

Awe Facilitates Focused Attention at Midlife

Case Study

Julie Hicks Patrick¹

¹West Virginia University, Morgantown WV, USA

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Abstract

Introduction: Although research demonstrates that emotion influences cognitive processing, most investigations have relied on college student samples and focused on happiness over other emotions.

Methods: Three non-college student adults completed a flanker task assessing focused attention before and after viewing an awe-inducing video. Measures of reaction time were derived for each person.

Results: Differential benefits of awe were observed across the differently aged adults. The middle-aged adult, whose initial performance was the slowest, improved the most (19%) relative to the 13% improvement by the younger adults and the stable performance for the emerging adult.

Conclusions: Unlike other positive emotions that may broaden cognition, awe may help adults to focus their attention. These results suggest an avenue to support adults with attention-related deficits.

Key Words: Emotion, cognition, aging

Corresponding author: Julie Hicks Patrick, Julie.Patrick@mail.wvu.edu

Introduction

Positive emotions, often operationalized as joy or happiness, facilitate a broadening of attention in the moment. Over repeated exposures, this may strengthen resources and improve cognitive, physical, and emotional outcomes in what Fredrickson refers to as a broaden-and-build fashion⁶. However, the connection between emotion and cognition is variable⁸ such that some positive emotions may focus attention, rather than broaden it. We propose that awe, that feeling of being small in the presence of something grand¹, warrants more empirical attention. Stimuli shown to induce feelings of awe include those related to nature, great art and architecture^{1,2}.

Although related to positive emotions like joy and happiness, awe is distinct from such general positive affect⁴. Research with college students, MTurk workers and tourists support the idea that unlike joy, awe narrows one's social perceptions^{2,12} and increases the expansiveness of time perspective and emotional well-being¹⁰. Dispositional awe has been linked to better physical health via lower proinflammatory cytokines¹³. There is support for the idea that awe also influences cognitive performance⁷, although the work in cognition is more limited than that

with physical and emotional outcomes.

Finally, it is unclear whether awe operates in the same way across the adult life span. Substantial evidence demonstrates that middle-aged and older adults approach positive and negative emotional stimuli differently, with age strongly correlated with more positive affect⁶. However, because it is relatively new to empirical investigations, few studies have examined age differences in awe. Due to its potential to help adults focus attention⁷, it is likely that exposure to awe-

inducing stimuli would improve performance on a focused-attention task. Moreover, middle-aged adults, who often experience challenges with speeded and focused attention tasks¹¹, could potentially benefit more than emerging and younger adults.

Scientific Methods

Participants

Data from three adult volunteers (nonbinary age 24 years, male age 32 years, female age 54 years) are included. Institutional review board acknowledgement of the study is on file and participants provided informed consent.

Protocol

Each adult individually completed a baseline flanker task, watched an awe-inducing video, and completed a post-video flanker test. The flanker task is available from the NIH Toolbox⁹. In this task, adults are shown various arrays of arrows and are asked to indicate whether the center arrow is pointing in the same direction (congruent) or the opposite direction (incongruent) from the set of arrows which surround or flank it, as shown in Figure 1 below. Measures are derived for reaction time in milliseconds, thus, lower times indicate a faster speed. The incongruent condition is considered to be more challenging, and thus, one would expect longer reaction times than in the congruent condition.

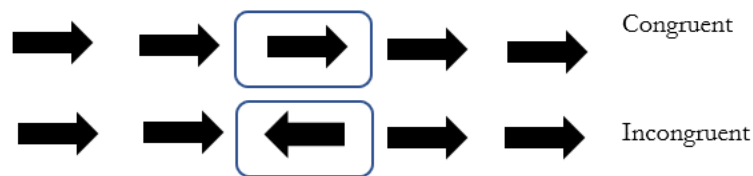


Figure 1. Example of a flanker task array

The awe-inducing video was pilot tested in a previous lab study and featured a 2.5-minute view of earth from the international space station (<https://www.youtube.com/watch?v=FG0fTKAqZ5g>) viewed without sound. Results from 140 adults in a prior validation study yielded a mean awe rating of 6.05 on a 7-point scale⁵.

Statistical Analysis

Guided by best practices in single subject experimental design³, the data were plotted (see Figure 2) and visually inspected. Baseline congruent and incongruent RTs were plotted for each adult, as were the RTs for post-awe congruent and incongruent stimuli. In addition, an index of percent improvement under the awe condition was calculated for both congruent and incongruent stimuli by subtracting the RT in the post-awe condition from its baseline counterpart and dividing that sum by the baseline RT.

Results

The RTs for each person in each condition are presented in Table 1, with Figure 2 graphically displaying these data. Inspection of the RTs across the three participants' columns generally shows the expected age difference, with the emerging adult being much faster than the middle-aged adult, and the younger adult generally falling between those two extremes. By reading across rows one and two in Table 1, all three adults were faster with the baseline congruent

Table 1. Mean Reaction Time (RT) in across Conditions.

