

# Covert Attention Alters 2nd-Order Contrast Sensitivity

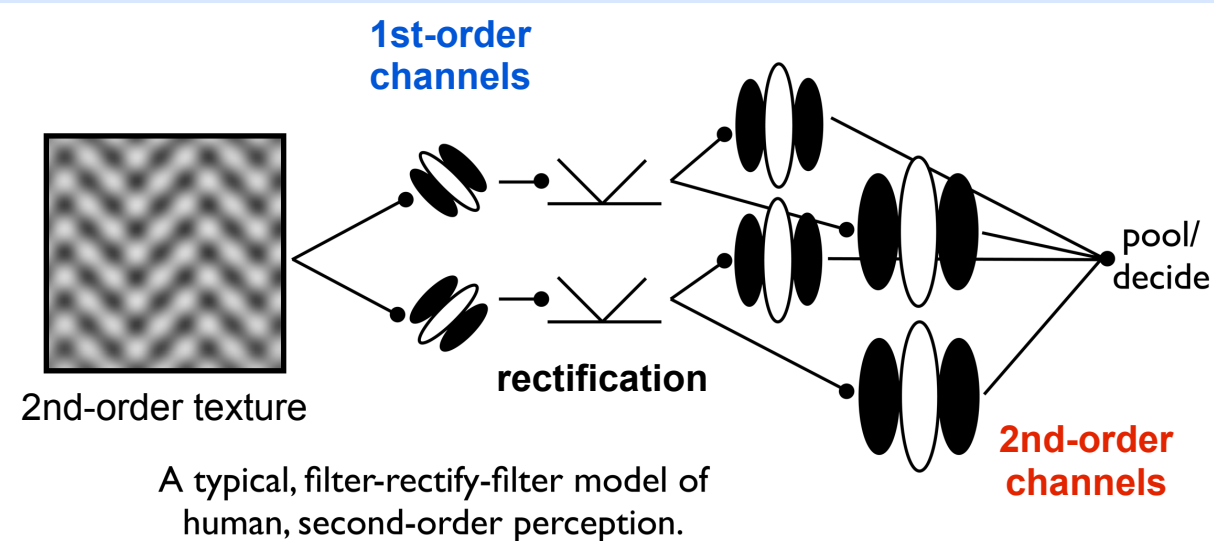
Antoine Barbot<sup>1</sup>, Michael S. Landy<sup>1,2</sup> & Marisa Carrasco<sup>1,2</sup>

<sup>1</sup>Department of Psychology, and <sup>2</sup>Center for Neural Science, New York University

## Background

- Covert attention affects contrast sensitivity for 1st-order, luminance-defined patterns, increasing sensitivity at the attended location, while reducing sensitivity at unattended locations. *Pestilli & Carrasco, 2005*

