

# National Institute on Aging

## Symposium on Cognitive Training for Older Adults

Hyatt Regency Bethesda One Bethesda Metro Center Bethesda, Maryland

February 29 - March 1, 2004

### ***Tentative Agenda***

(Rev. 1-13-04)

#### ***February 29 (Sunday)***

##### **7:00 PM No Host Group Dinner**

The Daily Grill (entrance through the Hyatt), private dining room

#### ***March 1 (Monday)***

##### **7:30 AM Coffee and Pastries**

##### **8:00 AM Welcome and Introductory Remarks**

Jeff Elias, National Institute on Aging

*There will be three sessions of clustered presentations, with each seeking to address the following overarching questions:*

*What do we know? What is state of the art?*

*What are the key research/methodological issues?*

*• How do we define success? Each speaker will have 15 minutes to present, followed by opportunity for group discussion.*

**8:30 AM Session 1: Basic Abilities** (*e.g., What are the best methods for specific training outcomes, or do all waters rise with training? Is training best done within the context in which it will be used (e.g., perceptual speed, memory, exercise, technology use)? Is multiple system training the best method and how shall we determine what systems are affected? How can current cognitive theory inform training and vice versa?)*

***Speed Training with Older Adults: Who Benefits, for How Long, and in What Ways***

– Karlene Ball, University of Alabama at Birmingham

***Considering the Transfer Question in Cognitive Interventions: Three Studies and Conceptual Considerations***

– Michael Marsiske, University of Florida

***Cognitive Training on Reasoning Ability within a Longitudinal Context***

– Sherry Willis, Pennsylvania State University

***Training Memory Abilities in Older Adults: In Search of Model Methods***

– George Rebok, Johns Hopkins University

***Memory Training in Older Adults: Issues of Prediction of Response, Mild Cognitive Impairment, and Interaction with Medications***

– Jerome Yesavage, Stanford University

**9:45 AM Session 1: Group Discussion**

Moderator: George Rebok

**10:30 AM Break**

**10:45 AM Session 2: General Approaches to Training** (*e.g., What are the physiological correlates of training and transfer of training? What is the impact of social engagement on cognition? What do we know about cognitive plasticity?*)

***Healthy Body, Healthy Mind? The Relationship among Fitness, Cognition, Brain Structure and Function***

– Art Kramer, University of Illinois at Urbana-Champaign

***Improving Cognitive Function in Older Adults: Nontraditional Approaches***

– Denise Park, University of Illinois at Urbana-Champaign

***The Senior Odyssey Program: A Model for Intellectual and Social Engagement***

– Elizabeth A. L. Stine-Morrow, University of Illinois at Urbana-Champaign

**11:30 AM Session 2: Group Discussion**

Moderator: Elizabeth Stine-Morrow

**12:15 PM Break to get lunch**

**12:45 PM Session 3: Cognition and Performance** (*e.g., How should we define successful training? That is, how long do training effects have to last to be successful? Who are the best candidates for cognitive training and why? Does cognitive training in later adulthood develop cognitive reserve or serve a protective effect?*)

***Training Metacognitive Skills to Enhance Learning***

– John Dunlosky, University of North Carolina at Greensboro

***Training a System Mental Representation: Understanding Transfer of***

*Training in the Context of Enhanced Activities of Daily Living*  
– Wendy Rogers, Georgia Institute of Technology

*Training and the Acquisition of Real World Functional Tasks*  
– Sara Czaja, University of Miami

- 1:30 PM**                    **Session 3: Group Discussion**  
                                 Moderator: John Dunlosky
- 2:15 PM**                    **General Questions and Answers**
- 2:45 PM**                    **Common Themes and Future Directions**
- 3:30 PM**                    **Wrap Up**  
                                 Jeff Elias, National Institute on Aging
- 4:00 PM**                    **Adjourn**

**National Institute on Aging  
Symposium on Cognitive Training for Older Adults**

**PRESENTATION ABSTRACTS**

(Rev. 2-5-04)

**Session 1: Basic Abilities**

*What are the best methods for specific training outcomes, or do all waters rise with training? Is training best done within the context in which it will be used (e.g., perceptual speed, memory, exercise, technology use)? Is multiple system training the best method and how shall we determine what systems are affected? How can current cognitive theory inform training and vice versa?*

***Speed Training with Older Adults: Who Benefits, for How Long, and in What Ways***

**Karlene Ball, University of Alabama at Birmingham**

This presentation will focus on the impact of speed of processing training on the cognitive and functional abilities of older adults. The presentation will focus on who benefits from training, which accounts for some of the discrepancies among studies, as well as retention of training effects, and the transfer of training to everyday abilities such as driving competence. Finally, an evaluation of real-world applications for speed training, as well as issues for future research will be addressed.

