

# NIH Toolbox

Assessment of Neurological and Behavioral Function

*Special Issue!*

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Sensation

Motor

Emotion

Cognition



## Inaugural Toolbox Conference a Success

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I am pleased to report that the inaugural NIH Toolbox public conference, “Building the Toolbox”, held October 27, 2008 at the Marriott Bethesda North Hotel and Conference Center, Bethesda, MD, was a great success. There were over 250 attendees, including researchers, clinicians, psychologists, epidemiologists and NIH project officers from across the country who came to learn more about the NIH Toolbox development effort and its availability for use in future studies. This special conference edition of NIH Toolbox news focuses on the highlights of this meeting.

The conference focused on providing an overview of the study kicking-off with a presentation by Deputy Director, NINDS, Walter Koroshetz, MD, who spoke about the NIH Blueprint - a group of 16 NIH Institutes coming together to advance research within the field of neuroscience. The NIH Toolbox project is one of several projects the NIH Blueprint funds. Molly Wagster, PhD, Chief, Behavioral & Neuroscience Branch, NIA, and Lead Project Officer of the NIH Toolbox study, followed with a presentation on what Toolbox promises. The vision for the final Toolbox is 4 domain-level batteries (Cognition, Emotion, Motor, Sensation), including 50 individual instruments fully normed for ages 3-85 years, and a tool “shed” of additional instruments (*continued on page 3*)



Richard Gershon, PhD, PI (CORE/NU), kicks off the inaugural public NIH Toolbox meeting to a full house.

## Poster Session & Instrument Demonstrations

After the morning speaker presentations, we broke for lunch and a poster session which included live demonstrations of selected instruments for each Toolbox domain.

**Pictured Right:** The Emotion team demonstrated how self-report items may be displayed to respondents. Dr. Paul Pilkonis is shown demonstrating how computerized adaptive testing (CAT) can be used to obtain reliable score estimates, while administering relatively few items per concept.

### Emotion Demonstration



### Sensation Demonstration

**Pictured Left:** Jamie Griffith, one of the Sensory domain managers, demonstrates the “Wrist Position Test” a measure of proprioception within the Somatosensation sub-domain. Proprioception refers to awareness of the position and motion of body parts. In this version pictured, the respondent is asked to indicate the position of their wrist while their vision is occluded.

**Pictured Right:** This picture illustrates Cognition Domain Manager, David Blitz, demonstrating the Flanker task to Dr. Ellen Witt, NIH/NIAAA. The Flanker task is one of 3 Executive Function measures in the Cognition battery of the Toolbox. This particular version of the Flanker was adapted from Posner’s Attention Network Test (ANT). The Flanker assesses a respondent’s attention to target stimuli in the presence of distracting information. The task for the respondent is to correctly identify the direction of the target and respond by touching an arrow pointing in correct direction.

### Cognition Demonstration



**Pictured Left:** The Motor function development team displayed an array of pegboard-based tests of manual dexterity including standard 9-hole pegboard and the more complex grooved 25-hole pegboard. A variety of dynamometers for measuring upper and lower extremity strength were also on display and demonstration. Members of the Motor team discussed some challenges of the pegboard-based dexterity measures and hand-held dynamometry for strength testing with representatives of the Section 508 compliance team.



### Motor Demonstration

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## Recent 2008 Conference Presentations

**October 15-19, 2008**

ACRM  
Toronto, Ontario

**Susan Magasi, PhD**

*Defining Priorities and Selecting  
Measures for Uniform Assess-  
ment Battery of Neurological and  
Behavioral Function*

**November 20-24, 2008**

Society for Neuro-Oncology  
Las Vegas, NV

**Jin-Shei Lai, PhD, OTR/L**

*The NIH Toolbox: A  
New Assessment Tool for  
Measuring Neurological  
and Behavioral Function*

**November 21-24, 2008**

Gerontological Society of  
America  
National Harbor, MD

**Margaret Wallhagen, PhD**

*The NIH Toolbox: Consistent  
Measurement of Neurological  
and Behavioral Function*

