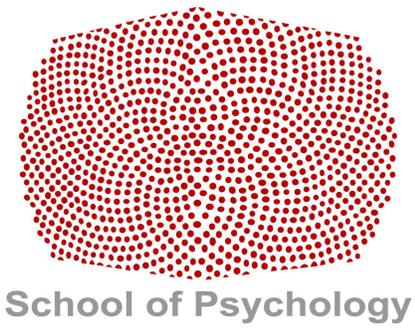
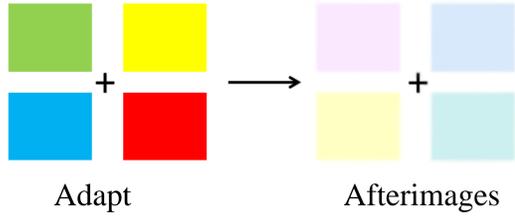


Hues Being Framed and the Nulling of the Afterimage

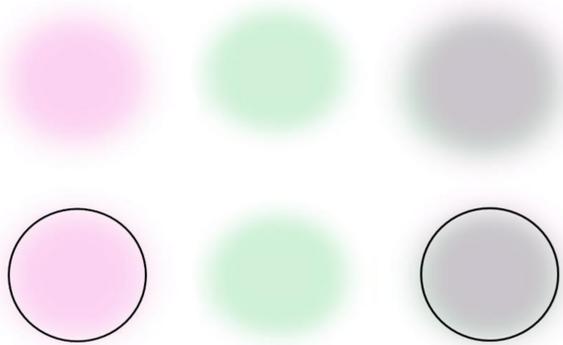
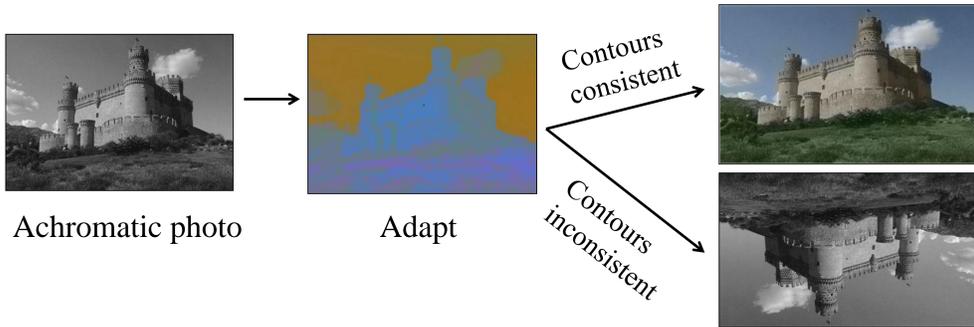
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INTRODUCTION: Are colour afterimages predominantly retinal or are they significantly cortical?



Our conscious perception of afterimages is unstable: sometimes we see them, sometimes we don't. Contextual cues are remarkable modulators of afterimage visibility (e.g. Spanish castle illusion, below). Luminance contours also increase detection and discrimination of physical chromatic stimuli, due to early cortical interactions between colour and luminance.



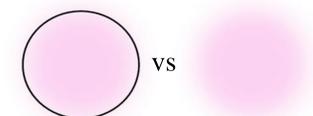
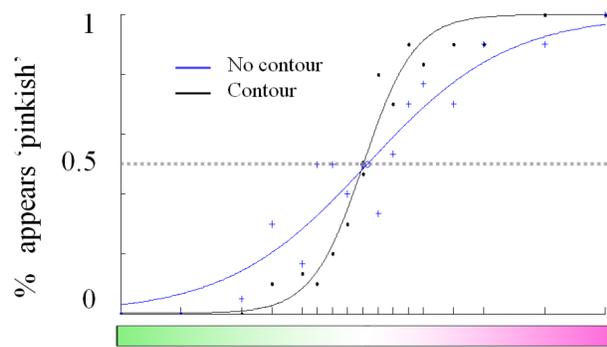
A common technique to measure afterimage intensity is to null them by addition of physical stimuli.
If contextual cues alter our conscious perception of afterimages, do they also alter the point at which they are nulled?

Physical stimulus + Afterimage = Both on retina

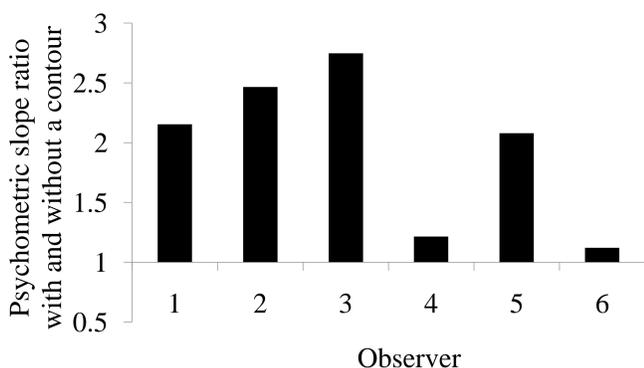
If adaptation occurs mainly at the retinal level, contours would modulate the signal resulting from the sum of the physical stimulus and the afterimage. I.e. a contour that increased the intensity of an afterimage would also increase the intensity of the physical stimulus.

Thus, the same afterimage would be always be nulled by the same physical stimulus, with or without a contour. But is it?