***Considering the Transfer Question in Cognitive Interventions: Three Studies and Conceptual Considerations***

**Michael Marsiske, University of Florida**

This presentation will briefly review what is known about training transfer in research on cognitive interventions with older adults. Findings from the ACTIVE study will also be considered, with a particular focus on the underlying model in which the study's transfer battery was constructed. Findings from two intensive practice studies will also be considered. One study (Marsiske and Allaire) provided 120 occasions of practice to unimpaired older adults. Despite substantial gains on measures of reasoning and perceptual speed, there was minimal transfer to even closely related tasks. Similar findings are reported from a newer study (Marsiske and McCoy), which provided 30 occasions of practice to unimpaired and impaired older adults. These practice results argue against simplistic models of engagement as a cognitive intervention with older adults. Drawing on the larger literature on complex activity engagement and cognition, we consider "top down" versus "bottom up" approaches to cognitive interventions as a framework for planning future training studies.

***Cognitive Training on Reasoning Ability within a Longitudinal Context***

**Sherry Willis, Pennsylvania State University**

This presentation will focus on the impact of cognitive training on reasoning or executive functioning ability within the context of the individual's cognitive developmental trajectory. The magnitude and direction of training effects will be considered within the context of the individual's cognitive functioning, both prior to training and also for up to a decade following training.

### ***Training Memory Abilities in Older Adults: In Search of Model Methods***

**George Rebok, Johns Hopkins University**

This presentation will provide a critical overview of previous memory training research with older adults and describe recent innovations for enhancing training impact and durability. The presentation will begin with a discussion of traditional memory interventions involving either brief “instant” strategy training or more extended training involving multiple sessions and/or strategies. The preliminary results of an ongoing evidenced-based review of the memory training studies conducted over the past thirty five years will then be discussed. It will be argued that the results from this review, together with those from previous meta-analyses of the memory training literature, provide a solid knowledge base for future training research with older adults. Several novel training platforms will then be introduced, including trainer-less training, interactive CDROM-based training, Web-based training, and multi-modal training. The potential applications of these newer methods for memory enhancement will be discussed, along with methodological and theoretical issues that remain to be explored.

### ***Memory Training in Older Adults: Issues of Prediction of Response, Mild Cognitive Impairment, and Interaction with Medications***

**Jerome Yesavage, Stanford University**

Our cognitive training work has primarily been with memory and has centered on techniques to enhance the applicability of image association devices (mnemonics). I will present several studies on such interventions and then some analyses of predictors of response to illustrate where additional techniques may enhance the usefulness of training. Some of these analyses use Receiver Operator Characteristics (ROC) techniques. Results from these studies also indicate that even small levels of cognitive impairment reduce the usefulness of mnemonics. In this context I will present some data to suggest that some medications may be of use to retain trained techniques.

## **Session 2: General Approaches to Training**

*What are the physiological correlates of training and transfer of training? What is the impact of social engagement on cognition? What do we know about cognitive plasticity?*

### ***Healthy Body, Healthy Mind? The Relationship among Fitness, Cognition, Brain Structure, and Function***

**Art Kramer, University of Illinois at Urbana-Champaign**

The presentation will provide a brief but critical review of the animal and human literature on the relation among improvements in aerobic fitness, cognition, and brain function, particularly for older adults. The presentation will begin with a discussion of what we currently know from the animal literature about fitness, behavior and the brain. I will then describe the results of a recent meta-analysis that includes longitudinal fitness studies conducted over the past thirty-five years. These studies examine the methodological and theoretical factors that influence the fitness-cognition relation. The meta-analysis reveals that there are robust but selective benefits of fitness training on neurocognitive function. I will then describe the results of on-going cross-sectional and longitudinal studies in which we are examining changes in cognition and brain function, as indexed by functional magnetic resonance imaging (fMRI) and event-related brain potentials, in response to improvements in the aerobic fitness of healthy older adults. Finally, I will conclude by describing issues for future

research as well as potential applications of what we have already learned – as well as what we still need to learn.

