Training & Transfer Effects Using a Complex Span Working Memory Task
Alexandra Morrison, Jason Chein, Shannon Fitzhugh, Nora Newcombe, Ingrid Olson, & Thomas Shipley
Temple University, Department of Psychology

Background & Motivation
- Can WM capacity be improved through training with a complex WM span task?
  - Prior work indicates that WM improves with repetitive practice
  - Present study uses a more widely investigated WM measure – complex WM span – as the training task
- Do the benefits of WM training transfer to other cognitive skills?
  - Prior studies have shown transfer through working memory training (e.g., Gf, Stroop, N-back)
  - Explore transfer in a more extensive battery of cognitive tests
- Current training targets domain-general WM mechanisms to promote broader transfer

Study Overview
- Experiment 1 - verbal and spatial WM training versus untrained control
- Experiment 2 - verbal WM Training, verbal STM training, & spatial visualization training

Experiment 1 - Training
- Participants (n=20) trained for 4 weeks, completing a total of 20 daily training sessions (~ 30 min. each)
- Difficulty (n) adjusted according to performance

Experiment 1 - Results
- Practice Effects
  - Average Change in WM Span
- Transfer Effects
  - Average Reduction in the Stroop Effect
  - Average Change in Reading Comprehension

Experiment 2 - Design
- WM training produced the highest level of transfer
- Which subjects show the greatest degree of transfer following WM training?
- Identified subjects as “High WM span” and “Low WM span” groups based on a median split of composite WM score from 1st cognitive assessment

Who Benefits?
- WM training results in significant WM capacity increases
- WM training leads to improvements in other cognitive abilities
- Transfer across domains (verbal to spatial)
- Transfer to non-WM tasks
- Implicates a domain-general mechanism
- High span individuals seem to capitalize on transfer benefits training
- May indicate differential strategy engagement during training

Experiment 2 - Aims
- Replicate/Extend findings from Experiment 1
- Contrast WM and STM training in the verbal domain
- Include active control group
- Examine influence of WM training on Spatial Intelligence
  - Collaboration with the Spatial Intelligence and Learning Center (SILC)
  - Contrast WM training and spatial visualization training (Sorby workbook, 2008)
- Who Benefits?
  - WM training leads to transfer following WM training?

Experiment 2 - Training
- WM training improves with repetitive practice
- Identifying subjects as “High WM span” and “Low WM span” groups based on a median split of composite WM score from 1st cognitive assessment

Conclusions
- Training in an adaptive complex WM span task results in significant WM capacity increases
- WM training leads to improvements in other cognitive abilities
- Transfer across domains (verbal to spatial)
- Transfer to non-WM tasks
- Implicates a domain-general mechanism
- High span individuals seem to capitalize on transfer benefits training
- May indicate differential strategy engagement during training

References