The influence of real and perceived motion on putative on- and off-cell channels in motion induced blindness

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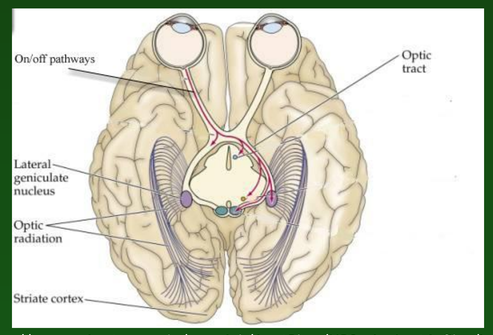
Introduction

Motion Induced Blindness (MIB) is a visual phenomenon in which stationary targerts disappear in the presence of a moving mask. Studies have shown that MIB seems to be located in the extrastriate area V5 (Schölvinck & Rees, 2010). The on and off retinal ganglion cells form two distinct pathways that code for increments and decrements of light respectively. These pathways remain separate until they converge at the lateral geniculate nucleus (Westheimer, 2007). The previous experiment, "The Role of Putative On- and Off-Cell Channels in Motion Induced Blindness", showed a distinct difference between the two pathways. We sought to replicate these results and investigate the effect of real and perceived motion on the differences.

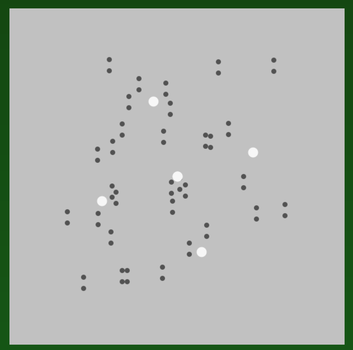


http://www.rci.rutgers.edu/~uzwiak/AnatPhys/NPSpringLect4_files/image022.jpg

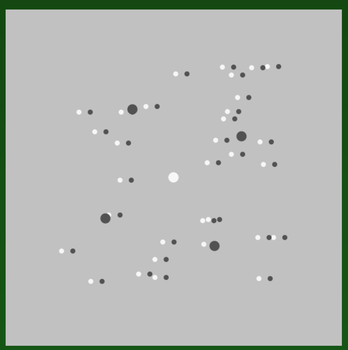
Methods

Subjects ran 10 sessions. Each session contained 4 trials of each of the 50 conditions, for a total of 200 trials per session. The stimuli were viewed on a 15inch MacBook Pro running OSX version 10.9.2. Subjects were placed on a chin rest three feet away from the computer screen. The computer screen was secured at a 90 degree angle from the subjects' eyes to insure equal luminance across all trials.

Three different types of masks, each with differing motion energy, were used. A sequential Glass Pattern, which was used in the previous experiment, contains real motion energy. A dynamic Glass Pattern, which contains no motion energy. Also, anti-Glass Patterns, which have motion energy by tapping into the on/off cell pathway.



