CATSS Newsletter - Center for Applied and Translational Sensory Science
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University of Minnesota: Driven to Discover

CATSS: Center for Applied and Translational Sensory Science

CATSS Newsletter

June, 2017

SUMMER IN CATSS

CATSS welcomes Logan Remington (pictured right), a sophomore student in BME, who will be spending the summer working as an intern in CATSS. Logan has a cochlear implant and a great interest in engineering for sensory sciences. He will be involved in a variety of research projects across multiple sensory-science disciplines.

Logan Remington

Don't miss our bi-weekly Brown Bag gatherings in the CATSS conference room (see schedule, below). We had our first meeting on May 30, with Ben Munson facilitating.

A film crew from LATIS spent a day in CATSS last month to begin producing a series of short videos about CATSS research. These videos will be used for CLA promotional purposes, and will also be accessible from the CATSS web site. Two projects were featured for pilot videos: Dr. Jessica Brown's (SLHS) *Visual Attention of Adults with Traumatic Brain Injury to Various Daily Planner Supports*, and Dr. Peggy Nelson's (SLHS) *Improving Amplification Outcomes in Noise by Self-directed Hearing Aid Fitting*.

Planning has begun for a study involving the use of EEG to characterize the brain response to stimulation and to assess the benefit of the Argus® II retinal implant. The study, led by Dr. Sandra Montezuma, will be a CATSS collaboration involving Ophthalmology, Psychology, and Second Sight, the manufacturer of the implant.

CATSS and SLHS have been invited to participate in ACHIEVE (Aging and Cognitive Health Evaluation in Elders), a multi-site clinical study investigating the effects of hearing rehabilitative treatment on cognitive decline in older adults. UMN is one of four sites; the study is nested within a larger, ongoing epidemiological study of health in aging individuals. From the ACHIEVE Manual of Operating Procedures:

> *"Novel approaches for reducing cognitive decline in older adults are needed, given the aging of the population and the personal, socioeconomic, and public health implications of cognitive impairment and dementia in older adults. Epidemiologic data now strongly suggest that age-related peripheral hearing loss in older adults is independently associated with accelerated cognitive decline and incident dementia. Mechanistic pathways that could underlie this observed association include the effects of poor audition and distorted peripheral encoding of sound on cognitive load, brain structure, and/or reduced social engagement. These pathways may be amenable to comprehensive hearing rehabilitative treatment consisting of the use of hearing assistive technologies (hearing aids, other integrated hearing assistive devices) and rehabilitative training. To date, however, there has never been a randomized trial that has investigated whether hearing loss treatment could reduce cognitive and other functional declines in older adults."*

Stop by this summer for a tour or a visit! We'd love to see you!

CATSS PODCAST #2: Dr. Gordon Legge and MNREAD

Ken Mills, local journalist, writer, consultant, and member of the CATSS Advisory Board, has now produced three audio podcasts about the mission and work of CATSS. Two are currently accessible on our web

CATSS SUMMER BROWN BAG SERIES

Looking for a way to keep informed on sensory research at U of M this summer? CATSS Brown Bag gatherings are scheduled every other week throughout the summer. These informal, noon-time or mid-afternoon gatherings are led by a facilitator and focus on a number of different topics. Our intention is to create a forum where colleagues can share their current research activities and discuss topics of interest to participants.

Tuesday May 30, 3:30pm: Benjamin Munson, facilitator.

site, with the third coming soon. Written transcripts of the podcasts are also available.

The second podcast features Dr. Gordon Legge, Professor in the Dept. of Psychology, and his work in low vision research.

Listen to the podcast...

Monday, June 12, noon: *Audiovisual approaches to communication*, Andrew Oxenham, facilitator.

Thursday July 6, noon: *Finding a cure for tinnitus?*, Rich Tyler, guest facilitator.

Monday July 10, noon: *Big data for low vision research*, Steve Engel, facilitator.

Tuesday July 25, 3:30pm: Gordon Legge, facilitator.

Monday Aug 7, noon: *Functional outcome measures*, Peggy Nelson, facilitator.

Tuesday Aug 22, 3:30pm: *High field fMRI frustrations*, Cheryl Olman, facilitator.

Andrew Freedman

CATSS MEMBER PROFILE: Andrew Freedman

CATSS member and graduate student in the Cognitive and Brain Sciences program, Andrew Freedman, works with Dr. Gordon Legge at the Minnesota Laboratory for Low Vision Research. His work focuses on how low vision affects navigation and object recognition. (At left: Andrew wears the Tobii Glasses eye tracker, a key tool used in the *Guided Tour* experiment, part of his ongoing research.)

Combining Science and Design

The *Guided Tour* is part of the larger Designing Visually Accessible Spaces (DEVA) project, a body of ongoing research focused on how to design public spaces to be more accessible for people with low vision, defined as visual acuity less than 20/60 after the best possible correction, or the presence of a blind spot or visual field loss. For a space to be visually accessible, it should follow three primary guidelines: first, people with low vision should be able to **travel efficiently and safely** through the environment. Second, it should be easy to **perceive the spatial layout** of the space and key features within it. Finally, the space should facilitate **keeping track of one's location and orientation** within its layout. To address the issue of visual accessibility in public spaces, the DEVA team is working to create software for architects that can detect sections of their building designs which may be problematic for people with low vision to navigate. The software will take lighting, color contrast, and other important design elements into account when detecting these features.

Measuring Accessibility

Navigation Track

The *Guided Tour* fits into the DEVA project as a real-world space in which to collect data on how those design elements affect navigation, object detection, and reading for people with low vision. It was designed to simulate exploring a novel indoor space such as conference room or school building. In the experiment, subjects are instructed to walk along a set path through a controlled environment, pictured here, guided by a chain boundary on their right side. Target objects, the white cylinders and boxes in the photo, are set up adjacent to the path with letters attached to them. Subjects are then instructed to walk around the room, locate the objects, and read the attached letters. Performance on the course is assessed by several measures, including where participants focus their gaze while they navigate (accomplished using the Tobii eye tracker), letter recognition accuracy, object detection rate, and the time it takes to finish trials.

Outcomes and Future Applications

At this time, the project is just beginning. Freedman and colleagues are now analyzing their first data set from eight low-vision subjects and eight normally-sighted controls. Once a typical data profile has been established, the experiment will begin involving more complex lighting and color contrast elements to see if performance can be reliably improved (e.g., less time spent searching for objects, reduction of the frequency of missed targets, or lower trial times). Furthermore, the team can simulate the experimental environment in the DEVA architecture software program, using data gathered in this experiment, to empirically determine if the software is working as intended. This process will help fine-tune predictions about what makes a space accessible and ultimately enable the design of public spaces everyone can enjoy.

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