

Visual & haptic geometry of 3D shape discrimination

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Questions.

- How do we visually and haptically explore 3D objects?
 - What is our global eye-movement behavior?
 - What aspects of the object do we look at?

Method.

Task: Paired comparison of glavens.
Data: Eye tracking, haptic manipulation tracking,
1st, 2nd, 3rd order geometric properties.

Analysis.

Eye movement behavior

- Fixation counts
- Fixation times
- Recurrence (RQA)

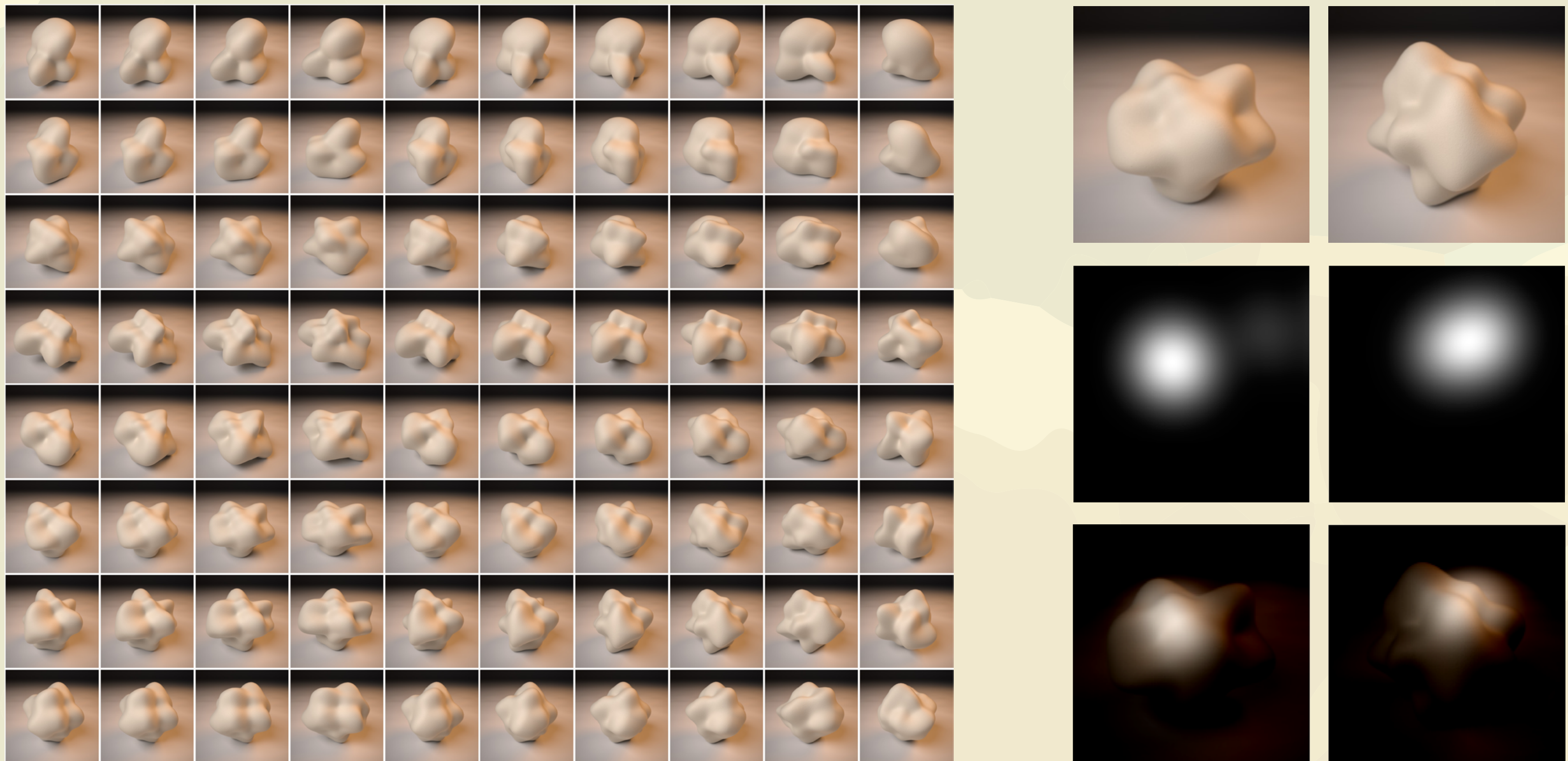
Geometric Properties

- Correlation / correspondence with property maps
 - 1st – Depth, boundary contours
 - 2nd – Shading, occlusions
 - 3rd – Shape index, curvedness, mean curvature, curvature contrast, maximum curvature

Answers.

