

WHEN INCREMENTS MATCH DECREMENTS

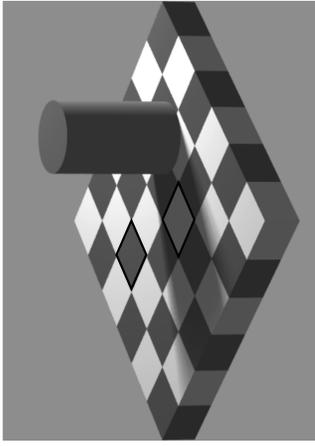
Introduction

1. Two seemingly opposing phenomena in lightness perception are: simultaneous contrast and assimilation [1,2,3].
2. Studying the two phenomena we found that observers matched luminance increments with decrements under certain circumstances.
3. Previous studies had reported that luminance increments and decrements were hardly ever matched with each other [2,4,5]. Here, we addressed the question when increments and decrements are matched with targets of opposite contrast polarity.

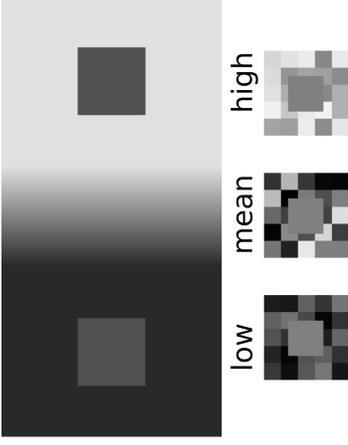
Methods: Matching of background fields

"adjust test field so as to match dark or light target field in lightness"

AC - Adelson checkerboard [6]



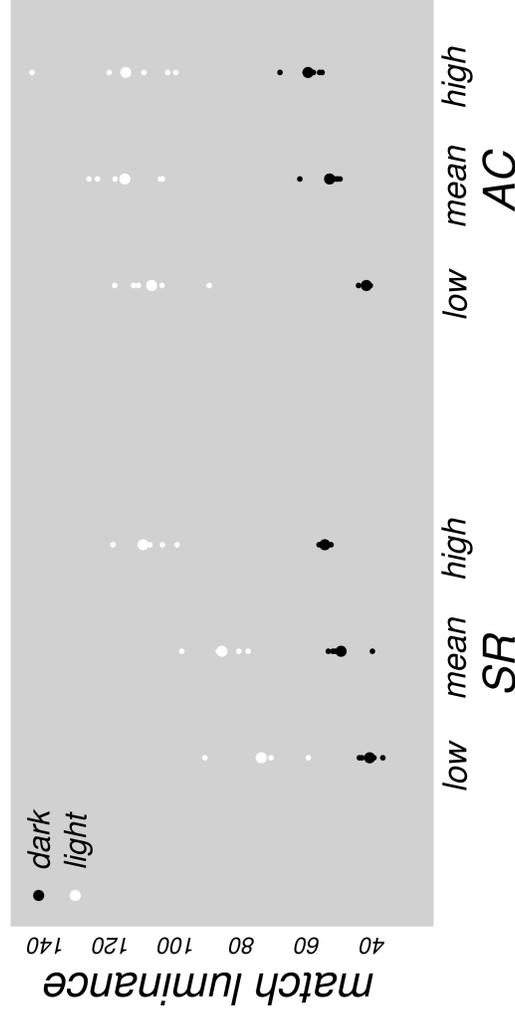
SR - Shapley-Reid stimulus [3]



- target luminance 58cd/m²

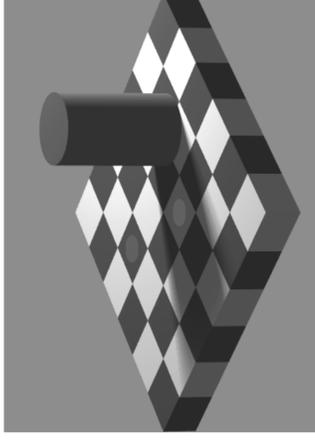
- surround luminances test field: low - 69, mean - 111, high - 153cd/m²

Results: Background fields



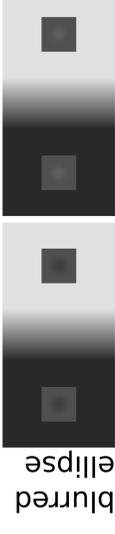
Methods: Mutual matching

"adjust test on light check so that it looks the same lightness as target on dark check"

