The Influence of Guided Mindfulness-Meditation on Attentional Efficiencies

A. Luke Sackett

Introduction:

What is attention?

Attention can be defined as the mental process of selectively concentrating on a discrete stimulus, or a specific piece of perceived information, while ignoring other perceivable information.

Introduction:

The Components of Attention:

- Attention has *three* main components:

(1) Alerting: the ability to achieve and maintain a state of high sensitivity to sensory information.
(2) Orienting: the ability to select discrete sensory information
(3) Executive Control: the mechanism involved in resolving conflict within incoming sensory information

Introduction:

Default-Mode Network:

- a network of brain areas that support self-referential processing which correlates heavily with the state of mind-wandering

Introduction:

What is Meditation?

- a practice where an individual uses a technique – such as *mindfulness*, or focusing the mind on a particular object, thought or activity – to train attention and awareness, and achieve a mentally clear and emotionally calm and stable state.

Hypothesis:

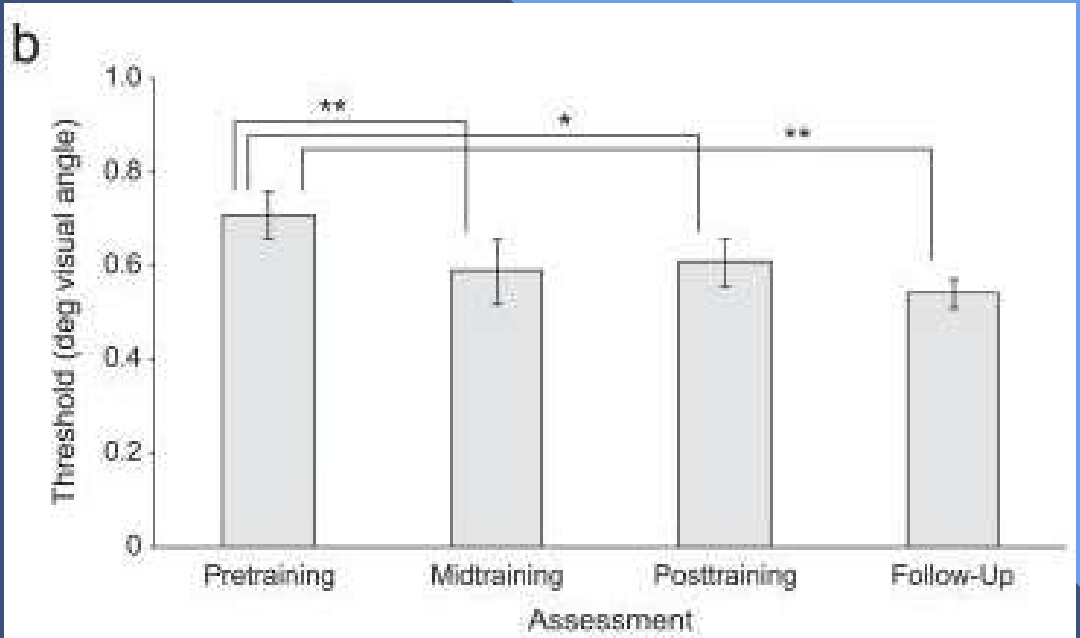
If High School student participants engage in ten classes of guided Mindfulness-Meditation training throughout two weeks, their ability to use the three components of attention will improve.

Literature Review:

Meditation training can improve aspects of attention and it is specifically suggested that an enhanced sustained-attention ability can be linked to long-term meditation practice.

Maclean, K. A., Ferrer, E., Aichele, S. R., Bridwell, D. A., Zanesco, A. P., Jacobs, T. L., . . . Saron, C. D. (2010). Intensive Meditation Training Improves Perceptual Discrimination and Sustained Attention. Psychological Science, 21(6), 829-839. doi:10.1177/0956797610371339

Literature Review:



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Literature Review:

Regular meditation resulted in less activation of the posterior-cingulate cortex, as well as the superior, middle and medial-temporal gyri and uncus which all constitute the default-mode network.

Brewer, J. A., Worhunsky, P. D., Gray, J. R., Tang, Y., Weber, J., & Kober, H. (2011). Meditation experience is associated with differences in default mode network activity and connectivity. Proceedings of the National Academy of Sciences, 108(50), 20254-20259. doi:10.1073/pnas.1112029108

Literature Review:

Relative to the control group, mindfulness training led to less probe-caught mind wandering, self-caught mind wandering and retrospectively self-reported mind wandering during testing.

