Contingent adaptation in masking and surround suppression

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Introduction

Hebbian normalization model of adaptation[1]: neurons that fire together more often inhibit each other more.

Hypothesis

Contingent adaptation: presenting stimuli synchronously leads to greater suppression compared to asynchronous presentation.

- Demonstrated in macaque physiology[2].
- Untested in humans.

Conclusion

- Contingent adaptation raises detection threshold and changes appearance.
- Supports the Hebbian normalization model.

Reference

1. Westrick et al., J Neurosci, 2016.
2. Aschner et al., SFN, 2016.

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Detection and cross-orientation suppression

- Adapt: non-contingent or contingent
- Measure: threshold contrast for detecting a masked grating

Which side has an extra grating?

Contingent adaptation results in stronger cross-orientation suppression and thus increased masked detection thresholds.

Appearance and surround suppression

- Adapt: vary center-surround contingency
- Measure: perceived matching contrast

Which center has higher contrast?

The center grating *appears* to have lower contrast when it matches the adapter, thus requires higher *physical* contrast to match the other center grating.