

Sciencewatch

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Linking sound with meaning

A study of nearly two thirds of the world's 6000+ languages has revealed widespread associations between the sounds of words and their meanings. It has long been known that when people are shown pictures of an amorphous blob and a star-like shape and are asked which one is likely named "bouba" and which one "kiki", speakers of different languages consistently associate the blob with the former word and the star with the latter. Damián Blasi of the University of Zurich and colleagues have now found that a large proportion of 100 basic vocabulary items have strong



Words for "tongue" tend to contain the letters i or u, "round" often appears with r, and "small" with i.

associations with specific speech sounds across continents and linguistic families. The distributions of the associations with time and location suggest that many words arose independently, potentially revealing deep connections between the developments of languages.

• Further reading

D Blasi *et al.* 2016 *PNAS* **113** 10818.

Cosmic rays make more muons

Researchers at the Pierre Auger Observatory in Argentina have measured the longitudinal and lateral distributions of ultra-high-energy cosmic-ray air showers with primary energies of 6–16 EeV (corresponding to centre-of-mass energies of 110–170 TeV). The average shower is 1.33 ± 0.16 and 1.61 ± 0.21 times larger than predicted from the leading LHC-tuned models EPOS-LHC and QGSJetII-04, respectively, corresponding to an excess of muons. This suggests either flaws in the underlying models or a more fundamental change in physics at these energies.

• Further reading

A Aab *et al.* 2016 *Phys. Rev. Lett.* **117** 192001.

Statistical mechanics of consciousness

Ramon Guevara Erra of the Université Paris Descartes and colleagues have reported a new insight into the nature of consciousness. The researchers recorded the brain activity of people while they were sleeping, awake, and having epileptic seizures. They found that normal wakeful states are characterised by the greatest number of interactions between brain networks, equating to the highest entropy values. This means there is higher information content in the networks associated with conscious states and suggests that consciousness could be the result of optimising information processing.

• Further reading

R Guevarra Eva *et al.* 2016 *Phys. Rev. E* **94** 052402.

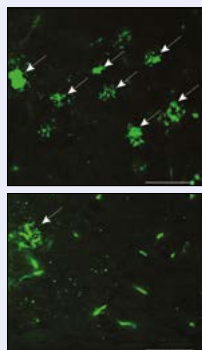
LEDs for Alzheimer's

Researchers in the US have unveiled a non-invasive, drug-free approach to treating Alzheimer's disease, based on flickering LEDs.

Hannah Iaccarino of MIT and colleagues showed that levels of beta-amyloid plaque of the type associated with Alzheimer's in mice are reduced by exposure to flickering LED light at frequencies of 40 Hz. This corresponds to the gamma-frequency range of brainwaves (25–80 Hz), which in normal brain function is associated with attention, perception and memory. One hour of exposure to the light reduced beta-amyloid plaque by an impressive 40–50%. Levels of abnormally modified Tau protein, also associated with Alzheimer's disease, were also reduced. Other frequencies between 20 and 80 Hz were ineffective. Clinical trials with humans are now being planned.

• Further reading

H Iaccarino *et al.* 2016 *Nature* **540** 230.



The brain of a mouse after seven days of one-hour per day in the dark (top) or exposure to a 40 Hz flicker (bottom), showing plaques (white arrows). The scale bar is 50 μ m.

An antidote to carbon monoxide

For the first time, an antidote has been found to carbon-monoxide poisoning. Ling Wang and Qinzi Xu of the University of Pittsburgh in Pennsylvania and collaborators gave mice air containing 3% carbon monoxide for 4.5 minutes, which would kill most humans. The mice recovered when given a modified neuroglobin (a protein found in the brain and retina that protects cells by binding with oxygen and nitric oxide) that was engineered to bind to carbon monoxide 500 times more tightly than it binds to hemoglobin. The US Food and Drug Administration has promised an expedited review of the work.

• Further reading

I Azarov *et al.* 2016 *Sci. Transl. Med.* **8** 368ra173.

Flying to reduce jet lag

Joseph Bass of Northwestern University in Chicago and colleagues have made the surprising finding that flying can sometimes reduce jet lag. After observing daily cycles in blood and tissue oxygen levels in mice kept on a normal light–dark cycle, the team found that if the mice were subjected to a six-hour-long change in light cycle that corresponded to flying east on a jet, those kept in a low concentration of oxygen adapted more quickly. The mechanism involves changing the amount of HIF1 α , which is required for oxygen levels to entrain the circadian clock.

• Further reading

C Peek *et al.* 2016 *Cell Metabolism* DOI:10.1016/j.cmet.2016.09.010.

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