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Improving Memory Through N-back Training

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Introduction

❑ Jaeggi and colleagues (Jaeggi, Buschkuehl, Jonides, & Perrig, 2008; Jaeggi, Buschkuehl, Jonides, & Shah, 2011) have claimed that fluid intelligence (Gf) may be improved through a cognitive training regime utilising the *n*-back task. They have maintained that the improvement in Gf is realised through melioration in working memory (WM). To date there has been no evidence to support this assertion, however Jaeggi et al. (2008) obtained a significant improvement in short term memory (STM).

❑ The current study examined the *near transfer* mechanisms of the single *n*-back task; specifically STM span and attention, short term auditory memory span and divided attention, and WM as operationalised through the Woodcock-Johnson III: Tests of cognitive abilities (WJ-III).

Introduction

❑ The **Single *n*-back task** is a memory task requiring the participant to remember where a visuospatial stimulus was presented *n* iterations previously. The stimulus is a blue square that randomly accommodates one of eight positions on a black background for a period of 500ms, followed by a 2500ms inter-stimulus interval.

The constructs of interest were:

❑ **STM**, a simple finite capacity temporary storage facility, where information is consciously held for up to 30 seconds.

❑ **WM**, a limited capacity cognitive system allowing for the temporary storage and manipulation of information for complex tasks such as comprehension, learning and reasoning.

Hypothesis

Consistent with the findings of Jaeggi et al. (2008) and mirroring the process of Jaeggi et al. (2011), it was hypothesised that single n-back training would:

❑ result in a significant difference between pre- and post-training STM scores.

❑ cause a significant difference between pre- and post-training WM scores, given the close relationship between STM and WM within the Carroll Horn Cattell framework.

Research Design

Forty seven participants (30 female & 17 male, ages 17 to 68 years) were divided into experimental and control groups and each subjected to different training regimes, comprising 20- daily, 20-minute sessions over a 30-day period. The experimental group trained on the single *n*-back task, whilst the active control group trained on the combined verbal tasks D*efinetime* and *Who wants to be a millionaire* (Millionaire). All groups were tested with WJ-III Tests 7 and 9 before and after the training phase, with the subsequent experimental and control groups test scores compared for performance changes.

Findings

❑ All findings were non-significant when comparing pre- and post-training scores across experimental and control group treatments for Tests 7, 9 and WM.

❑ In addition, age did not have a significant effect on Test category scores after combining experimental and active control groups at the pre-training phase; and similarly for Test gain across experimental and active control group treatments.

Conclusions

❑The constructs of WM and STM as operationalised by the WJ-III were not significantly improved by single n-back training. The WM outcome supports previous studies, however the failure to improve STM is at odds with Jaeggi (2008).

❑Furthermore, pre-training Test scores, and Test gain between pre- and post–training for the different treatment groups were found to be independent of age.

References

Jaeggi, S. M., Buschkuehl, M., Jonides, J., & Perrig, W. J. (2008). Improving fluid intelligence with training on working memory. *Proceedings of the National Academy of Sciences of the United States of America, 105*(19), 6829-6833.

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