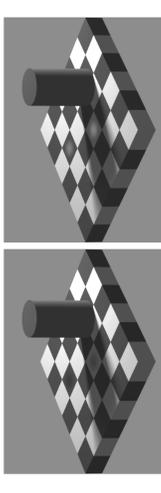


Stimuli

decrement increment



decrement increment



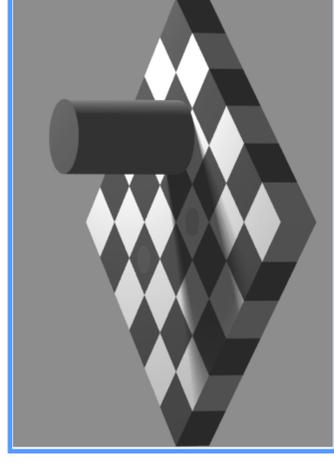
targets and tests were blurred or proper ellipses that were identical in local contrast on dark and light background checks [7,8]

Discussion

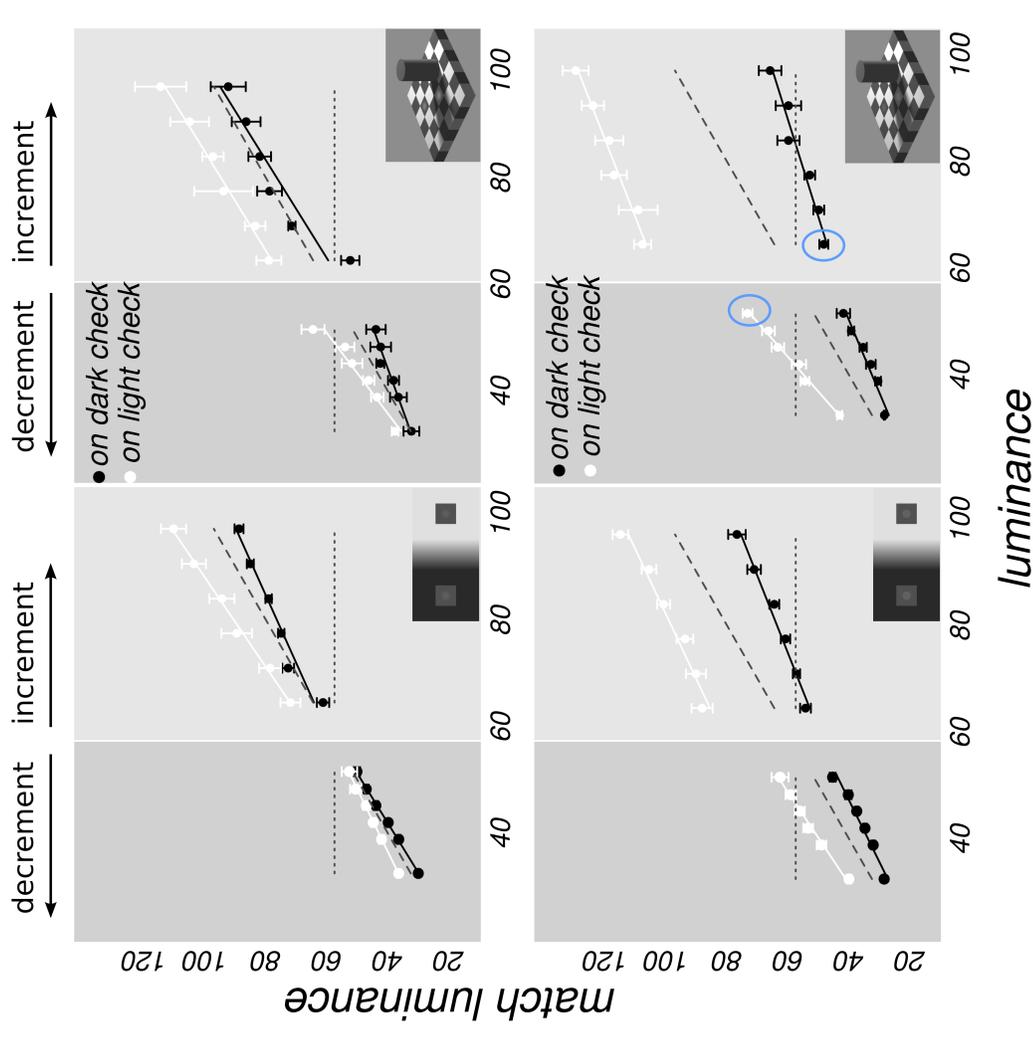
- in AC assimilation and contrast effects of similar magnitude
- proper and blurred ellipses differ in perceived lightness
- assimilation of proper ellipses much bigger for AC compared to SR
- decrements show similar result pattern as increments but with reduced magnitude
- increments are matched with decrements and vice versa in AC with proper ellipses

- How is lightness stabilized against sign differences in contrast?

Illustration of increment-decrement match corresponding to encircled data in result plot



Results: Increments and Decrements



References
 [1] Jameson, D. & Hurvich, L. (1975). Leonardo, 8, 125-131.
 [2] Gilchrist, A. (2006). Seeing Black and White.
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 [7] Hillis, J.M. & Brainard, D.H. (2007). Curr Biol, 17, 1741-19.
 [8] Maertens, M. & Wichmann, F.A. (2013). JoV, 13, 1-11.