EUR 44 million) a year — a figure that explains why the trade keeps accelerating before the EU export ban on plastic waste deadline on November 21, 2026. Spain dwarfs all other EU exporters — shipping up to 4.5 million kg of waste to Morocco in a single month, while every other country combined barely registers. Source Basel Network trade records, Sep 2024–Sep 2025 The 36,611-tonne ban figure captures only what Europe still ships under waste codes: clothing, plastics, paper, electronics. The Moroccan Energy Transition and Sustainable Development Ministry’s much larger total includes 517,000 tonnes of ferrous metals and 200,600 tonnes of organic residues that European exporters list as commodity scrap, not waste. The gap between the two figures is essentially the

volume reclassified out of the waste category before it leaves Europe. “The longer the chain of parties involved, the shorter the chain of enforcement,” says Paola Ficco, environmental lawyer and director of the Italian magazine Rifiuti . “Unofficial flows are undetectable.” Spain handles nearly 80 percent of clothing exports to Morocco — 73 tonnes a day — and two-thirds of its plastic waste. The corporate players are embedded. The French firm CHIMIREC established a Moroccan subsidiary in 2020 to produce “Energy Substitution Fuel” for cement manufacturers. CHIMIREC Maroc told us it processes only domestic waste. Lafarge-Holcim’s Ecoval subsidiary is the country’s primary industrial waste treatment provider. Ciments du Maroc, owned by Germany’s Heidelberg Materials , operates a grinding centre at Jorf Lasfar — a documented entry point for European shipments. Neither LafargeHolcim nor Ciments du Maroc responded to requests for comment. The loophole The Basel Convention nominally restricts wealthy nations from dumping hazardous waste on poorer ones. In practice, a single word change on a customs form — from “waste” to “secondary raw material” — transforms a regulated substance into an unregulated commodity. According to data collected through a Freedom of Information request, the Italian Institute for Environmental Protection and Research (ISPRA) told us that between 2020 and 2023 no Italian waste was registered as having gone to Morocco “for disposal purposes” — but, in the same response, it acknowledged that “small quantities” had been shipped during 2021, 2022 and 2023 “for the purpose of material recovery.” UN Comtrade records for 2023 confirm the

This story originally appeared on Global Voices

flow; approximately 817 tonnes of Italian rubber waste reached Morocco that year, worth USD 427,000. The following August, the Moroccan Ministry of Energy Transition authorised the import of 20,000 tonnes from Italy alone. Ninety-three percent of EU waste exported to Morocco is declared as “worn clothing” — material industry insiders say only 20–30 percent of which ever reaches secondhand markets. Source: Basel Network, Sep 2024–Sep 2025 The contradiction is the loophole. Under EU law, burning waste in a cement kiln counts as “energy recovery,” not “disposal.” Reclassifying garbage as alternative fuel or reusable merchandise allows European countries to legally erase millions of tonnes from their disposal ledgers while keeping their domestic recycling statistics pristine. The human cost The health impacts accumulate invisibly. Communities living near Moroccan cement plants face an excess risk of respiratory disease, cancer and mortality. Peer-reviewed research on cement kilns co-processing hazardous waste has measured dioxin emissions rising more than fourfold once hazardous waste enters the fuel mix. In Morocco specifically, occupational cement exposure has been directly linked to chronic obstructive pulmonary disease — a leading cause of respiratory mortality. Mediouna’s landfill alone receives 1.2 million tonnes a year and is approaching saturation; in November 2024, the World Bank approved a USD 250 million programme to upgrade Morocco’s landfills — a tacit acknowledgement that domestic capacity is inadequate before any added burden from imports. When the government approved more than two million tonnes of new imports in August 2024,

activist Mohamed Benata of the Environmental Assembly of Northern Morocco called it “incompatible with the spirit of citizenship” and unconstitutional. In 2016, similar outrage forced the government to suspend Italian waste imports. The shipments resumed. European corporate accountability law does not reach what happens after the containers leave port. The 2024 Corporate Sustainability Due Diligence Directive “ends with handing over the goods, more or less,” says Miriam Saage-Maaß, legal director at the European Center for Constitutional and Human Rights. Whether European exporters bear any responsibility for what then burns inside Moroccan kilns, she adds, “depends on how direct EU exporters are connected to the waste burning.” From November 2026, the EU will ban plastic waste exports to non-OECD countries like Morocco; other non-hazardous waste exports will follow in May 2027 unless a country is on an approved list. Morocco submitted its application in February 2025. “Circularity cannot become an elegant way to outsource health and environmental impacts to other communities,” says Cristina Guarda, an Italian MEP from the Greens/EFA, “creating ‘sacrifice zones’ outside Europe.” Back in Mediouna, Fatima remains caught in the middle. Europe celebrates its recycling milestones; Morocco counts the jobs. She and families like hers are left breathing the toxic fumes — from waste produced at home and shipped in from a continent that no longer wants its own. Khalid Bencherif is an award-winning freelance journalist from Morocco, based in Berlin, Germany, and specializing in covering environmental and political issues in North Africa. He received the 2022 Michael