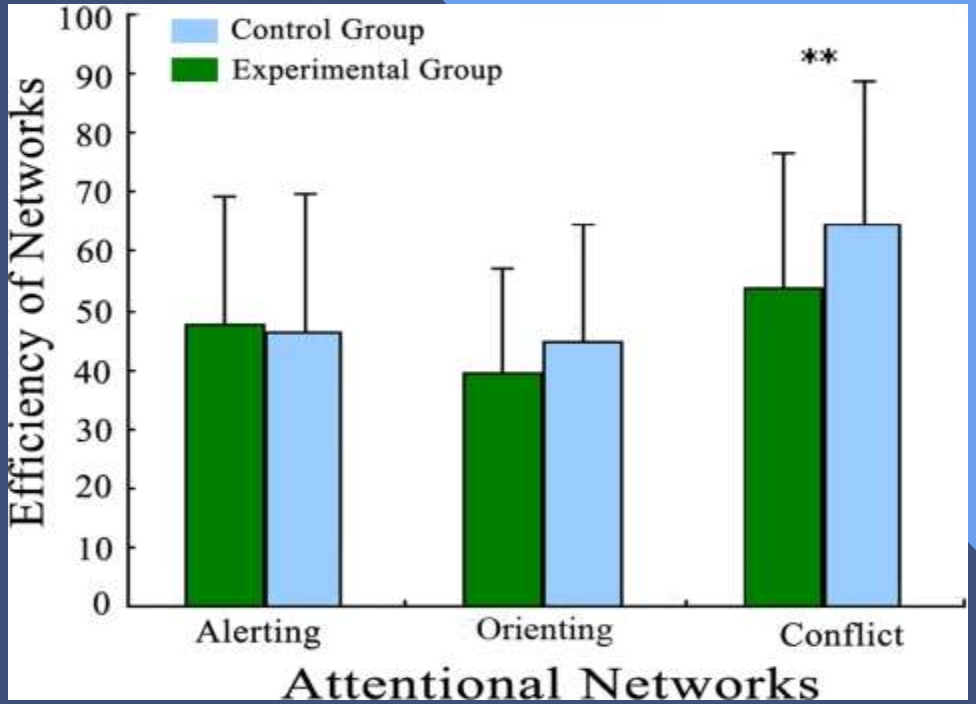
Mrazek, M. D., Franklin, M. S., Phillips, D. T., Baird, B., & Schooler, J. W. (2013). Mindfulness Training Improves Working Memory Capacity and GRE Performance While Reducing Mind Wandering. Psychological Science, 24(5), 776–781. doi: 10.1177/0956797612459659

Literature Review:

The experimental-group session interaction was significant for the executive network, indicating that the before vs. after difference in the conflict resolution score was significant only for the trained group.

Tang, Y. Y. (2014). Short-Term Meditation Intervention Improves Self-Regulation and Academic Performance. Journal of Child and Adolescent Behaviour, 02(04). doi: 10.4172/2375-4494.1000154

Literature Review:



Tang, Y. Y. (2014). Short-Term Meditation Intervention Improves Self-Regulation and Academic Performance. Journal of Child and Adolescent Behaviour, 02(04). doi: 10.4172/2375-4494.1000154

Methodology:

Materials:

- Computers
- A Quiet Space
- A Place to Sit
- Attentional Network Test (ANT)
- Guided-Meditation archive: Declutter the Mind

Methodology:

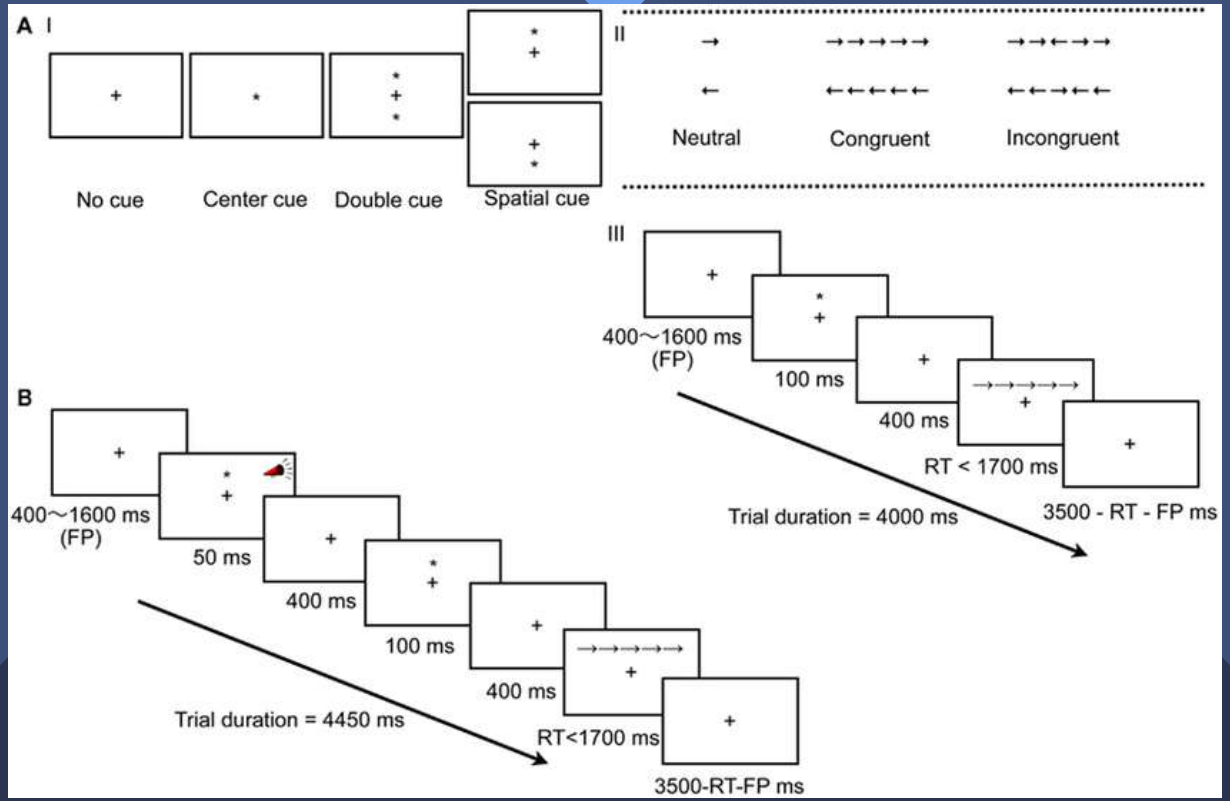
- Participants underwent two-weeks of Mindfulness-Meditation training instruction through pre-recorded guided meditation.
- There were ten twenty-minute sessions throughout these two weeks.
- Weekends were not included in the study.

Methodology:

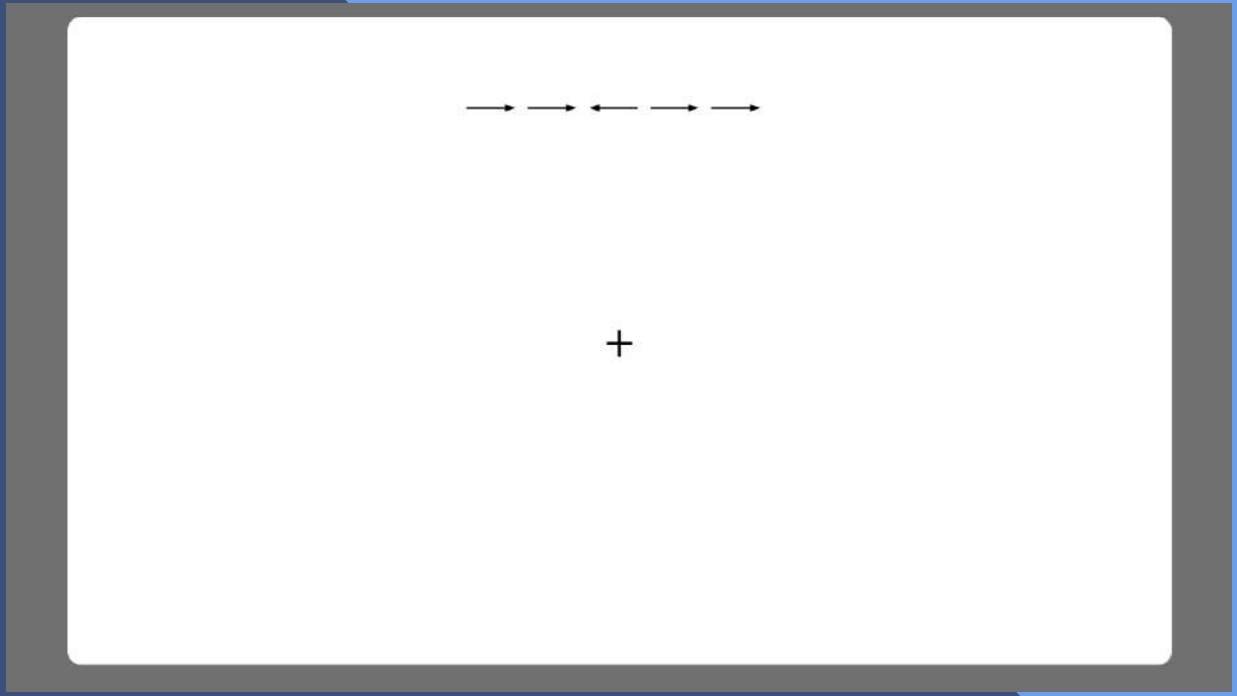
- Participants will be measured using the Attentional Network Test (ANT) which measures Alerting, Orienting and Executive Control.