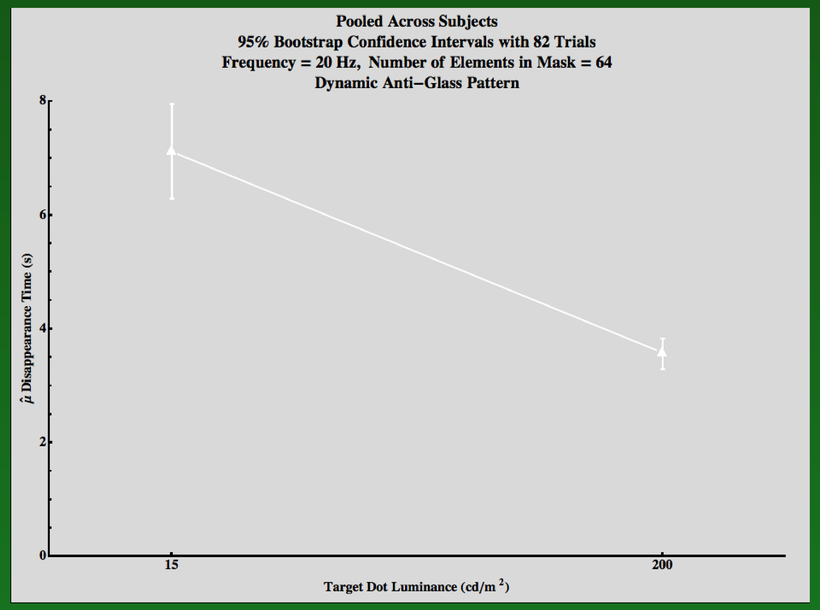
Dynamic Glass Pattern

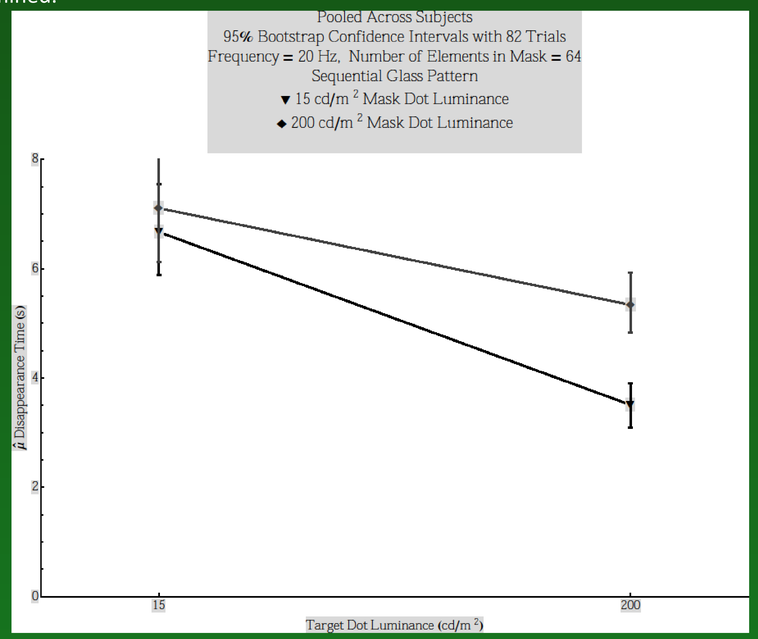


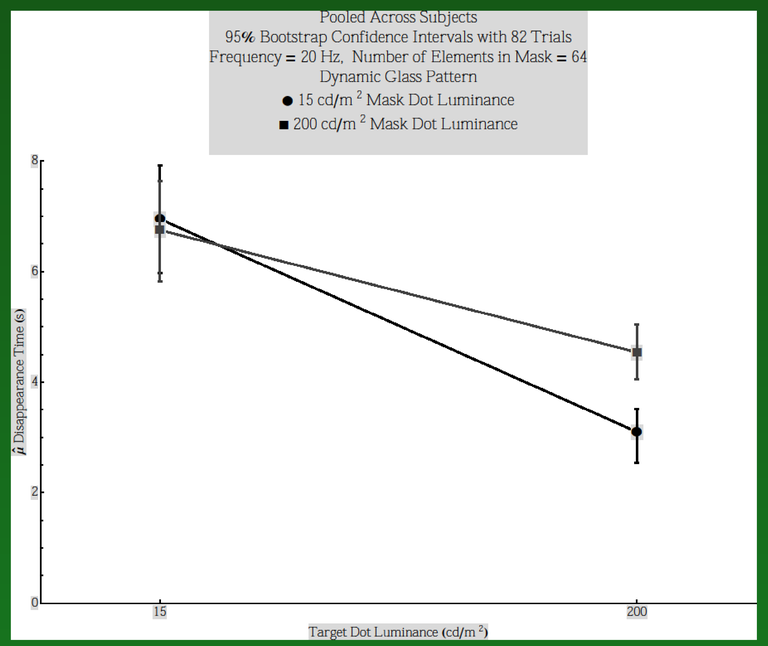
Anti-Glass Pattern

Results

Data was pooled across samples and the probability of perceived disappearance was determined.







Discussion

Major findings:

- Regardless of the amount of motion energy within the mask, black targets were still more difficult to mask than white targets.
- The white mask was most effective during the white target condition
- Thus, it seems that the differences between the pathways observed in the initial experiment are not caused by differences in types of motion
- The on and off-cell pathways do retain differences past LGN that are not affected by motion in an MIB setting

References

- Schölvinck, M., & Rees, G. (2010). Neural Correlates of Motion-induced Blindness in the Human Brain. Journal of Cognitive Neuroscience, 6, 1235-1243.
- Westheimer, G. (2007). The ON–OFF dichotomy in visual processing: From receptors to perception. Progress In Retinal And Eye Research, 26, 636-648.