

Beyond the Five Senses: Scientists Uncover Tactile Connection of Time

Sensory experiences and the perception of time are intricately linked within the somatosensory cortex of the brain. Here, the neural representations for both sensations are intertwined, being "multiplexed" within a shared neural network.

Time is felt, seen, and heard, yet there are no specific sensory receptors dedicated to perceiving time, unlike those for touch, sight, hearing, and smell. This fact has long tantalized neuroscientists with the possibility that sensing time might "piggyback" on true sensory modalities. New research in fact demonstrates that the percept of time embodied within a tactile experience is rooted in the dual functionality of the somatosensory cortex.

Professor Mathew Diamond and his SISSA research team recently published their findings in Nature Communications, shedding light on the intricate interplay between the sense of touch and the sense of time.

As we process stimuli received through the skin, neurons in the somatosensory cortex robustly represent the detailed features of the stimuli, culminating in the subjective experience of touch. However, was the stimulus brief or extended in time? How does the perception of elapsed time emerge? The research team's results indicate how the somatosensory cortex contributes to the perception of time.

Utilizing optogenetics, a technique enabling the modulation of neuronal activity through application of light to the cortex, the study established a connection between two seemingly distinct experiences – the "what" and the "how long" of a stimulus. In rats trained to assess vibration intensity while disregarding duration, optogenetic intervention influenced perceived intensity.

Conversely, in animals trained to evaluate vibration duration while disregarding intensity, optogenetic intervention influenced perceived duration. These findings not only affirm the expected function of the somatosensory cortex in constructing the tactile sense but also support the notion that the perception of time is rooted in a widespread network of brain areas with diverse functions, including touch. This research lays the foundation for future studies exploring the intricate relationship between sensory experiences and the perception of time.

A Widespread Network for Time Perception "The neuronal mechanisms underlying the perception of the duration of sensory events are still not fully known," explains Professor Mathew Diamond, the research coordinator. "It is believed that, rather than relying on a single dedicated brain center, the perception



of time emanates from networks of neurons distributed across various brain regions. The study's findings demonstrate that the sensory processing stage of cortex is one component of the network. This means that one population of cortical neurons can give rise to two distinct sensory experiences, emphasizing the interconnected nature of time perception and touch."

A Study Exploiting Optogenetics Previous work by the SISSA research group hinted at the integration and accumulation of impulses in the sensory processing pathway as a potential mechanism underlying time perception. Now, optogenetic techniques were employed to test this hypothesis directly, enabling the manipulation of neuron activity at a specific target location. Diamond explains: "If there is a behavioral effect of optogenetic intervention, the only explanation is that the target neurons are somehow involved. Targeting similar sets of neurons in the two groups of rats produced two different outcomes in their behavior. Increasing neuronal firing by optogenetics increased the perceived duration in the "duration" rats and increased the perceived intensity in the "intensity" rats. Since both percepts involve an overlapping set of neurons, we describe the two signals as "multiplexed" in the somatosensory cortex. As a final step, we constructed a mathematical model that goes from the physiology of cortical neurons to the final percept. The model points to potential cellular mechanisms for building elaborate percepts from neuronal firing."

The study concludes that the perception of time is intricately intertwined with touch, emerging within the tactile sensory representation. This insight opens the door to exploring the experience of time through the lens of sensory encoding, offering new avenues for understanding the complex relationship between sensing the external world and sensing time.

Engineering the Unbreakable: MIT's Microscopic Metamaterials Defy Supersonic Impacts

An intricate, honeycomb-like structure of struts and beams could withstand a supersonic impact better than a solid slab of the same material. What's more, the specific structure matters, with some being more resilient to impacts than others. That's what MIT engineers are finding in experiments with microscopic metamaterials — materials that are intentionally printed, assembled, or otherwise engineered with microscopic architectures that give the overall material exceptional properties. In a study published recently in the Proceedings of the National Academy of Sciences, the engineers report on a new way to quickly test an array of metamaterial architectures and their resilience to supersonic impacts.

