Examination of the effects of working memory training on working memory capacity and transfer to fluid intelligence

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Working Memory Training
- Working Memory
- WM training: improve working memory capacity (WMC)
- Klingberg: application to ADHD
- Neurological changes

Fluid Intelligence & WM
- Correlation between performance on WM tasks and fluid intelligence tests
- Fluid intelligence task: Raven’s progressive matrices

Jaeggi, Buschkuehl, Jonides, Perrig (2008)
- WM training: N-back task for 8, 12, 17, or 19 sessions
- WMC transfer to improved fluid intelligence on BOMAT

Research Questions
- Can working memory capacity (WMC) be improved with training?
- How long will training effects last?
- If WMC is improved, will it transfer to improvement on tests of fluid intelligence?

Methodology
Training (N=15)
- Day 1: Pretest
- Day 2-11: 10 days training
- Day 12: Post-test1
- Day 26: Post-test2

Control (N=15)
- Day 1: Pretest
- Day 2-11: nothing
- Day 12: Post-test1
- Day 26: Post-test2

Pre-test: Baseline WM task; Digit Span; Raven’s progressive matrices
Training: WM training task
Post-test1: Baseline WM task; Digit Span; Raven’s progressive matrices
Post-test2: Baseline WM task; Digit Span; Raven’s progressive matrices
Repetition-Detection Baseline Task

- Task: “Find the repeat” in series of 12 stimuli
  - Press spacebar to see each stimulus
  - “Click” answer at end of trial
- Difficulty varied across trials:
  - Lag = distance between repeated stimuli
  - Random order of Lags 1 - 7
- 140 trials with feedback on performance
  - Participants given 5 breaks
- Measured accuracy and processing time
  - Only accuracy examined in analyses

WM training: Lag programs

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<th>Lag program</th>
<th>Stimuli</th>
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Start program: based on baseline performance
Criteria to advance: 88% overall accuracy

Research Questions

- Can working memory capacity (WMC) be improved with training?
  - Examine changes in baseline task performance from pre-test to post-test1
- How long will training effects last?
  - Examine changes in baseline task performance from post-test1 to post-test2
- If WMC is improved, will it transfer to improvement on tests of fluid intelligence?
  - Examine changes in Raven’s test performance from pre-test to post-test1 to post-test2

Performance on repetition-detection baseline task

Performance on Raven’s progressive matrices
**Summary of Results**

- Training group’s WMC (baseline task performance) improved from pre-test to 1st post-test.
- Training group’s improvement maintained from 1st to 2nd post-test (2 weeks).
- Control group’s performance was unchanged from across all sessions.
- Improvement of WMC did not transfer to improvement on Raven’s Progressive Matrices.

**Importance of Research & Future Directions**

- WMC is related to fluid intelligence, however, no transfer effect was found – why?
- Effect may be task-specific.
  - Use of simplistic versus complex WM task for training.
- Future studies:
  - Use different WM tasks.
  - Use different fluid intelligence task.
  - Examine other populations: older adults.

**Implications of WM Training**

- Potential to improve quality of life for individuals with Alzheimer’s disease.
- WM Training: use in nursing homes.

**We would like to thank our Advisor, Dr. Bopp and our participants!**