

## Introduction

For many years cognitive psychologists have studied the effects of different conditions, stimuli, and task demands upon skills of attention, perception, memory, and higher-level functioning, yet little thought was given to *improving* performance. Recently researchers have made a concerted effort to investigate ways to improve cognition, and therefore improve performance on a wide range of tasks. The current research investigated the predicted benefits of viewing scenes of nature on the allocation of visual attention.

Berman, Jonides, and Kaplan (2008) found that performance on a cognitively demanding task significantly improved following a 50 minute walk through a leafy area compared to a walk through an urban area, and they attributed this to 'attention restoration'. The Attention Restoration Theory (ART; Kaplan, 1995, 2010) suggests that because natural environments involve more bottom-up influences on attention than top-down influences, being in such environments allows top-down processes to restore (recuperate) in preparation for the next task. In contrast, urban environments incorporate more top-down influences and so do not allow for such restoration.



Figure 2: Example of an urban scene



Figure 1: Example of a natural scene

Sandry, Schwark, Hunt, Geels, and Rice (2012) tested the ART with very brief exposure to natural scenes (1500ms); asking participants to view scenes of urban or natural environments before completing a visual search task. They found that visual search (and therefore spread of attention) was significantly better following the scenes of natural environments, revealing that restoration can occur with minimal exposure to nature.

The aim of the current study was to measure the effects of natural scenes versus urban scenes on focused attention using a change detection flicker task (e.g. Rensink, O'Regan, & Clark, 1997). The ability to spot changes in this paradigm is dependent on top-down, goal-driven attention because the motion transient associated with the change (which would capture attention bottom-up) is disrupted. A measure of self-reported emotional affect was also included in the experiment to ensure that any benefit to performance could be attributed to restoration. Frederickson (2001) outlines that positive emotions can expand attentional resources and it could be argued that viewing natural scenes/interacting with nature may increase positive feelings. As a consequence it is possible that any cognitive improvement is due to emotion rather than restoration.

## Method

- Twenty-four participants completed two blocks of trials. In each block 20 images (natural or urban; see figures 1 and 2) were presented in a random order for 5 seconds each.
- Following this 'scene viewing' stage participants completed 24 change detection trials (see figure 3). All trials were presented in a random order and consisted of 12 images with a central change and 12 with a peripheral change.
- Finally participants completed the Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegan, 1988).

Original image – 1000ms

Blank screen – 500ms

Changed image – 1000ms

Blank screen – 500ms

Response  
screen

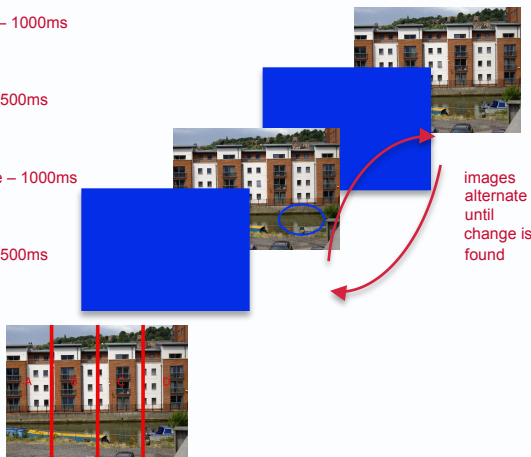


Figure 3: Trial layout in the change detection task with a peripheral change.

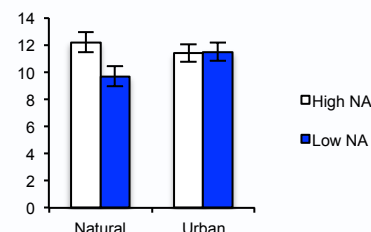
## Results and Discussion

Two 2x2 mixed measures ANOVAs were completed to investigate the effect of 'restoration' and 'emotion' on ability to detect central and peripheral changes. In each analysis participants were separated into two groups on the basis of mean positive and negative scores on the PANAS.

**Positive Affect (PA):** Participants were significantly quicker to detect central changes compared to peripheral changes (9.4 vs. 13.2;  $F(1,20) = 36.538$ ,  $p < 0.001$ ). There was a non-significant difference between the low PA group and the high PA group ( $p = 0.078$ ).

**Negative Affect (NA):** There was no significant difference between the two groups (high and low NA), however the interaction between emotion and restoration was approaching significance ( $F(1,20) = 3.677$ ,  $p = 0.070$ ). Post-hoc t-tests showed that in the natural condition low NA participants detected changes faster than high NA participants ( $t(20) = 2.385$ ,  $p = 0.027$ ), see figure 4.

Figure 4: Change detection performance following presentation of natural and urban images for participants reporting high and low negative affect.



There was a benefit to visual attention following the presentation of natural scenes, but only for participants who reported low levels of negative affect. This suggests that 1) attentional resources are restored through relatively limited (and arguably artificial) exposure to nature, and 2) this restoration is influenced by the mood of the individual. It is possible that the difficulty of the task did limit the impact of restoration, however using the change detection paradigm provides a direct test of top-down attentional resources and the ART.

## References

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