  During the test, three things happen:
- 1. A cue is shown (*)
- 2.Five arrows (or one arrow) are presented at either the Top or the Bottom of the computer screen (<<<<<) or (>>>>>) or (>><>>) or (<<><<) or (>) or (<)
- 3. Subjects are required to indicate the direction of the central arrow of the five.

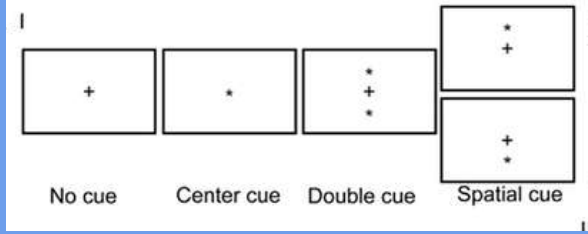
Methodology:



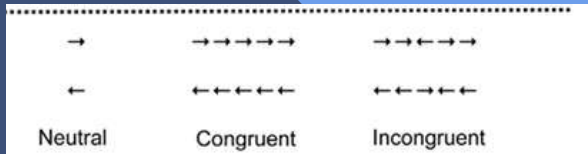
Methodology:



Methodology:



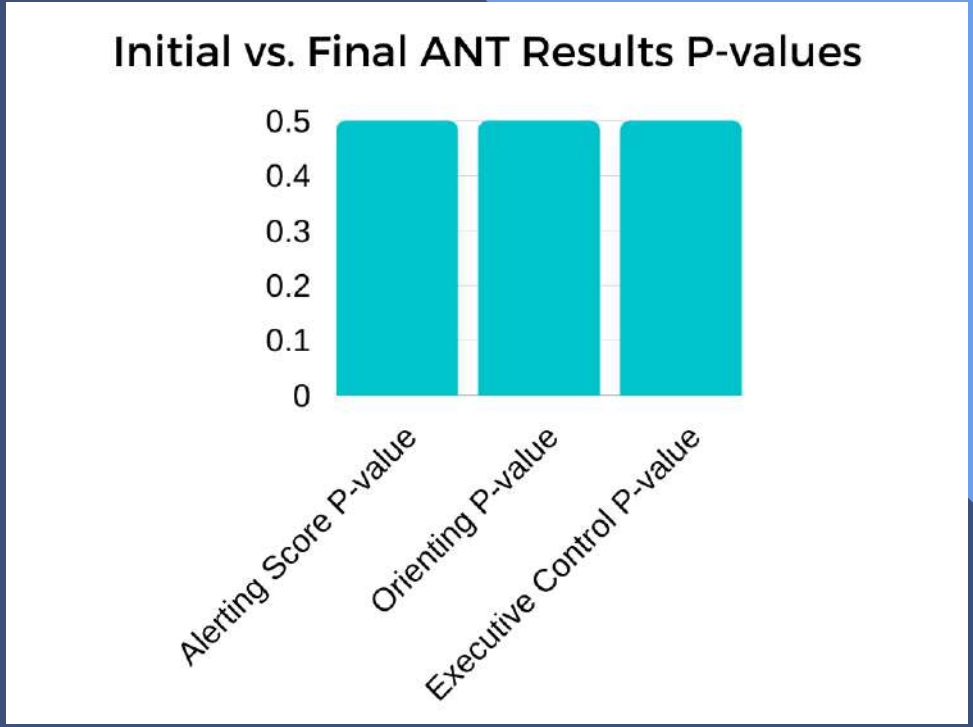
- Each network is assessed via reaction times (rts).
- Alerting: the difference of mean rts with Double Cue conditions and No Cue conditions
- Orienting: the difference of mean rts with Spatial Cue conditions and Center Cue conditions
- Executive control (conflict resolution): the difference of mean rts with Congruent conditions from Incongruent conditions.



