



National Science Foundation
WHERE DISCOVERIES BEGIN



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NSF AT WORK

Study Targets Risk of Texting and Driving

In 2010, over 3,000 people were killed in distracted-driving crashes, according to the U.S. Department of Transportation.

A recent NSF-supported study confirmed that multitasking seriously hurts performance. However, the researchers also found that people are better at juggling some types of multitasking than they are at others. Trying to do two visual tasks at once--such as texting and driving--impairs performance significantly more than combining an audio and a visual task, such as talking on the phone while driving.

Furthermore, people doing two visual tasks at the same time rated their performance much higher than it actually was.



Credit: morguefile

"Many people have this overconfidence in how well they can multitask, and our study shows that particularly is the case when they combine two visual tasks," said Zheng Wang, assistant professor of communication at Ohio State University. She added, "People's perception about how well they're doing doesn't match up with how they actually perform."

In **Wang's study**, eye-tracking technology showed that people's gaze moved around much more when they had two visual tasks compared to a visual and an audio task, and they spent much less time fixated on any one task. "When people are using IM [instant messaging], their visual attention is split much more than when they use voice chat," Wang said. One of the implications, she said, is that technology companies need to be aware of how people respond to multitasking when they are designing products.

A Generation of Adults Unconcerned About Climate Change



Credit: © 2011 Jupiter Images Corporation

Generation X is lukewarm about climate change, uninformed about the causes and unconcerned about the potential dangers, according to an **NSF-supported study**.

"Most Generation Xers are surprisingly disengaged, dismissive or doubtful about whether global climate change is happening and they don't spend much time worrying about it," said Jon D. Miller of the University of Michigan, author of "The Generation X Report." Miller directs the Longitudinal Study of American Youth, funded by NSF since 1986. Recent surveys have included responses from approximately 4,000 Gen Xers--people born between 1961 and

1981 who are now between 32 and 52 years of age.

Only about 5 percent of those surveyed last year were alarmed about climate change, and another 18 percent said they were concerned about it. Meanwhile, 66 percent said they weren't sure whether global warming was real, and about 10 percent were convinced it wasn't.

Earlier reports of Miller's findings about Generation X are available [here](#).

Biodiversity Pays Off in Health Benefits

Biodiversity acts as a buffer against infectious disease transmission within ecosystems, researchers have concluded. This finding suggests that losses of species could have significant consequences for the spread of infections, including those that affect humans, such as West Nile virus and Lyme disease.

NSF-supported researchers at the Institute of Ecosystem Studies in Millbrook, NY, reviewed dozens of ecosystem studies searching for common patterns. They found that higher biodiversity tended to decrease the rate at which diseases were transmitted. The species most likely to disappear as biodiversity declined were those that buffered infectious disease transmission. The species that remained tended to be ones that magnified the transmission of infectious diseases such as West Nile virus, Lyme disease and hantavirus. Highly diverse ecosystems dampened a pathogen's ability to spread among humans.



White-footed mouse with larval blacklegged ticks attached to its ears--a potential carrier of Lyme disease. *Credit: Jesse L. Brunner, Cary Institute of Ecosystem Studies*

Did you know ... ? NSF publishes many stories about research results, at "Science, Engineering, and Education Innovation" on [Research.gov](#).

Native Plants Offer Birds Refuge and Offset Biodiversity Loss



A curve-billed thrasher forages in an arid Phoenix yard. *Credit: Eyal Shochat*

Yards planted with native vegetation offer birds "mini-refuges" and therefore could help offset losses of species in cities, according to an NSF-supported study.

Researchers used quantitative measures and a systematic approach--including 24-hour video monitoring--to analyze the foraging behavior of common backyard birds. They confirmed that "native" yards support birds better than those with traditional grass lawns.

The research team, from the University of Massachusetts-Amherst and Arizona State University, conducted **the study** through NSF's

Central Arizona-Phoenix Long-Term Ecological Research (LTER) site. Twenty-six LTER sites are located around the globe in diverse ecosystems--from coral reefs to forests to deserts.

DID YOU KNOW?

Businesses Concentrate R&D Efforts in a Small Number of U.S. Locations

Businesses perform the bulk of their research and development (R&D) in a small number of geographic areas. Of 2,370 large companies that performed at least \$3 million in R&D in 2008, 19 percent said that their primary R&D location was in one of two metropolitan areas: San Jose-San Francisco-Oakland or New York-Newark-Bridgeport. In these two areas alone, companies performed at least \$29 billion of R&D in 2008. Perhaps not coincidentally, these two areas were also among the largest in terms of U.S. patents awarded to inventors residing in the area. The R&D industries in San Jose-San Francisco-Oakland are dominated by computer and electronic products manufacturers, and, in New York-Newark-Bridgeport, by pharmaceutical and chemicals companies.



Credit: © 2010 Jupiter Images Corporation

The data are from a new **InfoBrief** from NSF's National Center for Science and Engineering Statistics.

FACES OF NSF RESEARCH

Future of Water Inspires Scientist to Develop Data-driven Models



Auroop Ganguly develops data-driven models for water sustainability research. *Credit: Mary Knox Merrill/Northeastern University*

Water will be a critical factor in the future sustainability of communities and nations. Auroop Ganguly boldly pursues research on how extremes of weather and climate could impact global water resources. As head of Northeastern University's Sustainability and Data Sciences Lab in Boston, Ganguly conducts research at the nexus of climate change, water sustainability and data sciences that helps in analyzing complex systems.

Ganguly developed a computational model to predict future water availability under various scenarios of climate change and population growth. The model integrates large scientific datasets on climate change, population changes, socioeconomic factors and freshwater availability. It provides a framework for combining data into a form that could be useful for water planners.