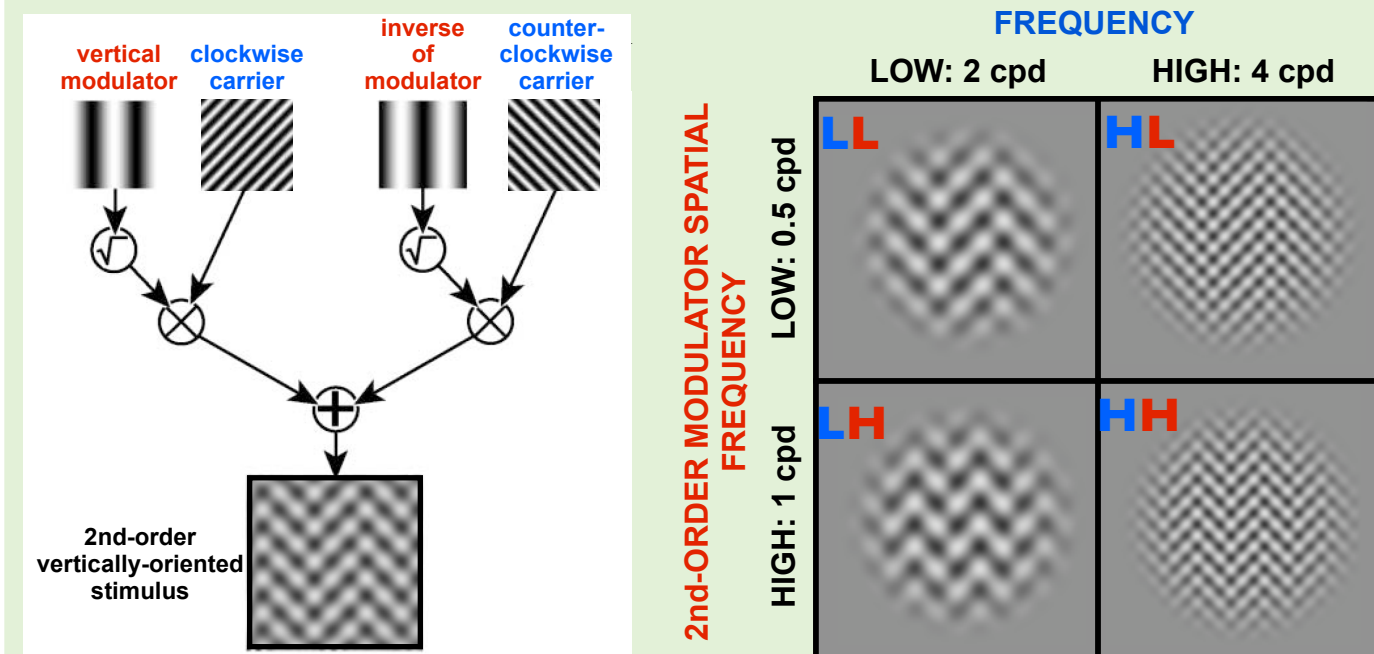
- Humans are also sensitive to 2nd-order texture patterns *Landy & Graham, 2004*



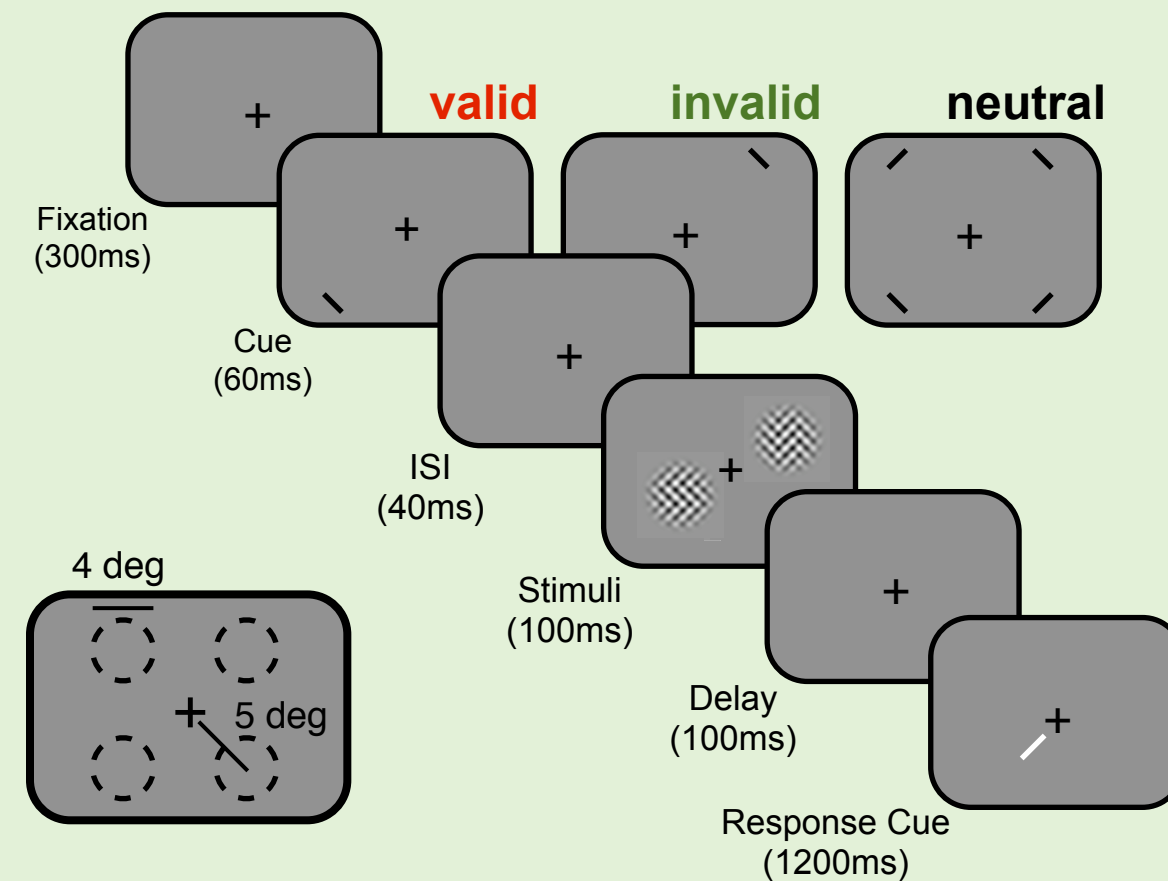
**Does transient attention affect sensitivity to 2nd-order texture-defined contrast?**

