Saccadic adaptation changes perception of the saccade target object

Jessica Parker, Madeline Embrey, A. Caglar Tas

The University of Tennessee, Department of Psychology

Introduction

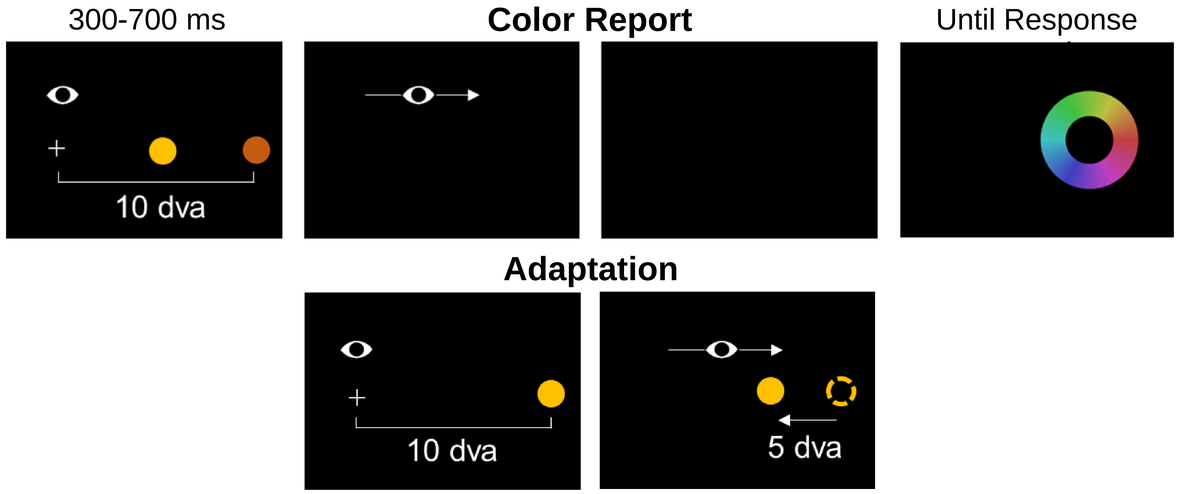
Previous work found that saccadic adaptation results in a corresponding shift of pre-saccadic attention to the adapted location,[1] and this shift of attention alters the perception of objects at the non-adapted locations.[2]

Research Question:

Does saccadic adaptation alter perception of color at the non-adapted location?

If presaccadic attention is shifted to the adapted location, then the color information at the adapted location should affect perception at the non-adapted location by shifting the distribution of responses or increasing the probability of incorrectly reporting the color at the adapted location.

Method

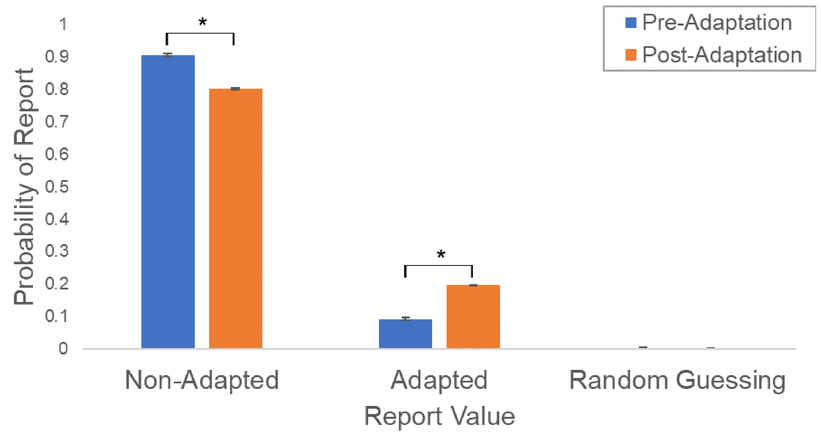


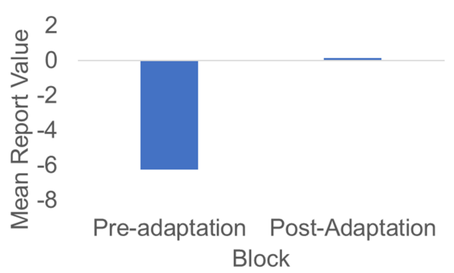
Block 1 (Pre-Adaptation Block): Color Report only (60 trials)
Block 2: Adaptation (200 trials)
Block 3 (Post-Adaptation Block): Mixed block (two Adaptation trials were followed by one Color Report trial, 288 trials)

Analyses

Subjects' response distributions were fitted with a probabilistic mixture model using MATLAB Memtoolbox[3] to calculate the probabilities of reporting the color at the non-adapted location and the adapted location.

Results





Pre-Adaptation mean: -6.25
Post-Adaptation mean: 0.15

- The probability of reporting the non-adapted location color value was higher in the pre-adaptation than in the post-adaptation block (p<.001).
- The probability of reporting the adapted location color value was lower in the pre-adaptation than in the post-adaptation block (p<.001).
- The rate of random guessing was not significantly different between the pre-adaptation and the post-adaptation block.

Conclusions

1. *Participants were less likely to report the color at the non-adapted location after adaptation.*
2. *Instead, they were more likely to report the color value at the adapted location.*
3. *Bias in responses shifted more towards the non-adapted color value after adaptation.*

Overall, our results support that color report of a target value is impacted by adaptation to a non-target location by increasing the likelihood of reporting the color value at the adapted location rather than at the non-adapted location.

References

1 Doré-Mazars, K., & Collins, T. (2005). Saccadic adaptation shifts the pre-saccadic attention focus. Experimental Brain Research, 162(4), 537–542. https://doi.org/10.1007/s00221-005-2221-1
2 Van der Stigchel, S., Schut, M. J., Fabius, J., & Van der Stoep, N. (2020). Transsaccadic perception is affected by saccade landing point deviations after saccadic adaptation. Journal of Vision, 20(9), 8. https://doi.org/10.1167/jov.20.9.8
3 Suchow, J. W., Brady, T. F., Fougnie, D., & Alvarez, G. A. (2013). Modeling visual working memory with the MemToolbox. Journal of Vision, 13(10):9, 1–8. https://doi.org/10.1167/13.10.9