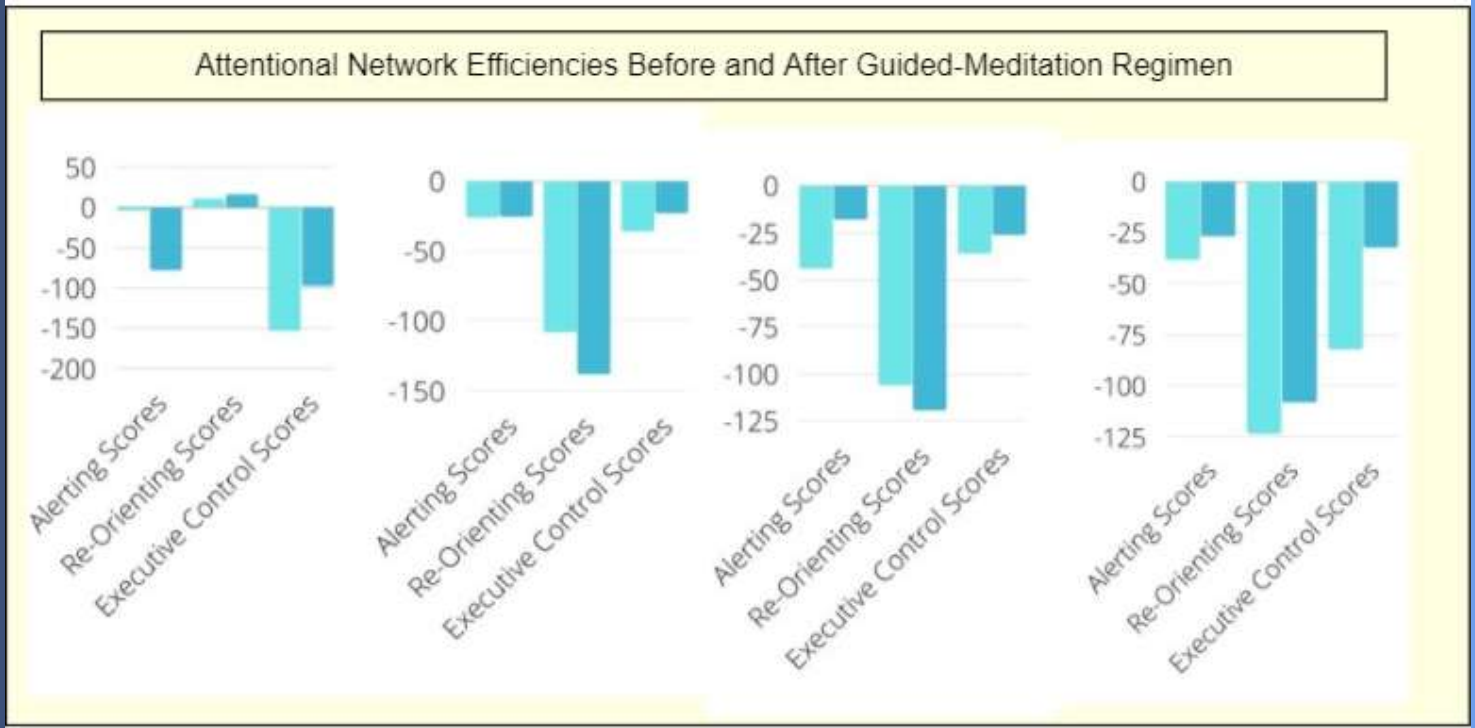
Results

I found no statistically significant differences in efficiency scores after guided-meditation practice in contrast with their initial results prior to the regimen.

Results


Initial vs. Final ANT Results P-values
0.5
0.4
0.3
0.2
0.1
0
Alerting Score P-value
Orienting P-value
Executive Control P-value

Discussion


Attentional Network Efficiencies Before and After Guided-Meditation Regimen
50
0
-50
-100
-150
-200
Alerting Scores
Re-Orienting Scores
Executive Control Scores
0
-50
-100
-150
Alerting Scores
Re-Orienting Scores
Executive Control Scores
0
-25
-50
-75
-100
-125
Alerting Scores
Re-Orienting Scores
Executive Control Scores
0
-25
-50
-75
-100
-125
Alerting Scores
Re-Orienting Scores
Executive Control Scores

Conclusion

There was no statistical significance towards the hypothesis that a short-term guided mindfulness-meditation influences network efficiencies in a manner where scores improve.

Future Plans:

- Lengthened meditation-training periods could be used to decrease variability
- Larger sample-sizes could be used to decrease variability
- More intense guided-meditation regimens could also be used