## Stimuli / Conditions

- 4 different 2nd-order orientation-defined texture patterns vertically or horizontally oriented



## Procedure



Details:

- non-informative peripheral cue
- 1st-order carrier contrast: 70%
- 2nd-order modulation contrast: 16-96%
- each of 4 conditions were blocked
- data fitted with a Naka-Rushton function

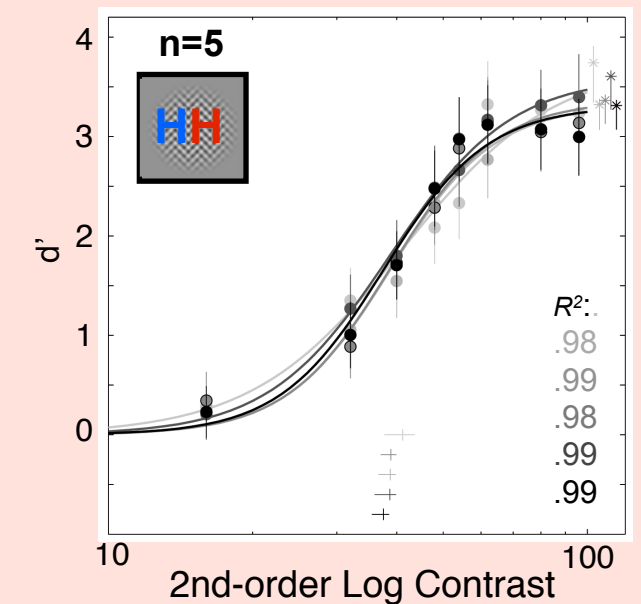
Can an increase in effective contrast at the 1st-order stage explain the present findings?

neutral condition

1st-order contrast:

60%  
65%  
**70%**  
75%  
80%

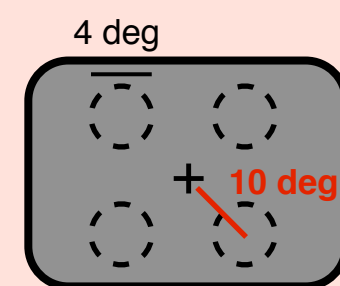
Answer: NO



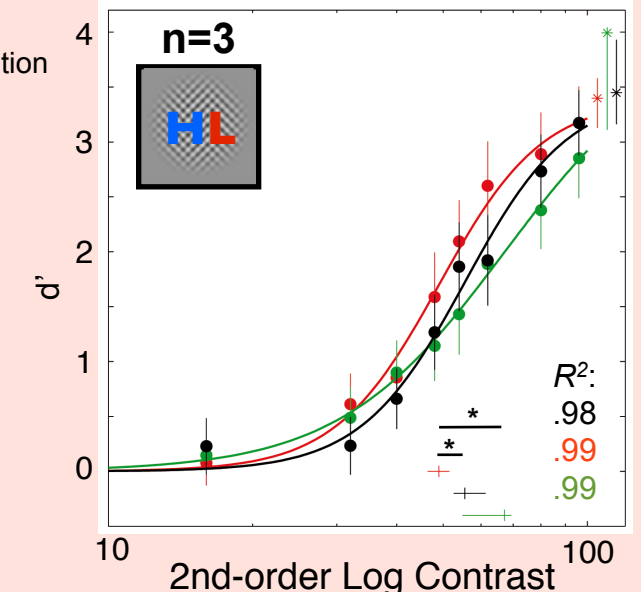
Can attention affect contrast sensitivity of low 2nd-order-spatial-frequency stimuli?