PHYSICAL STIMULI : We first confirmed that luminance contours enhance discrimination of physical, pink/green patches by measuring the slope of the psychometric function with and without a contour.

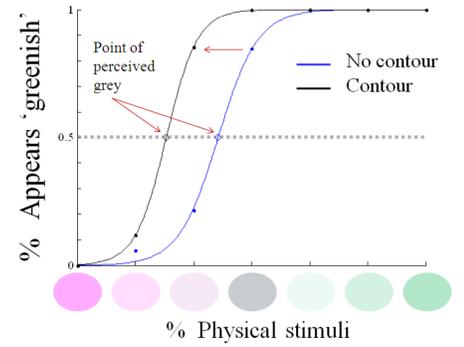


Fixational eye movements during adaptation produce afterimages with blurry edges, so to achieve perceptual similarity with an afterimage, our physical patches also had blurry edges.



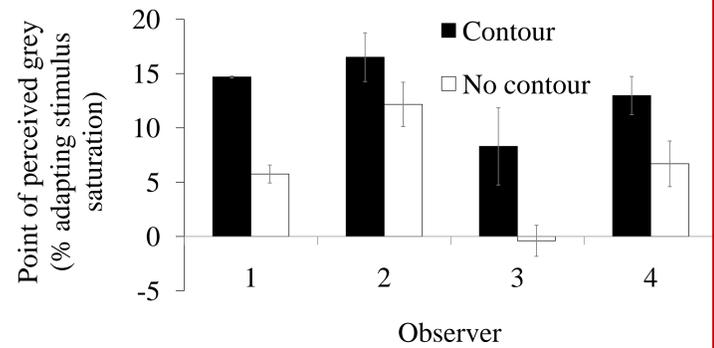
AFTERIMAGES: We then adapted observers to pink and green centrally presented circles, and nulled the resultant afterimages with our physical chromatic patches.

Afterimage intensity was measured by the physical stimulus saturation required to null the afterimage (i.e. the point of perceived grey). The physical stimuli were presented with and without a luminance contour.

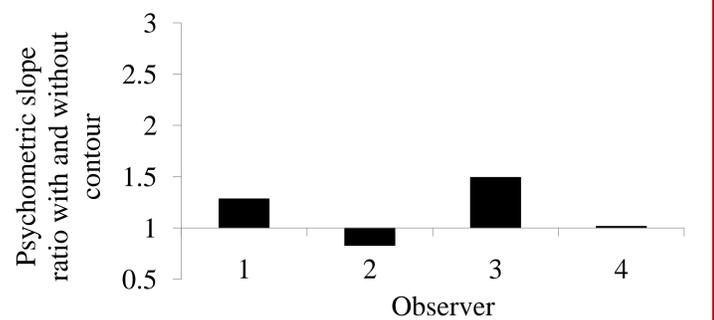


RESULTS:

Luminance contours increased the intensity of afterimages.

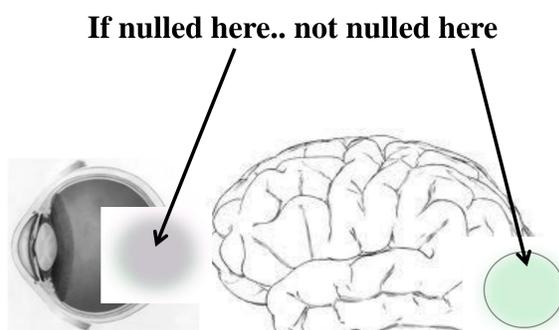


While slope analysis suggests they did not consistently improve discrimination of the combined retinal signal of the afterimage plus the physical stimulus.

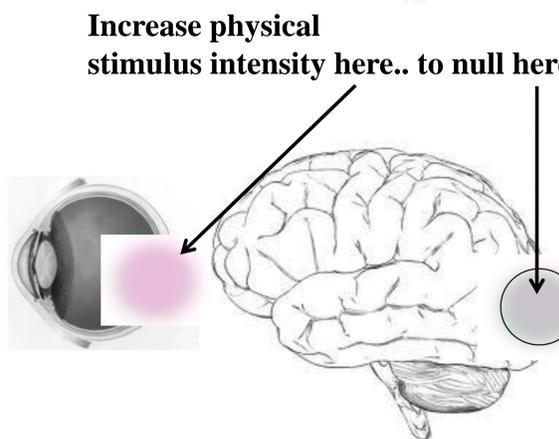


CONCLUSIONS: Retinal adaptation alone cannot explain why afterimages are enhanced more than physical stimuli in the contour condition.

Perhaps, while retinal adaptation is nulled by the physical stimulus, the contour enhances cortical adaptation signals, leading to a stronger afterimage percept.



Thus, although you can determine conditions that will null the conscious perception of an afterimage, it is unlikely that this afterimage will be nulled at every single locus of adaptation.



This is because there may be different representations of an afterimage at different levels of the visual system, and these levels are differently modulated by the presence of a contour.

Afterimages are perceptually unstable, and compared to real stimuli, their visibility is particularly modulated by the surrounding context. Why? Perhaps if signals are inconsistent, disambiguating cues such as luminance contours become more important as they increase the likelihood that the signal represents a real and significant object.