University of Utah
UNDERGRADUATE RESEARCH JOURNAL

ASSESSMENT OF NATURE IMAGERY'S INFLUENCE ON ATTENTION RESTORATION

Lensky Augustin, Nicole Hoffmann, Sara LoTemplio, Amy McDonnell, & David Strayer, PhD
Applied Cognition Lab

Introduction

In modern society, people are spending less time in nature and more time indoors making immersion in nature increasingly rare. Approximately a total of 56% of Americans spend about 5 hours or less a week immersed in nature (Kellert et al., 2017). Moreover, for children aged 6 to 12, participation in weekly outdoor activities has declined by 37% from 1997 to 2003 (Hofferth, 2009). Since the 1950s, urban populations around the world have steadily increased and are projected to continue (Pelletier et al., 2019). With an increase in urban populations, people experience increased barriers to access to nature either due to long commutes to immerse in nature or increased demand in productivity from work or school.

Kaplan's Attention Restoration Theory (ART) posits that nature can restore cognitive resources that are depleted in everyday, urban environments. One way to examine whether cognitive resources are restored by exposure to nature is by using electroencephalography (EEG) to quantify the error-related negativity (ERN), which is a component of the event-related potential (ERP) related to cognitive control ability. An increase in ERN amplitude is indicative of an increase in cognitive control ability as found in previous research that examined the link between immersion in nature and ART where an increase in ERN amplitude occurred when immersed in nature (LoTemplio et al., 2020). Because access to natural environments is becoming increasingly more difficult, the present study sought to expand upon this finding by examining whether nature imagery provides a proper enough "dose" of nature to similarly increase the amplitude of the ERN. Based on previous research that has found changes in attentional capacity in response to viewing images of nature (Hartmann et al., 2013), we hypothesized that nature imagery would display similar findings to nature immersion and that we would see an increase in ERN amplitude after viewing nature imagery.

Method

Participants

We recruited participants through flyers posted around the greater Salt Lake City area and through the Department of Psychology's SONA participant pool. The present study included a total of 7 participants (5 females, 2 males, M = 26.3 years of age). Participants were between the ages 18-40 and were compensated either $70 or course credit for participating.

Materials

EEG data were collected with a 7-electrode, gel-based BIOPAC EEG system to measure brain activity during the Flanker task. The Flanker Task was programmed in E-Prime. All EEG data were processed in MatLab and statistical analyses were conducted in R.

The Eriksen Flanker Task is widely accepted as a reliable assessment of visual selective attention and executive control, and most importantly, the task reliably elicits the ERN. In this task, participants focus on a central target while irrelevant stimuli are presented around it. The surrounding stimuli can either be "congruent" with the central target (i.e. SSSSS, HHHHH) or "incongruent" with the central target (i.e. SSHSS, HHSHH).

Procedure

Participants came into the lab for three, two-hour EEG testing sessions over the course of three weeks. During all three sessions, participants sat in a weatherproof pod outside the Behavioral Sciences building at the University of Utah. Before each experimental session, participants completed a series of subjective questionnaires related to their mood, stress, and amount of exercise, included as part of a separate study. At Sessions 1 and 3, participants stared at a wall for 10 minutes prior to completing the Flanker Task. At Session 2, participants viewed 10 minutes of nature imagery prior to the Flanker Task. After each session was complete, participants filled out a post-task attention survey to ensure that they had remained engaged in the Flanker Task.

Results

Results from the linear mixed effects model indicated that nature imagery did not significantly influence the ERN amplitude ($\chi^2(2)=2.98$, $p=0.225$). Compared to previous research, nature imagery did not elicit a similar ERN amplitude as immersion in nature did, suggesting that there may be unique characteristics of immersion in nature that influence cognitive control ability that nature imagery lacks.

References

Hartmann, P., Apaolaza, V., & Alija, P. (2013). Nature imagery in advertising. International Journal of Advertising, 32(2), 183-210. https://doi.org/10.2501/ija-32-2-183-210

Hofferth, S. L. (2009). Changes in AMERICAN children´s time - 1997 to 2003. Electronic International Journal of Time Use Research, 6(1), 26–47. https://doi.org/10.13085/eijtur.6.1.26-47

Kellert, S., Case, D., Escher, D., Witter, D., Mikels-Carrasco, J., Seng, P., (2017). The nature of Americans. DJ Case & Associates, Mishawaka, IN.

LoTemplio, S. B., Scott, E. E., McDonnell, A. S., Hopman, R. J., Castro, S. C., McNay, G. D., … & Strayer, D. L. (2020). Nature as a potential modulator of the error-related negativity: A registered report. International Journal of Psychophysiology, 156, 49-59. https://doi.org/10.1016/j.ijpsycho.2020.06.014

Pelletier, F., Bassarsky, L., Gu, D., Hertog, S., Lai, M. S., Sawyer, C., Spoorenberg, T., & Zhang, G. (2019). Urban and rural population growth and world urbanization prospects.

World Urbanization Prospects: The 2018 Revision, 9–31.
https://doi.org/10.18356/cd4eece8-en