- Effects of transient attention on texture segmentation of 2nd-order-spatial-frequency vary with eccentricity *Yeshurun & Carrasco, 2000*

Low 2nd-order-spatial-frequency condition tested at greater eccentricity

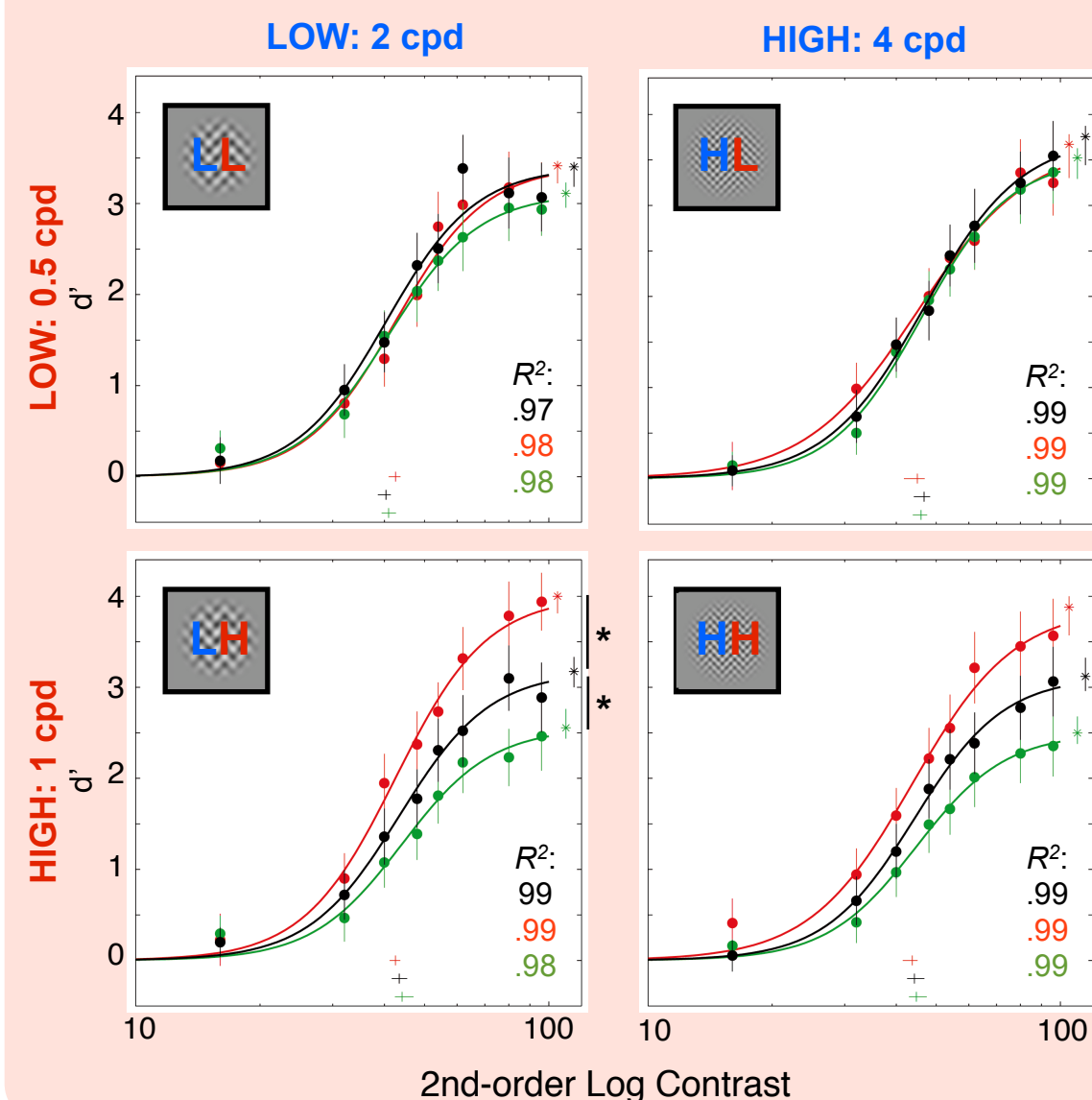


Answer: YES

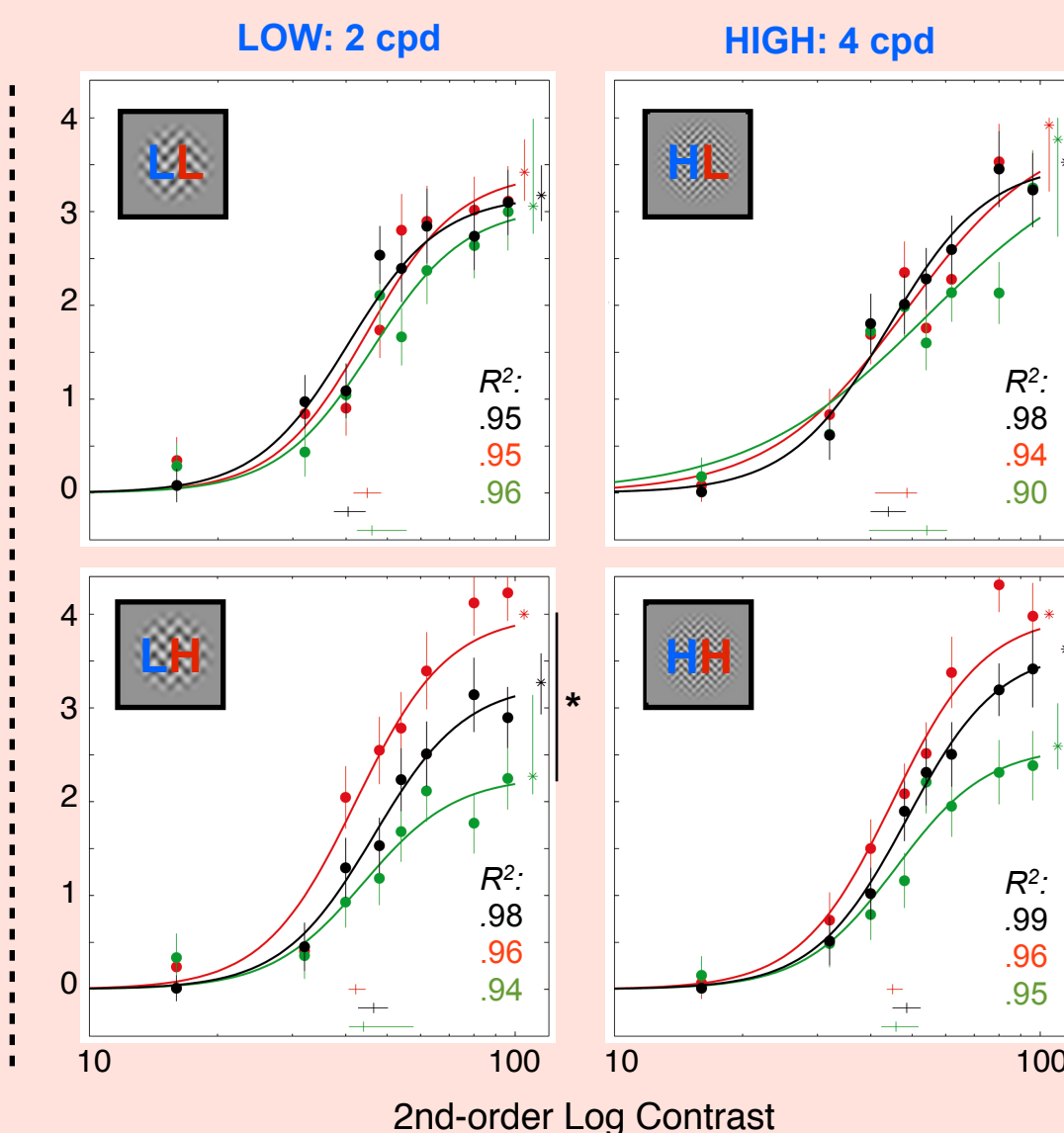


## Results

All observers (n=5)



Sample observer



## Summary

- Transient attention increased 2nd-order contrast sensitivity at the attended location, while decreasing it at unattended locations for high 2nd-order-spatial-frequency stimuli
- Increased 1st-order contrast sensitivity cannot explain our results
- Effects emerged with low 2nd-order-spatial-frequency stimuli at greater eccentricity

**Attention improves 2nd-order contrast sensitivity**