A population response model of spatial crowding over time

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Background
Recent studies have found crowding is greatly affected by the relative timing of target and flankers.

Harrison & Bex, 2014

Greenwood, Sayim & Cavanagh, 2015

The aim of the present study was to test if a population code could account for these data.

Model
Target and flankers are weighted and combined according to their positions within a spatio-temporal receptive-field.

Motivation
Stimuli and task
Spatial weights
Temporal weights

Data
Spatio-temporal modifications of the population code reduce crowding when flankers precede targets.

Synchronous onsets
Flanker onsets prior to target
Simulated perceptual performance

Conclusions and caveats
1. The model produces a reduction in crowding when flankers precede the target (consistent with Harrison & Bex and Greenwood et al).
2. Only a minor exacerbation of crowding occurs when flankers offset after the target offset (contrary to Harrison & Bex but consistent with Greenwood et al).
3. There is a robust reduction in critical spacing when flankers precede the target (consistent with Harrison & Bex but inconsistent with Greenwood et al).

- This hypothetical task is markedly different from tasks used previously — all data here require psychophysical validation.
- Several assumptions about the spatio-temporal profile of the receptive field were made, such as the change in orientation tuning over time.

References