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Spatial phase discrimination in visual textures

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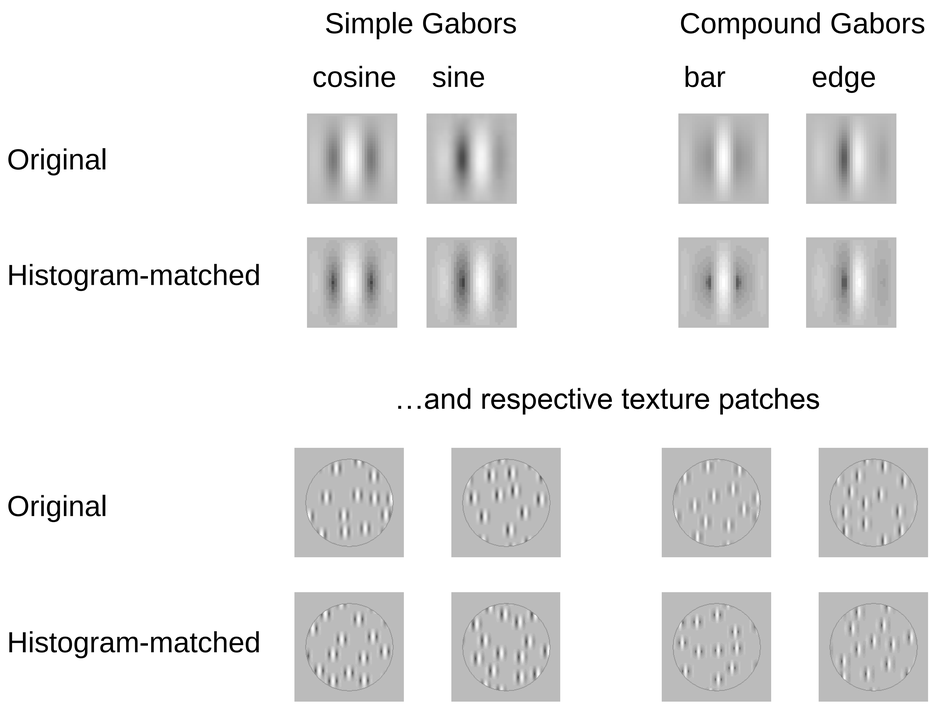
Purpose

To clarify the role of local luminance cues in phase discrimination using histogram matching of texture elements.

Stimuli

Texture patches composed of either simple Gabor patterns (sine vs cosine phases), or compound Gabors (first plus third harmonics, edge vs bar phases).

Both original and histogram-matched versions of patterns were used, four texture pairs in total.

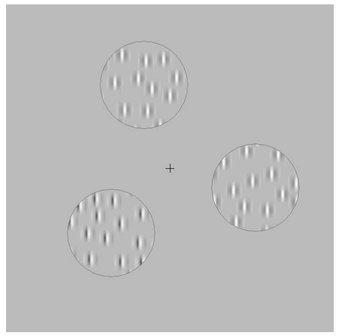


Experiment

Discriminability for each texture pair was measured.

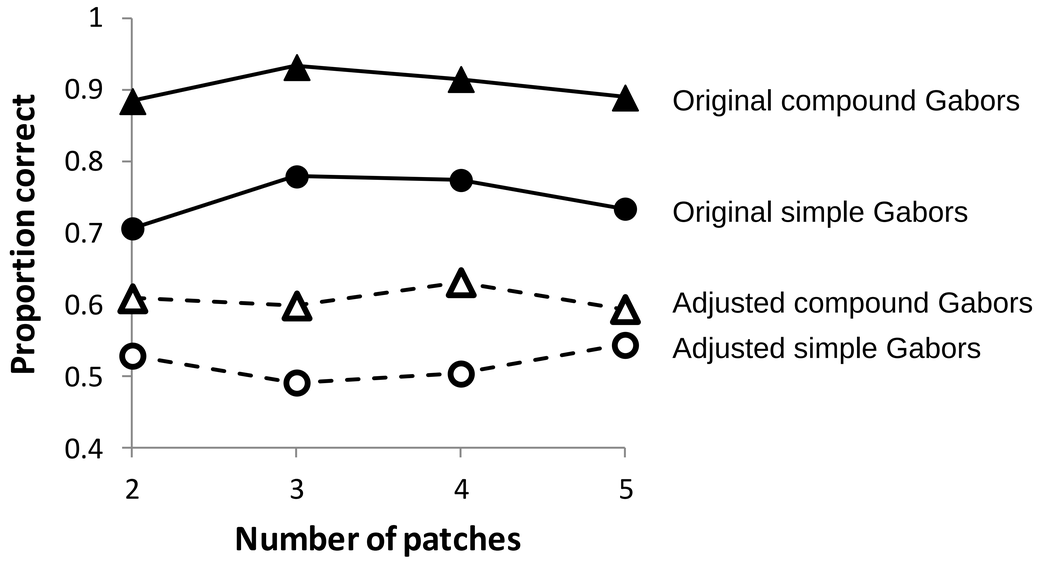
From 2 to 5 texture patches were presented briefly around the fixation point. Observers searched for an odd (different) patch (that was present with the probability 0.5).

Example stimulus display



Results

- Phase is more easily seen in compound as compared to simple Gabors
- Histogram matching heavily reduces discriminability of phase differences
- No effect of set size (number of texture patches)



Conclusions

- Local luminance cues play an important role in spatial phase discrimination
- There are low level mechanisms that discriminate edges from bars
- Discrimination of phase in textures does not need focal attention