This story originally appeared on Global Voices

Elliott Award for Excellence in African Storytelling from the International Center for Journalists (ICFJ). Recently, he has become more interested in AI projects, and is working on “ONWAN,” an AI editor tailored for Arabic journalism. Federica Rossi is an Italian freelance journalist based in Rome. Her work covers climate change, the green transition, self-sufficient communities, organised environmental movements, Mediterranean migratory routes, and citizenship. She collaborates with Euronews, Voxeurop, IRPI, La Repubblica, L’Espresso and more. She is also a public speaker and recently won the SWITCH award. She strives for ethical journalism that fosters collaborative practices. She co-manages the extended Fada Collective network, is part of Sveja — a local independent collective and radio station in Rome — and is a member of the International Press Institute. This story was developed with the support of Journalismfund Europe Written by UntoldMag

This story originally appeared on Global Voices

How your brain processes words you skip while reading

New research digs into how eye movements and brain activity shape reading comprehension. Reading seems like a straightforward process. The eyes scan the words, and the brain turns them into meaning. But it’s not always that simple. Readers regularly skip words, sometimes without realizing it. New research from the University of South Florida shows how the brain still processes those skipped words using peripheral vision, even as the eyes move past them. Elizabeth Schotter, associate professor and director of the USF Eye Movements and Cognition Lab, worked alongside first author and postdoctoral research scholar Sara Milligan on the study in Psychophysiology . “Our findings suggest that readers aren’t simply guessing words; they rely on detailed visual and linguistic processing,” Milligan says. “This supports the importance of learning letter-sound relationships and spelling rather than relying solely on contextual guessing strategies.” The study shows that reading happens through teamwork between the eyes and the brain, which work together to read quickly while still understanding the text. While the team’s research addresses basic science questions, it lays the groundwork for new ways to address reading challenges and improve instruction. Eye movements during reading occur roughly every 250 milliseconds, and many processes must happen simultaneously under the hood to make comprehension possible. To track such movements, the team used an electroencephalogram (EEG) cap that

Source: Futurity.org

measures brain waves, which requires careful setup to ensure accurate readings. At the same time, they used a camera-based eye-tracking system to monitor participants' gaze as words appeared on the screen. This approach lets researchers link eye movements directly to real-time brain activity. Together, the tools revealed split-second choices about which words readers engaged with and the neural activity surrounding those moments. "This study is unique because it allows participants to read naturally while simultaneously measuring eye movements and brain activity," Schotter says. "Many previous studies limited eye movements or relied on only one method. By combining both approaches, we can observe how real-time decisions during reading relate directly to brain activity." The study included 55 participants, each of whom had a tracked reading session lasting approximately two hours. Participants silently read 180 sentences presented one at a time on a screen. In some cases, the researchers manipulated upcoming words to be expected, slightly altered, or unexpected, allowing them to compare how the brain responded depending on whether a word was skipped or directly read. After finishing each sentence, participants pressed a button to continue. "We are addressing two major issues: How people read and what separates skilled from less skilled readers," Schotter says. "Understanding these mechanisms can inform educational approaches and interventions. The second challenge is technical, since combining eye tracking with EEG required us to develop new tools and software. That work allows researchers to study reading in more realistic ways." When the sessions concluded, the team

