

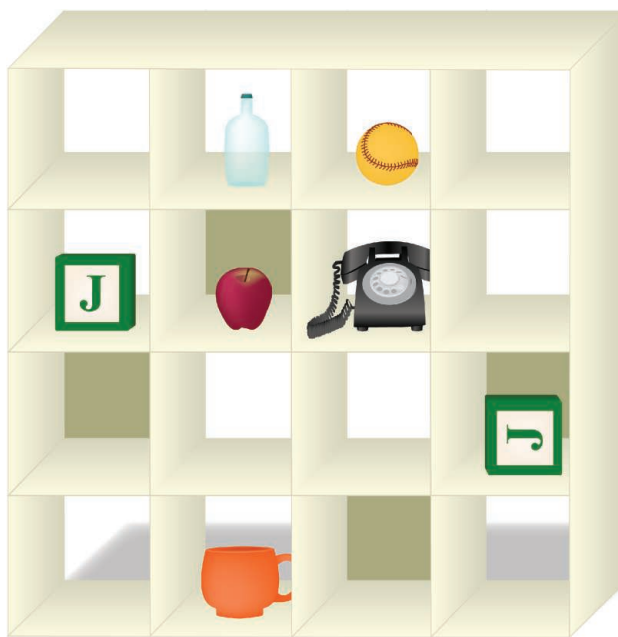
PSYCHOLOGY

Thinking Unselfishly

Problems that appear fiendishly challenging at first glance can seem childishly simple if viewed from the perspective of another. The capacity to infer the mental states of others—theory of mind—is known to develop at approximately the same age in children raised in different cultures, but the ease with which adults access these mind-reading abilities has been suggested to vary across countries, from the collectivism of East Asia to the individualism of the United States.

Wu and Keysar use a two-player game based on a 4-by-4 array of pigeonholes containing mundane objects, some of which are visible to both players and some only to the second. Directions (to move an object) that are completely unambiguous from the vantage point of the first player can, in fact, cause the second player to hesitate in choosing between two identical objects (only one of which is visible to the first player). They find, by tracking visual gaze and reaching movements, that Chinese reacted more quickly than Americans (non-Asians) and were almost never distracted by the second object that they could see but that their playing partner could not. These results favor the proposal that cultures with greater emphasis on interdependence induce a greater readiness to adopt or acknowledge the perspective of the other. — GJC

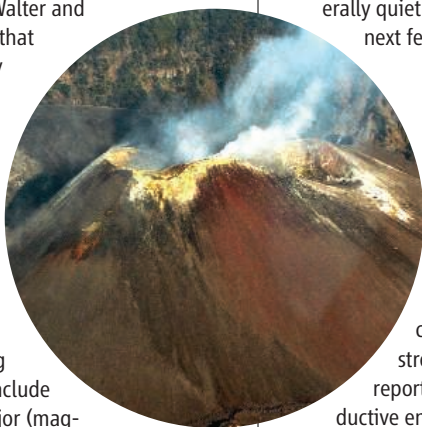
Psychol. Sci. **18**, 600 (2007).



GEOLOGY

Volcanic Shakeup

The powerful Sumatra Andaman earthquakes of 2004 (magnitude 9.3) and a few months later in 2005 (8.7) caused considerable devastation in Indonesia and, as a result of a huge tsunami, the surrounding regions. Walter and Amelung now suggest that these earthquakes may trigger an additional hazard. Such large subduction-zone earthquakes have been followed within a few years by eruptions in the neighboring volcanic arc, in some cases from dormant or rarely erupting volcanoes; examples include eruptions after the major (magnitude 9.0 or higher) earthquakes of Kamchatka in 1952, Chili in 1960, and Alaska in 1964. Two volcanoes (Talang and Barren Island) erupted in Indonesia soon after the nearby 2005 quake. Although the overall incidents are few, the pattern for large quakes is consistent and, according to the authors' analysis, statistically significant. Their numerical modeling shows that gener-



ally such large earthquakes in subduction zones, which are produced by large oceanward slip of the overlying plate, induce some extension in the volcanic arc further landward. Such extension can lower the pressure on trapped magma, inducing or hastening eruptions or leading to further melting. The authors recommend a close watch of generally quiet volcanoes in Indonesia over the next few years. — BH

Geology **35**, 539 (2007).

ENVIRONMENTAL SCIENCE

Fish Fatalities in the Field

Municipal wastewaters contain an enormous variety of chemicals, and fish located in downstream waterways have been reported to show alterations in reproductive endocrine function. Such male fish express proteins, such as vitellogenin, that are naturally found in the female reproductive system, and these males have been shown to develop early-stage eggs. It has been proposed that natural or synthetic estrogens in the water may contribute to the feminization of male fish, and controlled laboratory studies support this claim. Kidd *et al.* describe in detail a whole-lake analysis of

wild fathead minnows that have been exposed to low concentrations of estrogens. The results, which span seven years, reveal that when the synthetic estrogen 17 α -ethynylestradiol (as used in contraceptive pills) was added to a lake in northwestern Ontario, levels of vitellogenin mRNA and protein increased, and male fish showed arrested testicular development in comparison to fish in nearby untreated lakes. Intersex fish—that is, males with primary stage oocytes—were observed, and female fish showed elevated vitellogenin and displayed delayed ovarian development. Furthermore, though it is common to see fluctuations in wild fathead minnow populations, the experimental population collapsed after the second season of estrogen addition. This work demonstrates that chemicals like those that are detected in municipal wastewaters can affect wild fish reproduction and population sustainability. — BAP

Proc. Natl. Acad. Sci. U.S.A. **104**, 8897 (2007).