In their experiments, the team suspended tiny printed metamaterial lattices between microscopic support structures, then fired even

tinier particles at the materials, at supersonic speeds. With high-speed cameras, the team then captured images of each impact and its aftermath, with nanosecond precision. Their work has identified a few metamaterial architectures that are more resilient to supersonic impacts compared to their entirely solid, nonarchitected counterparts. The researchers say the results they observed at the microscopic level can be extended to comparable macroscale impacts, to predict how new material structures across length scales will withstand impacts in the real world.

"What we're learning is, the microstructure of your material matters, even with high-rate deformation," says study author Carlos Portela, the Brit and Alex d'Arbeloff Career Development Professor in Mechanical Engineering at MIT. "We want to identify impact-resistant structures

that can be made into coatings or panels for spacecraft, vehicles, helmets, and anything that needs to be lightweight and protected."

Other authors on the study include first author and MIT graduate student Thomas Butruille, and Joshua Crone of DEVCOM Army Research Laboratory. The team's new high-velocity experiments build off their previous work, in which the engineers tested the resilience of an ultralight, carbon-based material. That material, which was thinner than the width of a human hair, was made from tiny struts and beams of carbon, which the team printed and placed on a glass slide. They then fired microparticles toward the material, at velocities exceeding the speed of sound.

Those supersonic experiments revealed that the microstructured material withstood the high-velocity impacts, sometimes deflecting the microparticles and other times capturing them.

"But there were many questions we couldn't answer because we were testing the materials on a substrate, which may have affected their behavior," Portela says.

Valsad rape survivor ends life hours after accused gets bail

SURAT: The Valsad police have launched an investigation into the suicide of a 22-year-old fashion designer, who hanged to death, hours after a man she accused of rape got bail on March 27.

The woman Shruti Pal (name changed) was found hanging in her boutique in Imperial Apartment on the coastal highway. Police also found a suicide note in the boutique in which the woman blamed the accused Mayur Patel, his family members, and his friend for harassment.

Later, another suicide note torn into pieces was recovered from the dustbin in the shop.

Intention of accused to aid suicide is a must says HC; quashes case against 8 of a family

The note had similar details.

Shruti developed a friendship with Mayur through Instagram. They started meeting and Mayur engaged in physical relations and promised to marry her. However, when he reneged on his promise, she filed a complaint against him at the Valsad City police station on Jan 17.

Police had arrested Mayur following the FIR and he was lodged in judicial custody. Meanwhile, a court granted him on March 27.

"We are investigating the suicide and evidence is being collected. The family is occupied with the last rites and further action will be taken after their statements are recorded," said a police officer.

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Senior Divisional Signal & Telecom Engineer (CO), 2nd Floor, Divisional Railway Managers Office, Mumbai Central, Mumbai-400 008 invites E-Tender No. SG 623/1699/WA dated: 29.03.2024. Name of work : Comprehensive Annual Maintenance Contract (CAMC) for complete Train Management System (TMS) installed at Central Control Office including system software, TMS application software modules, field equipments with system software and application software installed over Churchgate-Virar section of Western Railway, Mumbai Division, for a period of One year. Approx. Cost of work: ₹ 4,90,47,716.88. Bid Security: ₹ 3,95,200/- . Time & Date for closure for submission of E-Tender Documents: At 15:00 Hrs. on 22.04.2024. Time & Date for opening of E-Tender: After 15:30 Hrs. on 22.04.2024. The tender can be viewed at web site <http://www.irps.gov.in>. 0002

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Scientists Develop Method To Cool One of the World's Hottest Cities by 8°F

A recent study from UNSW Sydney demonstrates that significant reductions in the temperatures of major cities located in hot desert climates can be achieved alongside decreases in energy expenses.

The findings, recently published in Nature Cities, detail a multi-faceted strategy to cool Saudi Arabia's capital city by up to 4.5°C, combining highly reflective 'super cool' building materials developed by the High-Performance Architecture Lab with irrigated greenery and energy retrofitting measures. The study, which was conducted in collaboration with the Royal Commission of Riyadh, is the first to investigate the large-scale energy benefits of modern heat mitigation technologies when implemented in a city.

