Segmentation mechanisms are sensitive to and can segment by higher-order statistics in naturalistic textures

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**Previous Findings**
- Removing phase information in natural textures impairs segmentation of contrast boundaries (VSS, 2008).
- Removing phase information in naturalistic synthetic textures impairs segmentation of contrast boundaries.
- Parametrically increasing density in naturalistic synthetic textures improves segmentation of contrast boundaries (VSS, 2009).

**Question**
How do higher-order statistics in textures affect human segmentation of orientation, structure, and density boundaries?

**Textures**
- Intact (INT): Intact micropatterns were scattered in random positions.
- Local Scramble (LS): Scrambled micropatterns were scattered in random positions.
- Global Scramble (GS): An INT texture was phase scrambled.

**Texture Creation**
- "edgelet": a sum of sine waves to create a broadband edge.

**Stimulus**
- Envelope: cosine-tapered half-disc.

**Methods**
- 2AFC
- 100 ms presentation
- Method of constant stimuli

**Results**
- Density is a higher-order statistic and is destroyed following phase scrambling, so density could not be varied in this condition.
- Orientation and contrast boundaries may be segmented by different mechanisms than structure (including density) boundaries.
- A texture's higher-order statistics are important to segmentation mechanisms both when they define the boundary and when they do not.

**Conclusions**