# Cognitive and Brain Training

## Improving mental abilities in and out of the classroom

## Objective

To **understand** the core processes necessary for effective and efficient processing of information, to **improve** these processes through intensive cognitive training, and to **apply** our research to important domains such as quantitative reasoning, language comprehension, and academic achievement.

## Background & Motivation

A fundamental component of successful performance in quantitative reasoning, language comprehension, and other achievement-oriented tasks is **working memory (WM) capacity**—the small amount of memory that stores and manipulates information for ongoing use.

Researchers within **cognitive psychology** have documented a strong positive correlation between individual differences in WM and performance on a variety of tasks, including tests of mathematical ability, reading comprehension, vocabulary learning, and note taking. At the same time, research within **cognitive neuroscience** has demonstrated the ability to improve working memory processes through extensive cognitive training.

**Our research brings together these two emerging literatures** to examine the efficacy of cognitive training for improving cognitive functioning generally, and quantitative reasoning and language comprehension specifically.

## Research Questions

>> **Does cognitive training improve quantitative reasoning and language comprehension?** Our research tests whether gains in basic cognitive ability result in concomitant gains in mathematical reasoning and language comprehension.

>> **What cognitive and neuropsychological functions are trained by different training tasks?** Our research examines the process specificity of various training tasks using both behavioral and neuro-imaging techniques.

>> **Does cognitive training lead to long-term gains in academic performance?** Our research examines the long-term efficacy of cognitive training for improving academic performance in the classroom.

## Implications

✓ Improve quantitative reasoning and language comprehension

✓ Improve academic performance and reduce achievement gaps

✓ Increase effectiveness of language professionals

✓ Address cognitive deficiencies in clinical populations

✓ Reduce and eliminate age-related declines in memory and cognition

**FOR MORE INFORMATION**

**Michael Dougherty, PhD**
Associate Professor of Psychology
University of Maryland
(301) 405-8423
mdougherty@psyc.umd.edu
www.bsos.umd.edu/psyc

**Research Team**

Sharona M. Atkins, MA, Graduate Research Assistant, Department of Psychology

Michael F. Bunting, PhD, Assistant Research Scientist, University of Maryland Center for Advanced Study of Language

Thomas Carlson, PhD, Assistant Professor, Department of Psychology

Michael R. Dougherty, PhD, Associate Professor, Department of Psychology

Paul J. Hanges, PhD, Professor, Department of Psychology

J. Isaiah Harbison, PhD, Assistant Research Scientist, University of Maryland Center for Advanced Study of Language

Erika Hussey, Graduate Research Assistant, Department of Psychology

Jared M. Novick, PhD, Assistant Research Scientist, University of Maryland Center for Advanced Study of Language

Jonathan Simon, PhD, Associate Professor, Department of Electrical and Computer Engineering and Department of Biology

Susan Teubner-Rhodes, Graduate Research Assistant, Department of Psychology

Department of
Psychology
UNIVERSITY OF MARYLAND