Preliminary results show that, under worst-case scenarios, a population roughly equivalent to today's entire global population could experience water stress by the end of this century. The model also indicates that population growth may have a larger impact on per capita water availability than climate change. In the United States, demand for water may outpace reductions in freshwater availability resulting from climate change by 2100.

Ganguly was inspired to study hydrology by his background in the Bengal region of his native India, a densely populated area subject to flooding from monsoon rains and potentially from sea-level rise

due to climate change.

In 2011, with colleague Vipin Kumar of the University of Minnesota, Ganguly applied new data-modeling methods developed through an NSF-funded **Expeditions in Computing** project to the task of estimating rainfall extremes. Using India as a **case study**, the researchers identified a steady increase in the geographic variability of heavy rainfall within India over the past half-century.

The research will help scientists build reliable models to predict the effects of climate change. The interdisciplinary nature of addressing water sustainability issues is evident from the many fields of study represented by Ganguly, his collaborators and the graduate students in his lab: climate modeling, computer science, complex networks, machine learning, data mining, natural hazards, hydrologic engineering, geography and statistics.

Learn more about Ganguly in this **video** on LiveScience.com.

NSF IN THE NEWS

NEON Light: A 30-year Plan to Study America's Ecology (*Economist*) - After a decade of discussion and planning, scientists will get a Big Science tool that will advance the field of terrestrial ecology.

How Tiny 'LunarCubes' Could Explore Moon on the Cheap (*NBCNews.com*) - An NSF-funded CubeSat—an ultra-small, lightweight satellite—could be ideal for investigating lunar swirls, magnetic fields and solar wind.

Dark Energy Camera Will Change Our Understanding Of The Universe (*Popular Science*) - The new camera, on the Blanco telescope at NSF's Cerro Tololo Inter-American Observatory, is specially designed for sky surveys.

'We're Literally Watching the Internet Be Rebuilt' (*Atlantic*) - Craig Labovitz, who has worked on the development of the Internet since the earliest days of NSFNet, sees a new era developing.

THE RIPPLE EFFECT

Citizen Science Gains Prominence in Addressing Societal Problems

Hundreds of thousands of volunteers--so called "citizen scientists"--annually make major contributions to studies in ecology, climate change, biodiversity, weather, astronomy, seismology, cell biology and other disciplines. Additionally, the number of citizen science groups is rapidly increasing, in part because the Internet and new applications afford quick and effective communication between citizen scientists and scientists.

The increasing prominence of citizen science was recently marked by two important "firsts." The **August 2012** *Frontiers in Ecology and the Environment*, a journal of the Ecological Society of America, was the first journal issue devoted to citizen science. It was supported by NSF funding. Also, the first cross-disciplinary **conference** on citizen science, held in Portland, Ore., attracted 300 participants. It was co-organized by NSF's National Ecological Observatory Network.



Lucille Tower records data on behalf of the USA National Phenology Network. *Credit: Ruben Garcia*

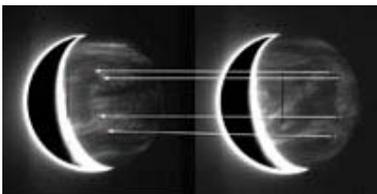


Learn more about the importance of citizen science contributions in an **NSF video**.

In memoriam: David Hanych, the NSF program director featured in the video, died September 14, 2012. He worked in the Division of Research on Learning in Formal and Informal Settings, Directorate for Education and Human Resources.

Credit: NSF

Citizen Scientists Help Track Venus' Rotating Atmosphere



Infrared images of Venus taken approximately 24 hours apart show how cloud features are tracked and used to measure wind speed. *Credit: Mark Bullock, SWRI*

Why does the atmosphere of Venus spin faster than the planet itself? To explore the answer, citizen scientists, working alongside professional astronomers, are clocking the Venusian winds. But they aren't using the usual anemometers that measure wind speed. Instead, images taken by the Infrared Telescope Facility on Mauna Kea, Hawaii, allow the team to probe deep under the visible cloud tops and view the planet's global circulation in 3-D.

Understanding how Earth differs from its "sister planet" is crucial to eventually understanding how all Earth-like planets evolve over time.

By combining observations of Venus' atmosphere from ground-based telescopes with those from spacecraft, astronomers hope to construct a comprehensive picture of the planet's atmospheric composition and motion at altitudes never previously explored. In this project, ordinary citizens track atmospheric motions that are unlike anything seen on Earth. Venus, for instance, makes a complete rotation in 243 Earth days, but its atmosphere--traveling at speeds up to 150 miles per hour--rotates in only four Earth days.

The scientists hope to better understand the similarities (and differences) between Venus' atmosphere and Earth's as well as the origin of the hotter planet's atmospheric super-rotation.

This **citizen science activity** is part of a larger project to study the planet Venus, led by researchers at the Southwest Research Institute and the Denver Museum of Nature and Science.



*The National Science Foundation (NSF) is an independent federal agency that supports fundamental research and education across all fields of science and engineering. Its Fiscal Year 2012 budget is \$7.0 billion. NSF funds reach all 50 states through grants to nearly 2,000 colleges, universities and other institutions. Each year, NSF receives more than 50,000 competitive requests for funding, and makes about 11,000 new funding awards. Contact NSF's **Office of Legislative and Public Affairs** at 703-292-8070 for more information or for permission to reuse newsletter images. Editor: Amber Jones.*



The National Science Foundation, 4201 Wilson Boulevard, Arlington, Virginia 22230, USA Tel: (703) 292-5111, FIRS: (800) 877-8339 | TDD: (800) 281-8749