"The project demonstrates the tremendous impact advanced heat mitigation technologies and techniques can have to reduce urban overheating, decrease cooling needs, and improve lives," says



UNSW Scientia Professor Mattheos (Mat) Santamouris, Anita Lawrence Chair in High-Performance Architecture and senior author of the study. Prof. Santamouris specializes in developing heat mitigation technologies and strategies to decrease urban temperatures in cities. Extreme urban heat affects more than 450 cities worldwide, increasing energy consumption

needs and adversely impacting health, including heat-related illness and death. Riyadh, the capital of Saudi Arabia, is one such city. Situated in the center of a desert, it is one of the hottest cities in the world, with temperatures that can exceed 50°C during summer. Furthermore, climate change and rapid urbanization are increasing the magnitude of

overheating. "Limited greenery and large artificial surfaces made of conventional building materials like asphalt and concrete trap heat, meaning the city continues to heat up," says Prof. Santamouris. "Additional heat from car pollution and industrial activities also increases the city's temperature."

Simulating city-scale heat mitigation scenarios For the study, the team led by UNSW researchers ran large-scale climatic and energy simulations of the Al Masiaf precinct of Riyadh, including the energy performance of 3323 urban buildings, under eight different heat mitigation scenarios to evaluate optimal strategies for lowering the temperature of the city and reducing cooling needs.

The modeling, which considered different combinations of super cool materials, vegetation types, and energy retrofitting levels, found it's possible to decrease the outdoor temperature in the

city by nearly 8.1°F (4.5°C) during summer. The strategy would also improve cooling energy conservation for the city by up to 16 percent.

The recommended heat mitigation (or cooling) scenario for Riyadh includes using super cool materials implemented in the roof of the buildings and more than doubling the number of irrigated trees to improve transpiration cooling. On the contrary, a blind implementation of urban cooling techniques not based on detailed and advanced scientific optimization, like the use of non-irrigated greenery, may result in a substantial increase in the city's temperature.

"By implementing the right combination of advanced heat mitigation technologies and techniques, it is possible to decrease the ambient temperature at the precinct scale," says Prof. Santamouris. "For a sweltering city the size of Riyadh, significantly reducing cooling needs is also tremendous for sustainability."

Scientists Discover Unconventional Method To Easily Improve Wine Quality

The market is showing a growing interest in carbonic maceration wines. These are youthful red wines characterized by dominant floral and fresh fruit scents, and they are best enjoyed within their first year. The most famous of these wines is France's Beaujolais nouveau. However, similar traditions exist in La Rioja and Catalonia, particularly in the Montsant region and the Conca de Barberà.

Research by the URV has found that the quality of these wines can be increased by using an unconventional yeast that considerably improves their organoleptic properties and speeds up the malolactic fermentation process. This effect has also been found in orange and rosé wines.

Carbonic maceration is a winemaking technique that consists of three phases. In the first, whole grapes are placed in vats full of carbon dioxide to create an oxygen-free atmosphere that leads to alcoholic fermentation inside the grains. When this fermentation takes place, many odors are released and the resulting wines have very fruity aromas, of banana and red fruits. After a few days, in the second phase, the macerated grains are pressed to complete the alcoholic fermentation. And in the third and last phase, malolactic fermentation is induced by the lactic acid bacteria in the wine.

For the first time, a research team from the URV's Biochemistry and Biotechnology Department has studied the effects of the Torulaspora delbrueckii yeast on carbonic maceration wines, rosé wines, and orange wines. "Previous research had focused largely on traditional wines, white and red, and we have studied other less common vinifications. In addition, we have studied not only alcoholic fermentation but the whole process, from start to finish," explains Candela Ruiz de Villa, the principal researcher of the project.

During the study, they inoculated strains of the yeast and observed what effect they

had on the organoleptic characteristics and the process of malolactic fermentation, which occurs after alcoholic fermentation, reduces acidity, and adds complexity, smoothness, and stability.