MICROBIOLOGY

Circumventing Host Mismatches

For many human pathogens, the molecular features of host specificity have not been defined, and this presents a hindrance to developing faithful animal models for diseases. A notable exception is the foodborne bacterium *Listeria monocytogenes*, in which the virulence factors internalin A and B

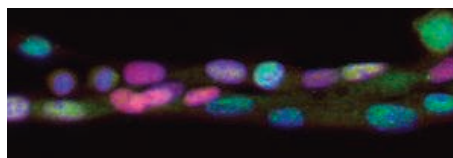
and their host targets (E-cadherin and hepatocyte growth factor receptor, respectively) are known to promote adherence (the first step in infection) to nonphagocytic host cells. One successful way of making a laboratory model for listeriosis has been to humanize mouse gut epithelium by introducing human E-cadherin, but this can add unexpected variables to experimentation. Wollert *et al.* have taken the obverse approach and adapted the pathogen to the mouse by using structure-based design to make individual amino acid substitutions in internalin A. Substitution of the proline at position 16 by glutamate together with a second substitution of a glutamate by a glutamine appears to equalize the binding affinities of internalin A for human and mouse E-cadherins. In vivo experiments confirmed that the engineered bacteria were competent to colonize the villi of mouse guts and cause systemic listeriosis. — CA

Cell **129**, 891 (2007).

DEVELOPMENT

Staying in Touch with Satellites

Adult skeletal muscle is remarkably proficient at repairing itself after bouts of intense exercise or injury, thanks to a population of satellite cells that are located in between the outer sheath (the basal lamina) and the inner muscle fiber. Satellite cells are normally quiescent, but in response to stress they begin dividing to generate new



Satellite cells (fuschia) and muscle fiber (green).

muscle tissue and to restore the pool of satellite cells. An unresolved question is whether satellite cells are already-committed muscle progenitors, true stem cells, or a mixture of the two. Using genetically manipulated mice and in vivo tracking of satellite cells, Kuang *et al.* found that this population is in fact heterogeneous. Satellite cells that coexpress the molecular markers Pax7 and Myf5 preferentially differentiate into muscle cells, whereas those that express only Pax7 (about 1 in 10) undergo self-renewal, thereby replenishing the satellite cell reservoir. Notably, Myf5-deficient satellite cells produced Myf5-expressing daughter cells when cell division was asymmetric; that is, when the mitotic spindle was oriented perpendicularly to the axis of the muscle fiber. In these instances, the daughter cell that remained attached to the basal lamina became a new satellite stem cell, but the daughter cell that lost contact with the basal lamina became committed to the muscle cell lineage. The authors speculate

that a perturbation of the balance between stem cell renewal and commitment to differentiation within the satellite cell population may be a contributing factor in human diseases such as Duchenne muscular dystrophy. — PAK

Cell **129**, 999 (2007).

APPLIED PHYSICS

Clean Up on Graphene

Graphene, which comprises exfoliated sheets of graphite that are often supported on a dielectric substrate, can display unusual electronic properties that arise through two-dimensional confinement, and in device configurations, biasing of the dielectric can be used to control its conductivity. Although these materials are often assumed to be nearly ideal, in practice the dielectric layer could have trapped charges, and materials used in processing could remain on the graphene. Ishigami *et al.* present atomic-resolution scanning tunneling microscopy studies of graphene devices supported on silica. The as-processed graphene surfaces are covered with photoresist and could not be atomically imaged, even after solvent cleaning. Exposure to an argon-hydrogen atmosphere at 400°C removes the photoresist layer and reveals the influence of the dielectric layer: In addition to the expected hexagonal patterns, a triangular lattice is observed, either from film curvature or the effect of trapped charges. The graphene layer exhibits corrugations that follow the underlying substrate's roughness. — PDS

Nano Lett. **7**, 10.1021/nl070613a (2007).

CHEMISTRY

Whole Numbers for Half Cells?

Electrochemical reduction potentials in solution are generally measured and tabulated relative to a chosen reference reaction at the opposite electrode. Leib *et al.* have taken a step toward formulation of an absolute scale through gas-phase cluster experiments. They induced collisions between electrons and aqueous clusters of Ru³⁺ hexaammine ions, mass-selected to correspond to a bulk concentration of 1 M, and then they measured the energy dissipated upon electron capture by tracking how many water molecules evaporated from the cluster. This value in turn could be corrected for solvation free energies of reactant, product, and free electron to yield an estimate of solution-phase reduction energy. The authors note that although a solvated electron may still differ substantially from a charge transferred directly through a metal electrode, the cluster method includes molecular solvent-solute interactions that are otherwise very challenging to model. — JSY

J. Am. Chem. Soc. **129**, 10.1021/ja067794n (2007).

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