



NIH Toolbox
Assessment of Neurological and Behavioral Function

Cognition

Team Leader:
Sandra Weintraub, PhD
Northwestern Feinberg School of Medicine

Date: October 27-28, 2008




For more information, please visit www.nihtoolbox.org
Richard C. Gerstman, PhD, PI gerstman@northwestern.edu

This study is funded in whole or in part with Federal funds from the Blueprint for Neuroscience Research, National Institutes of Health under Contract No. HHS-N-260-2006-00007-C



NIH Toolbox
Assessment of Neurological and Behavioral Function

<p>SENIOR SCIENTISTS AND DEVELOPERS</p> <p>Patricia Bauer Sureyya Dikmen Nathan Fox Robert Heaton Jennifer Manly Dan Mungas David Tulskey Sandy Weintraub Philip Zelazo</p>	<p>JUNIOR SCIENTISTS</p> <p>Beth Borosh Noelle Carlozzi Nancy Chiaravalloti Joanne Deocampo Jennifer Richler</p>
	<p>PROCESS/ORGANIZATION</p> <p>David Blitz Jerry Slotkin Dick Havlik</p>



Subdomains

Executive Function: The capacity to plan, organize, and monitor the execution of behaviors that are strategically directed in a goal-oriented manner.

Episodic Memory: Mental processes involved in acquisition, learning, and retrieval of new information.

Language: Mental processes that serve to translate thought into shared symbols (words, gestures) for the purpose of communication.

Subdomains



Processing Speed: The amount of time to process a set amount of information or the amount of information processed within a certain unit of time.

Working Memory: The capacity to 1) process information across a series of tasks and modalities; 2) hold information in a short-term buffer; 3) manipulate the information; and 4) hold the products in the same short-term buffer.

Attention: The allocation of limited capacities to manage an abundance of environmental stimulation; a foundation for other mental processes.

Cognition Team Milestones



- ♦ Jan-Apr 07
 - Domain Team Formation
- ♦ May 07
 - Initial Proposal - Subdomains
 - Initial Submission - Lit Review
- ♦ June 07
 - Finalize subdomains
- ♦ July 07
 - Initial instrument review
 - Team meeting
 - Recruit additional experts
 - Reorganize into subdomain teams

Cognition Team Milestones



- ♦ Aug-Oct 07
 - Select/refine instrument list
- ♦ Nov 07-March 08
 - Add Reading to Language subdomain
 - Reorganize into development teams
- ♦ May-Aug 08
 - Finalize experimental and validation instruments
 - Develop instruments for pretesting

Development Plan



- Aug-Sep 08: WebEx, Video training, and On-site training
- Sep-Oct 08: Pre-testing at five sites: (Emory, MN, KMRECC, Core, NU) 120 total subjects were administered the battery and 60 subjects re-tested; Age bands included 3-6 yrs., 18-30 yrs., 65-85 yrs.
- Oct-Nov 08: Analysis and evaluation of pre-testing data
- Nov 08: Review and consensus meeting of senior scientists and consultants to refine instruments
- Nov 08 - Jan 09: Revisions to instruments for validation

Instrument Development



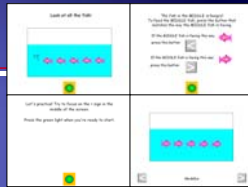
SUBDOMAIN	Toolbox Measures	Validation Measures
EXECUTIVE FUNCTION	Flanker Test (inhibition) Dimensional Change Card Sort (shifting) Self-Ordered Pointing	Trail Making Test, Part B Composite from NINDS EXAMINER
EPISODIC MEMORY	Imitation Based Assessment of Memory (IBAM)	A-RAVLT Word List A-Brief Visual Memory Test-Revised P-Children's Memory Scale
LANGUAGE	Vocabulary Comprehension Bilingual Reading Recognition	A, P-Peabody Picture Vocabulary Test A, P-Wide Range Achievement Test A-Spanish Word Accentuation Test
PROCESSING SPEED	Pattern Comparison	A-WAIS-III Processing Speed Index
WORKING MEMORY	List Sorting	A-Letter-Number Sequencing A-PASAT
ATTENTION	Flanker Test (congruent trials)	A-Continuous Performance Test-IP Children's Behavior Questionnaire (proxy for peds)

Development Plan



- TRYOUTS RESULTS
- Plans for validation:
 - Validation (Spring 09 ~ 4 months): Analysis/evaluation of validation data;
 - Consensus meeting to finalize battery and hand off for final technology development.
 - A validation sample of 600 individuals will allow comparisons between the new tests and "gold standard measures" commonly used in clinical practice followed by a normative study with approximately 6,000 individuals.

