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The WCC Note™

Presented by Stephen J. Pomeranz, M.D.

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fMRI ECONOMICS

Neurophysiology of Economic Behavior at Auctions Studied with Functional MRI

Peoples' behavior in economic markets has been evaluated mathematically using game theory,[1] for which the Nobel Prize in economics was awarded in 1994. Game theory postulates that the bids made by buyers reach an equilibrium (the "Nash equilibrium") when no player can improve his or her payoff by changing strategy, given the strategies of the other bidders. However, bidders have a propensity to bid above this equilibrium amount, called "overbidding." The burgeoning field of neuroecomonics offers an alternative methodology, that of neurophysiology, to analyze factors influencing human economic motivators. A recent study in *Science* examined the phenomenon of people overbidding at auctions by using functional MRI (fMRI).[2] The lead author from Rutgers University reported that 17 participants underwent a series of bidding experiments and their brain fMRI blood-oxygen levels and behavior were studied. The results showed lower blood-oxygen levels in the striatum when bidders lose an auction, but not when they win.[3] The authors propose that the fear of losing in a social situation, not the joy of winning, explains auction overbidding. **Conclusion: People's economic behavior can be studied using neurophysiology. Functional MRI and behavioral experiments support the theory that the fear of losing a social competition, not the joy of winning, leads people to overbid at auctions.**

DIGITAL IMAGING INNOVATION

Innovative Curved Imaging Device Simulates the Human Eye

Digital and video cameras employ flat image-recording surfaces.[4] While their resolution can display more than 10 million pixels, a bright and distortion-free image proves problematic with flat imagers. To avoid distortion at lens edges a combination of lenses are used, but these have proven heavy and costly, and yield dark images. In contrast, animal eyes consist of curved surfaces allowing a wide field of view and low aberration. Recently, researchers at the University of Illinois and Northwestern University created a novel electronic-eye camera that uses silicon electronics that are compressible and stretchable.[5] The mechanics allow molding into a hemispherical shape resembling the human eye. According to an article published in *Nature*, the optics depend on two innovations. First, thin metallic wires interconnect semiconductor photodetectors on a silicon wafer, allowing elastic compressibility despite high strain. Second, elastomeric elements can transform the initial planar configuration into the hemispherical geometry. These achievements could portend a broad array of applications, including new medical imaging systems. **Conclusion: Technical innovations herald the advent of digital imaging systems shaped like the human eye.**

NIH LEADERSHIP

Renowned Radiologist Dr. Elias Zerhouni Leaving NIH Directorship This Month

It was an epic day in radiology back in 2002, when one of our ranks ascended to the loftiest of roles in United States medi-

cine. Named Director of the U.S. National Institutes of Health (NIH), Dr. Elias Zerhouni took charge of the country's flagship medical institution, which now has more than 18,000 employees and an annual budget of $29.5 billion.[6] His elevation proved a signal event in the continuing incorporation of radiology into the crux of modern medicine. The nation entrusted its massive infrastructure of medical research and patient care to his stewardship and, under his deft guidance, the supertanker of the U.S. healthcare system sailed forward.

Director Elias A. Zerhouni, M.D., in front of NIH headquarters in Bethesda, Maryland.

Some of Dr. Zerhouni's accomplishments include creating the "NIH Roadmap," a compelling list of NIH initiatives that would make a profound difference in biomedical research. He also established interdisciplinary programs to tackle major public health problems, such as the NIH Strategic Plan for Obesity Research and the Neuroscience Blueprint. In addition, Zerhouni launched the Clinical and Translational Science Awards, the first systematic change of approach to clinical research at the NIH in 50 years. Also under his leadership, The Molecular Libraries program developed small molecule screening centers and PubChem provided free access to discoveries about the chemistry and biology of small molecules.

Zerhouni's agency supported high-risk/high-impact research and funding of early-career investigators. During his tenure, the Human Microbiome Project was launched to study the collective genomes of all microorganisms present in or on the human body, a largely unexplored territory. The NIH invested in studying epigenomics, the processes regulating how and when genes are turned on and off, and funded creating a comprehensive gallery of three-dimensional shapes of body proteins. He increased public access to health-related publications, accelerating release of manuscripts from NIH-supported research, and put forth effort to make the incomparable NIH resources accessible to the public. His predecessor praised Dr. Zerhouni's excellent relations with Congress and noted that he stood up to the President on stem-cell research.[7]

The mission of the NIH encompasses pursuit of fundamental knowledge about the nature and behavior of living systems and the application of that knowledge to extend healthy life, reducing the burdens of illness and disability. Dr. Zerhouni's departure takes place at the end of October.

Conclusion: Dr. Elias A. Zerhouni, a radiologist with MRI expertise, has announced his imminent departure as Director of the U.S. National Institutes of Health.

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NEXT ISSUE: MORE CLINICAL TRIAL IMAGING NEWS AND STUDIES

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- *Contributing Editors:* Margaret D. Phillips, M.D. (newsletter@wcclinical.com) and Stephen J. Pomeranz, M.D. (newsletter@wcclinical.com)
- *Managing Editor:* Rod Willis (newsletter@wcclinical.com)
- *Graphic Designer:* Tom Anneken (newsletter@wcclinical.com)

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• *Distribution Manager:* Shannon Roeper (newsletter@wcclinical.com)