Source: Futurity.org

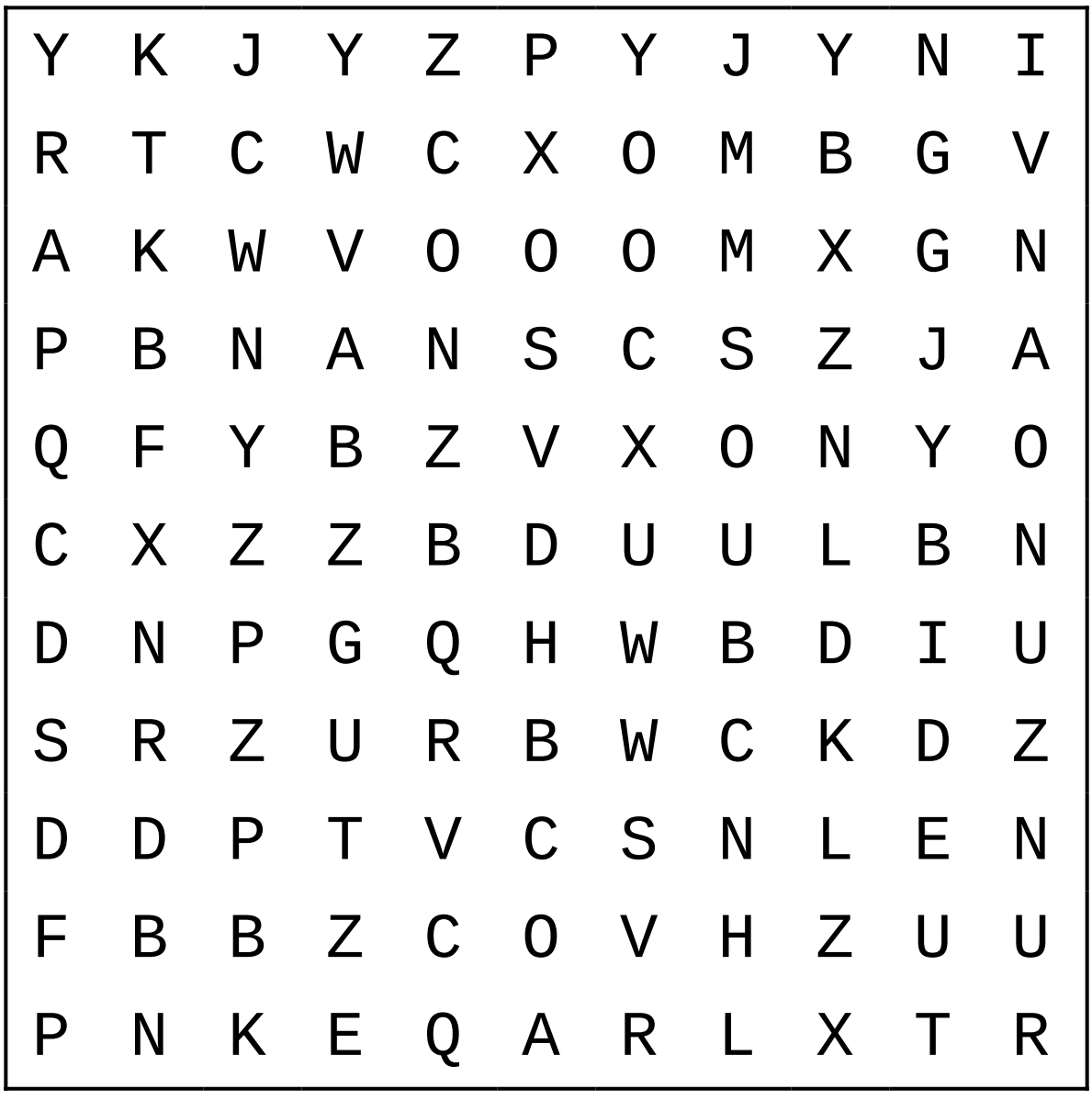
gathered data from the brain-wave cap and the eye-tracking system. They matched the information to identify connections between what the eyes and the brain were doing while reading. The study further shows that skipping a word does not mean it was ignored. Brain data demonstrated that readers often partially register skipped words in advance, and this processing can be deep enough to detect whether a word is expected or irregular. However, decisions to skip are made before full word recognition and integration are complete, meaning the brain operates on a fast, predictive system that prioritizes efficiency. Now with a clearer understanding, the lab aims to explore how reading strategies change depending on goals, such as reading for comprehension versus skimming. Researchers also want to study individual differences, including why some people read faster or more efficiently, and how reading strategies and brain processing change across the lifespan. Source: University of South Florida The post How your brain processes words you skip while reading appeared first on Futurity .

Source: Futurity.org

Activity Time - Word Search

Find the words below in the puzzle. Words go across or down only.

Words to Find:



Y	K	J	Y	Z	P	Y	J	Y	N	I
R	T	C	W	C	X	O	M	B	G	V
A	K	W	V	O	O	O	M	X	G	N
P	B	N	A	N	S	C	S	Z	J	A
Q	F	Y	B	Z	V	X	O	N	Y	O
C	X	Z	Z	B	D	U	U	L	B	N
D	N	P	G	Q	H	W	B	D	I	U
S	R	Z	U	R	B	W	C	K	D	Z
D	D	P	T	V	C	S	N	L	E	N
F	B	B	Z	C	O	V	H	Z	U	U
P	N	K	E	Q	A	R	L	X	T	R