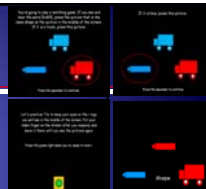
Attention/Executive Function



CHOICE REACTION TIME "FLANKER TASK"

- Computer (Rueda, Posner et al., 2004)
- Measure of inhibitory control: focus on a given stimulus while inhibiting attention to stimuli flanking it.
- Stimulus and flankers congruent: CPT type task
- Stimulus and flankers incongruent: requires inhibition

Executive Function



DIMENSIONAL CHANGE CARD SORT (DCCS)

- Computer (Zelazo and colleagues, 2003)
- Measures cognitive flexibility.
- Participants must match by shape or color.
- Those who pass the post-switch phase will then complete an adapted form of the task-switching paradigm where the relevant dimension randomly switches (e.g., between "shape" and "color").

Executive Function



SELF-ORDERED POINTING

- Computer (Petrides and Milner, 1982)
- Participants are instructed to point to one item in an array on the first trial.
- On subsequent trials, the location of objects changes and the subject is instructed to point to a different object, never pointing to the same item twice.
- Different numbers of items in the arrays will also be tried out, depending on the age of the participant.

Episodic Memory



Imitation Based Assessment of Memory

IBAM

- Working on computer adaptation (Bauer)
- Initially designed for children below 6 years of age; appropriate for use across the lifespan.
- Sequences of related or unrelated pictures of objects or activities are presented in a particular order.
- Recall of temporal information is tested by instructing subjects to reproduce the demonstrated order.
- The same sequence will be repeated 3 times with recall after each presentation (5 minutes).

Processing Speed



PATTERN COMPARISON:

- (computer administered) Developed after Salthouse
- Requires participants to identify whether a pattern is the same ("yes" or "no") as another pattern
- Requires approximately 4 minutes for children and 7 minutes for adults



Working Memory




LIST SORTING:

- (computer administered, Mungas)
- Spanish & English Neuropsychological Assessment Scales (SENAS) working memory task
- Requires sequencing of orally presented stimuli according to size.
- Two conditions:
 - one list condition: order a series of objects from the same category by size.
 - two list condition: rank order items in size from one category then from the second.




TEST ITEMS
(one list)

8

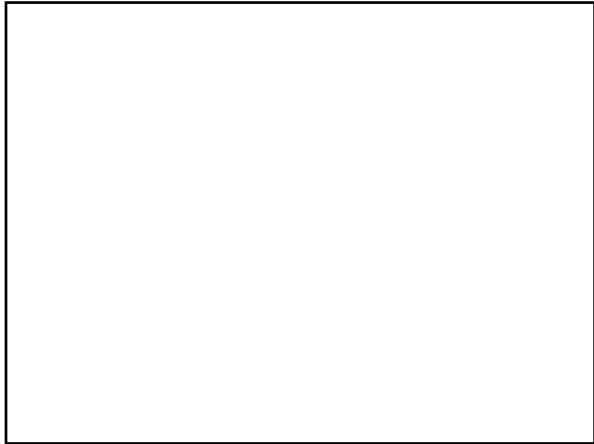



PUMPKIN

8



LEMON



LANGUAGE 

BILINGUAL READING RECOGNITION: (Computer)

- Read and pronounce letters and words as accurately and quickly as possible.
- Administration requires approximately 5-7 minutes.
- Not administered for ages 3-4.

VOCABULARY COMPREHENSION: (Computer)

- Words presented auditorily
- Point to one of four pictures depicting the vocabulary item

cucurbitaceous
forisfamiliate
prevarications
circumlocutory
imparidigitate

SUMMARY



- Cognition Instruments are being accepted by the intended populations, including pediatric, young adult, older adult
- Feedback is shaping changes in preparation for validation
- Strategy for norming in collaboration with Epi-Biostats team
- Potential projects to spin off from Toolbox



NIH Toolbox
Assessment of Neurological and Behavioral Function

Cognition

Team Leader:
Sandra Weintraub, PhD
Northwestern Feinberg School of Medicine

Date: October 27-28, 2008



For more information, please visit www.nihtoolbox.org
Richard C. Gershon, PhD, PI gershon@northwestern.edu

This study is funded in whole or in part with Federal funds from the Blueprint for Neuroscience Research, National Institutes of Health under Contract No. HHS-N-269-2008-00007-C.