#### *Improving Cognitive Function in Older Adults: Nontraditional Approaches*

##### **Denise Park, University of Illinois at Urbana-Champaign**

Two routes for enhancing memory and cognitive functioning in older adults will be explored. The first approach involves exploiting effortless, automatic processes that remain intact with age, to produce substantive improvements in prospective memory in older adults. The second approach promotes the impact of engagement in learning and activity programs that stimulate social, cognitive, motor, and sensory function simultaneously and carry over to activities of every day life.

#### *The Senior Odyssey Program: A Model for Intellectual and Social Engagement*

##### **Elizabeth Stine-Morrow, University of Illinois at Urbana-Champaign**

Recent evidence on variations in the trajectories of cognitive development as a function of experience paints a provocative portrait. On the one hand, training studies using experimental designs show that cognition is highly plastic in late life and that performance on a variety of abilities can be improved through training and practice. This line of research, however, has produced little evidence of transfer to real world cognitive functioning. On the other hand, correlational data suggest that older adults who have engaged in cultural, literacy, educational, and complex work activities live longer and fare better in everyday cognitive functioning. Unfortunately, the correlational nature of these studies prohibits a causal attribution (i.e., perhaps inherently more vital, cognitively intact people select these activities). We will describe a program promoting intellectual and social engagement that is based on the Odyssey of the Mind program, in which teams collaborate to compete with other teams in exercises of divergent thinking and creative problem solving. We believe that this program holds promise as a model of training because of several features: (1) the exercise of basic abilities in the context of situated cognition to meet personal goals, (2) embeddedness in a social context, which provides both opportunities for collaboration and competition, and (3) integration with creative activity, which is inherently engaging.

### **Session 3: Cognition and Performance**

*How should we define successful training? That is, how long do training effects have to last to be successful? Who are the best candidates for cognitive training and why? Does cognitive training in later adulthood develop cognitive reserve or serve a protective effect?*

#### *Training Metacognitive Skills to Enhance Learning*

##### **John Dunlosky, University of North Carolina at Greensboro**

Given that metacognitive monitoring and control processes have not been systematically addressed in memory-training research for older adults, I will describe some of the basic principles of a metacognitive approach to memory improvement. I will highlight (1) what we currently know about the success and limits of the approach, (2) gaps in our knowledge that currently undermine the application of this approach to domains outside of associative learning, and (3) the implications of this approach to some of the key themes of the symposium. The latter will largely focus on defining the success of memory training programs.

***Training a System Mental Representation: Understanding Transfer of Training in the Context of Enhanced Activities of Daily Living***

**Wendy Rogers, Georgia Institute of Technology**

Functional independence for older adults involves more than the ability to perform activities of daily living (ADLs) and instrumental activities of daily living (IADLs). Daily activities also include enhanced activities of daily living (EADLs) such as social communication, continuing education, community volunteering, caregiving, and part-time work. Training to use the technology that may support these activities is crucial. However, such training must be designed to enable older adults to develop a system representation that will lead to transfer of knowledge to perform novel tasks, troubleshoot problems, and understand system functionality.

***Training and the Acquisition of Real World Functional Tasks***

**Sara Czaja, University of Miami**

One important issue that needs to be addressed within the domain of aging and cognition is the ability of older adults to acquire skills needed to perform tasks within real world contexts such as work. This is especially important given the influx of technology into most settings. Technology changes task requirements and thus requires that people learn new skills to adapt to changes in task demands and successfully use these systems. The focus of this presentation will be on training and the ability of older adults to acquire new skills in unfamiliar cognitive domains. The link between cognitive abilities and functional performance will also be explored. In addition, the effects of practice and experience will be discussed. Within this context this presentation will: (1) summarize what is known in this area, (2) discuss the concept of “ecological validity” and methodological issues inherent in “ecological research,” and (3) highlight areas of needed research. Examples will be provided from a research examining technology-based work tasks.