The wines resulting from this process of inoculating Torulaspora delbrueckii in the first phase have been quite striking: "The carbonic maceration wines inoculated with this yeast had a much more intense color than those inoculated with spontaneous yeasts, because the anthocyanins, the compounds that give color to red wine, were conserved," adds Candela Ruiz de Villa. The researchers also observed an increase in some aroma families such as banana, which is the main one in these wines.

This improvement in the organoleptic characteristics of the wine was not the only finding. The research team also observed that this yeast also shortened the total time of the vinification process because it favors malolactic fermentation.

The results of the study are important, as they show that including this yeast in the carbonic maceration process can be a new way of increasing the quality of wines, enriching their aromatic profile, and improving their organoleptic characteristics. "This maceration process can produce high-quality wines and gives wine producers a potential tool for differentiating their products in a highly competitive market," explains Nicolas Rozès, a researcher who has also taken part in the study. The results have also proved to be valid for rosé and sparkling wines.

The research was tested semi-industrially in 10-liter tanks and the following year it was used in volumes of 1,000 liters at Mas dels Fares, the URV's experimental farm. The results were the same as those obtained in the laboratory. "The yeast is already on the market. Now that producers have information they didn't have before, they

New Research Reveals That Happiness Isn't Expensive

Many Indigenous peoples and local communities around the world are leading very satisfying lives despite having very little money according to new research from the Institute of Environmental Science and Technology at the Universitat Autònoma de Barcelona (ICTA-UAB). The study reveals that several communities with low monetary incomes experience life satisfaction levels on par with those found in affluent nations.

Economic growth is often prescribed as a sure way of increasing the well-being of people in low-income countries, and global surveys in recent decades have supported this strategy by showing that people in high-income countries tend to report higher levels of life satisfaction than those in low-income countries. This strong correlation might suggest that only in rich societies can people be happy.

However, a recent study conducted by ICTA-UAB in collaboration with McGill University in Canada suggests that there may be good reasons to question whether this link is universal. While most global polls, such as the World Happiness Report, gather thousands of responses from the citizens of industrialized societies, they tend to overlook people in small-scale societies on the



fringes, where the exchange of money plays a minimal role in everyday life and livelihoods depend directly on nature. The research, published in the scientific journal Proceedings of the National Academy of Sciences (PNAS), consisted of a survey of 2,966 people from Indigenous and local communities in 19 globally distributed sites. Only 64% of surveyed households had any cash income. The results show that "surprisingly, many populations with very low monetary incomes report very high average levels of life satisfaction, with scores similar to those in wealthy countries," says Eric Galbraith, a researcher at ICTA-UAB and McGill University and lead author of the study.

The average life satisfaction score across the studied small-scale societies was 6.8 on a scale of 0-10.

Although not all societies reported being highly satisfied – averages were as low as 5.1 – four of the sites reported average scores higher than 8, typical of wealthy Scandinavian countries in other polls, "and this is so, despite many of these societies having suffered histories of marginalization and oppression." The results are consistent with the notion that human societies can support very satisfactory lives for their members without necessarily requiring high degrees of material wealth, as measured in monetary terms.

"The strong correlation frequently observed between income and life satisfaction is not universal and proves that wealth – as generated by industrialized economies – is not fundamentally required for humans to lead happy lives,"

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Branch Office: 4th Floor, Office No 436-443 Emerald One, Winward Business Park, Jetalpur Road, Vadodara, Gujarat - 390020

Notice for sale of immovable assets through Private Treaty

Sale Notice for Sale of Immovable Assets through Private Treaty under the Securitisation and Reconstruction of Financial Assets and Enforcement of Security Interest Act, 2002 read with Rule 8(B)/r/w Rule 9 (1) of the Security Interest (Enforcement) Rules, 2002

ICICI Home Finance Company Limited (ICICI HFC) conducted several e-Auctions for the sale of the mortgaged property mentioned below, however, all such e-Auctions failed. Now, an interested buyer has approached ICICI HFC with an offer to purchase the said property for an amount of **Rs. 7,25,000/-**. Notice is hereby given to the public in general and in particular to the Borrower(s) and Guarantor(s) that the below-described immovable property mortgaged/charged to the Secured Creditor, the **Physical Possession** of which has been taken by the Authorized Officer of ICICI Home Finance Company Ltd., will be sold on "As is where is", "As is what is", and "Whatever there is", by way of Private Treaty as per the brief particulars given hereunder:

Sr. No.	Name of Borrower(s)/ Co Borrowers/ Guarantors/ Legal Heirs. Loan Account No.	Details of the Secured Asset(s) with known encumbrances, if any	Amount Outstanding	Reserve Price Earnest Money Deposit	Date and Time of Property Inspection	Date & Time of Auction
(A)	(B)	(C)	(D)	(E)	(F)	(G)
1.	Binodkumar J Shaw (Borrower) Rinku Shaw (Co-Borrower) Loan Account No. LHBRD00001302743 & LHBRD00001302742	Flat No. 313 on Third Floor, Rajdeep Complex, R S No. 210, Near Shankar Par Soc., Moti Nagar, Village Tarsali, Dist. And Sub Dist. Vadodara Gujarat.	Rs. 33,92,449/- March 28, 2024	Rs. 7,25,000/- Rs. 72,500/-	April 15, 2024 11:00 AM 03:00 PM	April 24, 2024 02:00 PM 03:00 PM

The online auction will be conducted on website (URL Link - <https://BestAuctionDeal.com>) of our auction agency **GlobeTech**. The Prospective Bidder(s) must submit the Earnest Money Deposit (EMD) RTGS/ Demand Draft (DD) (Refer Column E) at **ICICI Home Finance Company Limited, 4th Floor, Office No 436-443 Emerald One, Winward Business Park, Jetalpur Road, Vadodara, Gujarat - 390020** on or before **April 23, 2024 before 04:00 PM**. The Prospective Bidder(s) must also submit a signed copy of the Registration Form & Bid Terms and Conditions form at **ICICI Home Finance Company Limited, 4th Floor, Office No 436-443 Emerald One, Winward Business Park, Jetalpur Road, Vadodara, Gujarat - 390020** on or before **April 23, 2024 before 05:00 PM**. Earnest Money Deposit Demand Draft (DD) should be from a Nationalized/Scheduled Bank in favor of "ICICI Home Finance Company Ltd. - Auction" payable at Vadodara.

The general public is requested to submit their bids higher than the amount being offered by the interested buyer mentioned above. It is hereby informed that in case no bids higher than the amount being offered by the aforementioned interested buyer is received by ICICI HFC, the mortgaged property shall be sold to the said interested buyer as per Rule 8(B) r/w Rule 9 (1) of the Security Interest (Enforcement) Rules, 2002.

For any further clarifications with regards to inspection, terms and conditions of the sale or submission of bids, kindly contact **ICICI Home Finance Company Limited on 022-69974300** or our Sales & Marketing Partner **NexGen Solutions Private Limited**.

The Authorized Officer reserves the right to reject any or all the bids without furnishing any further reasons. For detailed terms and conditions of the sale, please visit <https://www.icicifnc.com/>

Date : April 06, 2024
Place : Vadodara

Authorized Officer
ICICI Home Finance Company Limited

WESTERN RAILWAY
MATERIAL MANAGEMENT DEPARTMENT
CORRIGENDUM TO E-AUCTION SALE PROGRAMME

e-Auction Sale Notification No. SIII/Auction Programme-1/April-2024 dt-05/03/2024, the following corrigendum to above mentioned E-auction programme is being issued. E-Auction Sale Programme scheduled to be held in the month of April-2024 at Pardi depot is scheduled as follows:

DEPOT	1 st round	2 nd round	Officer in charge	Contact no.
Pardi depot	08/04/2024	18/04/2024	Deputy Chief Materials Manager -Mahalaxmi	022-24929571 09004495750

All other terms and conditions will remain unchanged. Please visit Western Railway Website of material Management Department i.e. www.wr.indianrailways.gov.in as well as on www.irps.gov.in e-auction portal for further information.
(SIII/Auction Programme-2/April-2024 Dt.02/04/2024) 0012

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