	Emerging Adult (n = 1)	Younger Adult (n = 1)	Middle-aged Adult (n = 1)
Baseline Congruent	333.36	405.54	505.49
Baseline Incongruent	382.94	540.37	547.26
Awe Congruent	356.45	410.75	429.64
Awe Incongruent	394.93	479.00	442.34

Data are Means in ms

*Significantly greater than untrained and trained participants, $p = 0.004$

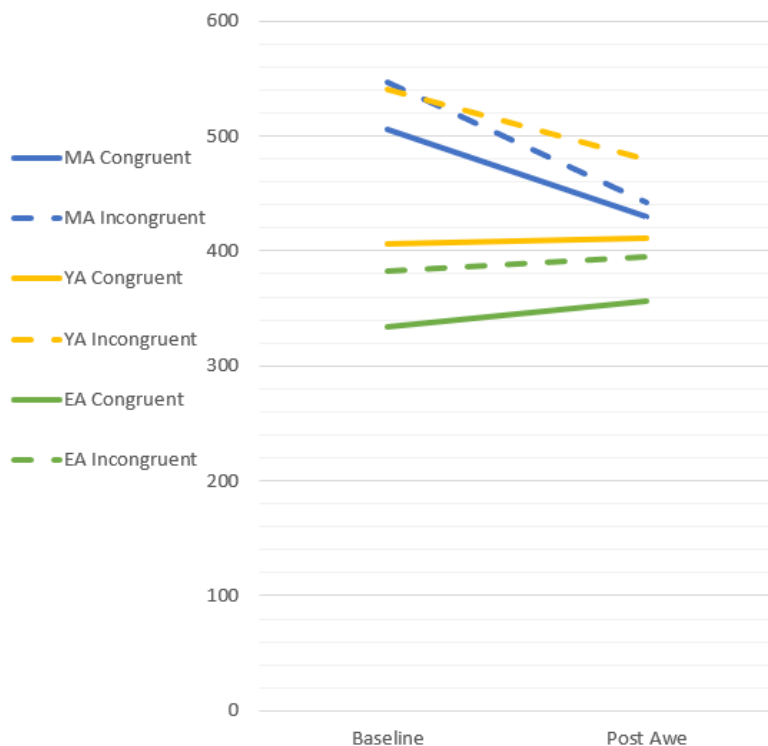


Figure 2. Differences in RT as a function of condition and stimuli

stimuli than with the incongruent stimuli at baseline, consistent with expectations. Similarly, the RT differences after the awe video favors a faster RT with the congruent stimuli than incongruent. More importantly however, as shown in Figure 2, adults were faster in the post-awe condition than in the baseline condition. Figure 3 shows the expected result that the middle-aged person, whose RT was consistently the slowest, exhibited the largest post-awe improvement in speed for both congruent and incongruent trials.

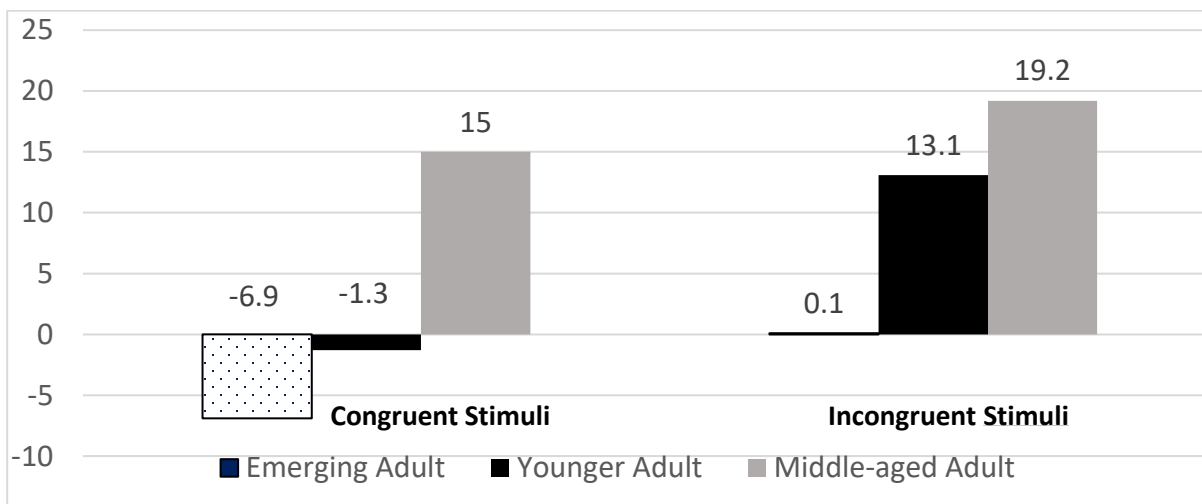


Figure 3. Percent Improvement in RT post-Awe



Discussion

Based on prior work with focused attention and awe⁷, it was expected that all three adults would demonstrate the flanker effect in which their performance was slower in the incongruent condition. Moreover, based on the intersections of aging research, affective science, and focused attention^{6,7}, differences between congruent and incongruent conditions were expected to be especially pronounced for the middle-aged adult. For these hypotheses, the current results are encouraging. Across the three adults, RT in congruent conditions were faster than in incongruent conditions, as expected. For the post-awe RTs, the emerging adult continued to perform at or near their ceiling, but the younger adult and middle-aged adult demonstrated improvements under the post-awe condition, as hypothesized. In contrast to work by Stellar and colleagues¹², these results suggest that awe may facilitate focus rather than broaden awareness. Moreover, this effect may be stronger for those whose speeded focused attention performance is weakened due to aging, anxiety or other factors that may reduce focused attention.

Conclusions

As more studies examine Fredrickson's broaden and build approach⁶, it is important to include a range of outcomes and positive emotions. The current work suggests that contrary to the broadening effects of joy and happiness reported in the literature¹, awe may help individuals to focus their attention in a way that facilitates speeded performance. Thus, interventions using awe may help adults to improve performance in speeded or focused attention tasks. Examining the effects of a variety of specific discrete emotions may help to advance several areas of psychology and behavioral sciences^{4,13}.

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