Working Memory Training and Transfer to Gf: Evidence for Domain Specificity?

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Introduction
We were recently able to show that a 4-week long training intervention with an adaptive n-back task leads to improvements in reasoning performance in healthy young adults (Jaeggi et al., 2008, 2010). In the current study, one group of participants trained on a dual n-back task (visuospatial and verbal material), whereas another group trained on a single n-back task (verbal material only). We investigated the extent of transfer in that we used multiple fluid intelligence (Gf) measures tasks which we combined into latent variables in an n-back task (verbal material only). We investigated the extent of transfer in that we used intelligence to test whether those factors might mediate training or transfer.

Method
Participants: We had 209 participants signing up for the study. 175 of those volunteered for participation in a “Brain Training Study” and did not receive any payment or course credit. 37 participants (21%) withdrew from participation after having completed one or two pre-test sessions (i.e., they never trained). 60 participants (34%) dropped out at some point during training, after having trained for 8.43 sessions on average (SD: 6.27; range: 1-20). The final group of participants which completed pre- and post-testing, as well as a minimum amount of 15 training sessions consisted of 78 participants (mean age: 25.21, SD: 6.46; range: 18-45; 36 women). Finally, 34 participants (mean age: 22.79; SD; 6.11; range: 18-44; 17 women) were recruited to take part in two paid baseline measurement sessions.

Procedure

Questionnaires: Beliefs in Intelligence, Need for Cognition, Cognitive Failure Questionnaire

Transfer Measures:
- Matrices Tasks (untimed): APM, BOMAT, CFT, Form Board, Space Relations
- Visual Tasks (timed): Reading Comprehension, Reading Analogies
- Verbal Tasks (timed): Verbal Analogies, Verbal Comprehension
- Speed (timed): High Symbol Test

Results

Pre-Existing Individual Differences - Who signs up for training and sticks to it?

Transfer – Latent Variables

Visuospatial Reasoning Factor
Verbal Reasoning Factor
Reading Comprehension
Surface Development
BOMAT
APM
DST

Note: DST did not load on either factor.

References

Conclusion
The current study is promising in that we observed transfer in a latent variable of Gf, providing evidence for broader generalization effects than we have demonstrated in our previous studies. Interestingly, the processes underlying n-back training seem to be domain free in that training on a verbal n-back task results in transfer on measures of visuospatial reasoning. On the other hand, the transfer effects seem to be restricted to the visuospatial domain, however, reliability issues in the verbal tasks might have prevented any transfer to occur. Finally, there seem to be important boundary conditions, one of which is related to intrinsic motivation to sign up for such a study, but also to stick with the intervention, and further, individual differences such as pre-existing ability, need for cognition, and beliefs in intelligence: all of which need to be considered in order get to a better understanding of why it is that some studies result in transfer to Gf, whereas others do not.

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