**Coming Up in 2009**

**February 11-14, 2009**

International Neuropsycho-  
logical Association  
Atlanta, GA

*NIH Toolbox Workshop  
& Poster Presentation*

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available for researchers who want to drill down in particular areas. Richard Gershon, PhD, Toolbox Primary Investigator based at the Center on Outcomes, Research and Education (CORE), Northwestern University (NU), then discussed the timeline and operational structure for building the Toolbox. He covered Phase I which umbrellas the first 2 years of the project (domain & sub-domain selection, instrument selection, pediatric option and instrument development) from September 2006 to present; Phase 2A, which includes calibration of items for instruments based upon Computerized Adaptive Testing (CAT), validation testing of new instruments, and concurrent validation with legacy instruments (2008-2009); Phase 2B which will entail a national norming study (2010-2011), and Phase 2C which will consist of calculating scoring crosswalks with legacy instruments; development of technical manual; and delivery of the final Toolbox at a public conference (2011).



*Molly Wagster, PhD, NIA & Lead Project Officer, NIH Toolbox, provides an overview of what Toolbox promises.*

Dr. Cindy Nowinski (CORE; Toolbox Steering Committee) provided background on creating the domain framework including the process for selection and priorities, and Dr. Richard Havlik (Westat) discussed the specifics of instrument selection stating that while a wide net was cast to identify potential instruments, application of criteria and expert opinion narrowed the field. Pre-testing and piloting are refining these instruments and an extensive validation will result in final instruments. David Cella, PhD (CORE; Toolbox Executive Committee), followed with a presentation on using Item Response Theory (IRT)-based instruments and Computerized Adaptive Testing (CAT) for assessment of health and function. He stated that IRT models enable reliable and precise measurement with shorter tests. CAT enables custom tests to be delivered in real time targeted at the subject's ability level. Dr. Hugh Hendrie (Indiana University; Toolbox Executive Committee) discussed integrating health information into longitudinal studies; Toolbox Project Officer, Dr. Kevin Conway, NIDA, followed with an overview of Toolbox connections with other NIH projects; and Nathan Fox, PhD (University of Maryland; Toolbox Executive Committee), provided an overview on the importance of Toolbox to pediatrics. The morning session concluded with Dr. Bruce Cuthbert (University of Minnesota; Toolbox Consultant) sharing his insight into the Toolbox measures and neurological processes.

The scientific aspect of the project was the focus of the afternoon with respective domain leaders providing progress reports highlighting accomplishments to date, instrument development and a glimpse of what their instruments are likely to look like in the final toolbox.

## Question & Answer Session



*Left to Right:  
Cindy Nowinski, MD, PhD (CORE),  
Richard Havlik, MD, PhD (Westat),  
and David Cella, PhD (CORE),  
respond to questions from the  
audience.*

*At the end of the conference we had a lively Question & Answer Session with several stimulating questions asked, and comments provided by, audience members. Here is a snapshot of that session:*

**Q: How do you define “normal”? Do the individuals have to be normal on all of the domains (i.e., to participate in norming)?**

A: The definition will be in terms of what they can and cannot do in reference to a general community dwelling population. The only possible reason not to assess someone with Toolbox measures will be a cognitive inability to understand the instructions. There will be a screening test for cognitive impairment.

**Q: When the Toolbox was put together, were therapists included in the interdisciplinary design and some of the interventions? Data may not be able to be translated by therapists, how can we be sure it will help them?**

A: The RFI recommended including a broad and diverse group and there are clinicians and therapists involved in the project. After the Toolbox is validated, we can get additional therapists who have intervention in mind. Toolbox isn't intended to be used diagnostically, but can be used as a template to find problem areas. Toolbox is collecting normative data to which therapists can compare their results.

**Q: What criteria are you going to impose to define adequate validation?**

A: We are currently working on developing validation criteria. In some cases, we will compare them to gold standards. We want the newly developed Toolbox measures to perform as well as gold standards. There will also be a subjective evaluation on how well the new instruments will perform.

## Steering Committee

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