

**Cognitive Test Battery Testing Work Group
Summary of Meeting
August 3 and 4, 2011
New Orleans, Louisiana**

Participants:

Tucson

Carol Barnes, Betty Glisky, Lee Ryan, Gene Alexander

Gainesville

Dawn Bowers, Jennifer Bizon. Tom Foster

Birmingham

David Geldmacher. Erik Roberson

Miami

Bonnie Levin, Tony DeFazio, Clinton Wright (not able to attend)

OUTCOME:

We envision **two primary papers** arising from these efforts. The first is a human test battery that does not take into account whether or not the task can be used in nonhuman species. At the end of our New Orleans meeting, we decided that we need to explore each domain listed below, and by the time of our next meeting, have all the information at hand to be able to finalize and select the core battery that will be proposed for use across Institutions. At that time, it will become clear which tests, because of time constraints or reliability, will not be used at each site, but for some purposes, have value. These may be included in a broader “toolbox”.

The second manuscript will focus on tasks that clearly can be applied in a cross-species manner, that are sensitive to normative aging processes.

A Common Human Cognitive Test Battery

A set of common cognitive tests will provide a cognitive profile which, along with demographic and sampling characteristics information, will allow data across sites to be combined, or specific subsets of participants to be selected for inclusion in multiple site studies. The ideal battery will be relatively short, provide assessment of multiple domains, and emphasize tests that are known to be sensitive to normal age-related cognitive impairment. Where possible, these tests are known to be mediated by specific anatomical brain regions or systems.

The battery will include sensory and cognitive screening instruments in order to rule out the presence of frank dementing illnesses, depression, and sensory impairment that would interfere with cognitive testing. Demographic and medical history information will be obtained, as well as information on sampling procedures and characteristics. The battery will assess the following cognitive domains: language, verbal and visual

memory, social cognition and decision making, working memory, executive functions, visual-spatial ability, and processing speed.

Each cognitive domain will include tests that are sensitive to age-related cognitive change. The tests may include clinical neuropsychological tests but also new tests borrowed or developed from the experimental literature. Ideas for tests in each domain are described here. Each section has a few people listed who will take the lead for that domain.

Screening (Geldmacher, Levin). Should include sensory and cognitive screening, demographics and medical history, activities of daily living, complaints, depression. Possibly include Glisky's new activities questionnaire. Tests discussed included the MMSE (Crum norms), FAQ to assess activities of daily living, GDS 15 question version (depression), Ishihara bedside color screening.

Memory (Bowers, Ryan). Will include assessment of both verbal and visual memory. Verbal memory includes paired associates, a list learning task, and story recall. Visual memory tests discussed included the visual paired associates, face recognition, the Rey-O for visual reproduction, objects in location (source memory), Doors & People task (Baddeley).

Visual-spatial, spatial navigation (Geldmacher). Tests discussed included the Johnson-O'Connor design reproduction, Benton VRT, Biber visual retention, Rey-O copy, Benton line orientation, the Hooper, Benton facial recognition, Ghent figures, Gollin figures, and Visual Object and Space Perception.

Executive function (Glisky, Alexander). We agreed that executive function should probably be built around an agreed-upon theoretical view of executive function. We discussed Miyake (set shifting, inhibition, updating) and Benson & Stuss (something like planning, anticipation, goal selection, feedback). We agreed that each area of our theoretical model will be assessed. Working memory and prospective memory is included in the assessment of executive function. Tests discussed included Trails A/B, global-local, flanker tasks, stop signal, anti-saccade task. Prospective memory tasks included Glisky's clock test and Raskin's Memory Intentions Test. Working memory tasks included PASAT, radial arm maze tasks, Corsi blocks backward/forward, Bohbot's battery for navigation through virtual spaces.

Language (Bowers). Should include assessment of vocabulary, fluency (FAS and categories), and possibly Boston naming.

Processing speed (Alexander). Tests discussed included computerized RT tasks, Trails A, signal detection tasks, Grooved pegboard.

Social and decision making (Levin, Wright). Decision making is included in this section. We discussed the Iowa Gambling Task.

A Cross-species Cognitive Test Battery

The purpose of this battery is to provide researchers with a set of tasks from the animal literature that assess various cognitive domains that are well characterized and sensitive to age-related changes in cognitive function. A major focus will be on identifying tasks that lend themselves to cross-species comparisons, including rodents, nonhuman primates and humans. The battery and associated toolbox should provide a resource to researchers who are new to cognitive aging research.

The minimal requirements of these tests will be that they are:

- a) age-sensitive
- b) dependent on known (or presumed) neural systems
- c) widely used in the animal literature, or may be productive to think about developing
- d) and that have (or should have) cross species procedures that can be used to "translate" our findings across different levels of analysis.

Cross-species tasks. We decided on five general domains of cognitive function for this battery that are of particular interest because of the possibility of comparing behavior across humans and animals and because they depend on regions of the brain known to be affected in normal aging:

1) **Spatial** - hippocampus-dependent tasks

Coordinator of this section: Tom Foster, with help from Lee Ryan and Dawn Bowers

2) **Object Discrimination** - perirhinal cortex-dependent tasks

Coordinator of this section: Carol Barnes, with help from Lee Ryan

3) **Associative Learning** as tested by eye-blink conditioning - cerebellar- and hippocampal-dependent versions

Coordinator of this section: Carol Barnes

4) **Fear Conditioning** - amygdala- and hippocampal-dependent versions

Coordinators of this section: Erik Roberson and Tony DeFazio

5) **Set Shifting, Working Memory, Decision and Risk Taking** tasks - frontal cortical-dependent

Coordinators of this section: Jennifer Bizon with help from Betty Glisky

Sections to be written that cover specific approaches to the animal work:

1) Roberson will write the 'lead in' summary and motivation for conducting cross species experiments, and rationale for each of the domains that will be covered.

2) DeFazio will write up the section on procedural details that are critical to consider in the design of animal experiments that will reduce variability and promote replication across laboratory sites (e.g., circadian aspects of testing, strain of animal, temperature of water in the Morris task, etc.).

3) Barnes will search the nonhuman primate literature to make sure each domain reviewed has representation of experiments that include monkeys.

Final Comments

The consensus was that we would never have been able to achieve the amount we accomplished by phone, email or other means. To keep the momentum going, to establish hard deadlines, and to utilize our time most effectively, we believe we need one more meeting before the Inter-institutional meeting, at which we hope to finalize revisions of our 'position papers' and make plans for collaborative experiments together.