ELECTRIC “THINKING CAP” CONTROLS LEARNING SPEED

With funding from the National Institutes of Health (NIH) and the National Science Foundation (NSF) Directorate for Social, Behavioral and Economic Sciences (SBE), Vanderbilt psychologists have shown that it is possible to selectively manipulate our ability to learn through the application of a mild electrical current to the brain, and that this effect can be enhanced or depressed depending on the direction of the current. The implications of the findings extend beyond the potential to improve learning. The current may also have clinical benefits in the treatment of conditions such as schizophrenia and ADHD, which are associated with performance-monitoring deficits.

BUILDING BETTER PUBLIC SERVICE

Vanderbilt, Duke, and Princeton University social scientists are examining government expertise—how to recruit people with it, how to develop it inside agencies, and how to keep it. This is an important and complicated problem, since public agencies must cope with episodic and dramatic political turnover, limited ability to adjust pay in response to outside market pressures, and tenure protections for civil servants. Ultimately, the project seeks to understand how to best design and manage a personnel system under these conditions. The research has broad implications not only for government personnel systems, but also for increasingly rigid private sector personnel systems. This research is supported with funding from the NSF SBE directorate.

NEURAL MECHANISMS OF MEMORY TARGETING

A Vanderbilt University psychologist is using NSF SBE funding to study how memories are formed and retrieved. Major issues being addressed in this project include determining how and why distraction impairs the ability to remember recent events, and determining how memory can be searched for a particular class of items as opposed to another (for example, if one is trying to remember which vegetables one needs to buy at the supermarket, it doesn’t help to recall the baked goods one needs). This research will help researchers better understand the brain and possibly develop treatments for brain disorders that affect memory including Alzheimer’s disease, schizophrenia, and other neurocognitive disorders.

Robert Reinhart applies the electrical stimulus to a subject. After 20 minutes, the headband is removed, and the EEG cap will capture readings of her brain as she executes the learning task.

(John Russell/Vanderbilt University)
**RUSSELL THE ROBOT GOES TO WASHINGTON**

Researchers from Vanderbilt’s School of Engineering and Peabody College of education and human development have developed a two-foot humanoid robot that acts as the front man for ARIA, an elaborate system of cameras, sensors, and computers developed at Vanderbilt that helps young children diagnosed with autism spectrum disorders (ASD) learn basic social skills. The initial funding for the project came from a Vanderbilt Kennedy Center discovery grant. That grant gave researchers the foundation they needed to compete successfully for NSF and NIH research grants that supported the development of ARIA and enabled the experiments which showed children with ASD pay more attention to the robot than they do to human therapists and accurately follow its instructions during sessions designed to teach critical communication skills. As part of the 2014 Coalition for National Science Funding exhibition, Russell the Robot was brought to Washington, D.C., to engage with members of Congress and their staffs.

**BRAIN MAPPING CONFIRMS PATIENTS WITH SCHIZOPHRENIA HAVE IMPAIRED ABILITY TO IMITATE**

With funding from the National Institute of Mental Health and the National Center for Research Resources, a team of neuroscientists at Vanderbilt University strengthened the theory that an impaired ability to imitate may underlie the profound and enduring difficulty with social interactions that characterize schizophrenia. Researchers reported that when patients with schizophrenia were asked to imitate simple hand movements, their brains exhibited abnormal brain activity in areas associated with the ability to imitate. These findings are significant, because the ability to imitate is present early in life and is crucial for learning how to navigate the social world.

**STUDY SEeks NEW WAYS TO HELP TEENS MANAGE TYPE 1 DIABETES**

In 2012, Vanderbilt University was awarded $1.8 million from the NIH to lead a team of researchers, engineers, and designers to identify ways to teach critical problem-solving skills to teenagers with type 1 diabetes using an Internet and mobile phone-based system. The four-year project will expand upon prior research that utilized a website to improve adherence to diabetes self-management. This research will continue to study how the internet and social interactions with peers can encourage adolescents to engage in adherence education and thus reduce the likelihood that serious health consequences occur as a result of inadequate self-care and glycemic control.

**IMPROVING MENTAL HEALTH EVALUATIONS FOR RETURNING SOLDIERS**

Following deployment, all Army service members are required to participate in the Post-Deployment Health Reassessment (PDHRA) program which helps to identify deployment-related health problems that may impact a service member’s daily life, family, or career. To improve the efficacy of these important screenings, researchers at Vanderbilt University’s Peabody College of education and human development received a three-year grant from the Department of Defense Office of Force Health Protection and Readiness to develop a training program for military and civilian providers who screen returning service members for deployment-related health problems. Collaboration with School of Medicine faculty helped Vanderbilt physicians improve their communication with patients and staff and created a workshop to teach military providers techniques used to build patient trust and compliance. Incorporating these techniques into the PDHRA interview could enhance the relationship between the provider and service member, thus potentially increasing the likelihood service members will disclose more information and get the medical attention they need.

For more information, please contact Vanderbilt’s Office of Federal Relations:
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