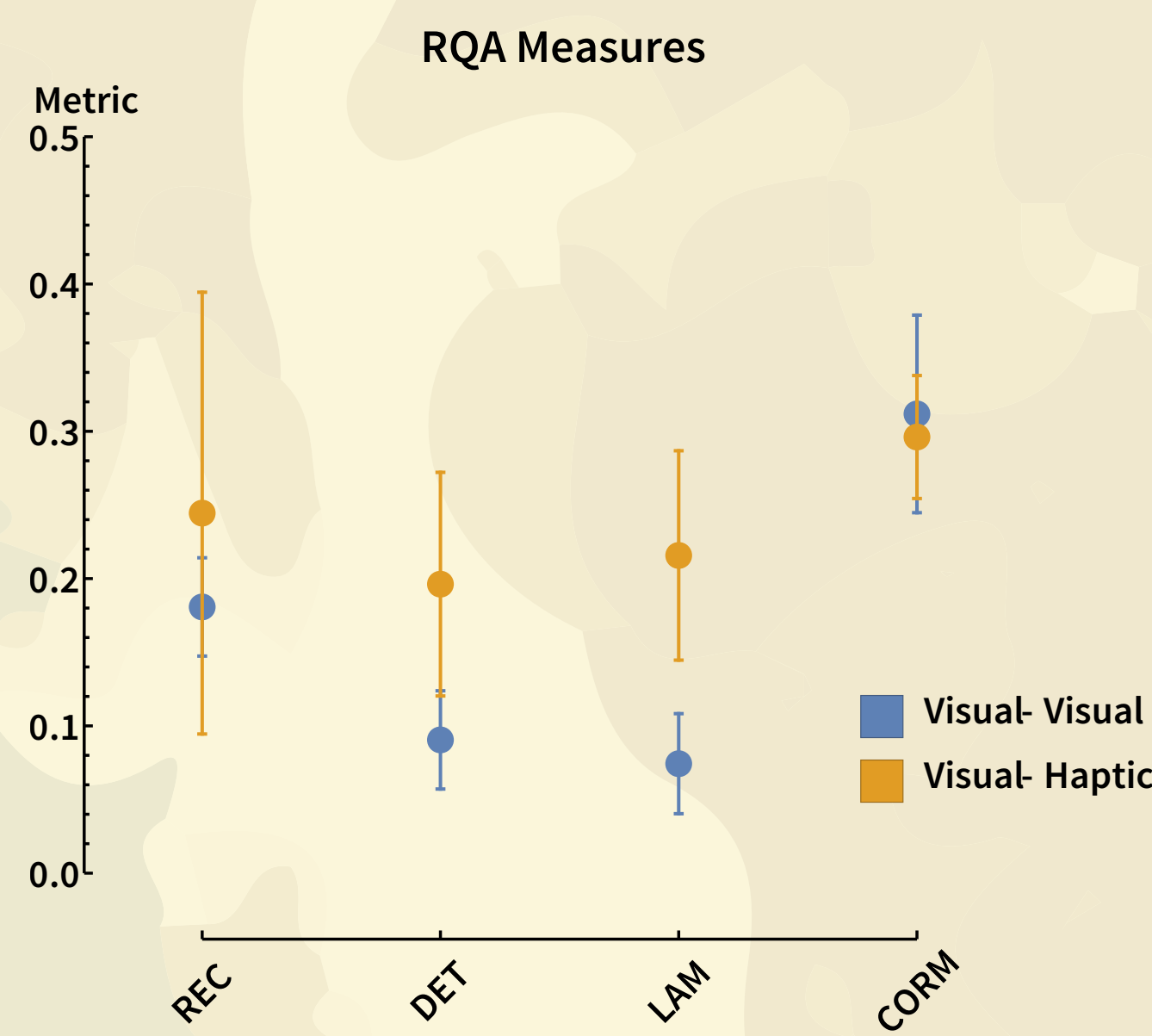
- Comparing within and cross-modal performance —
- RQA shows that our looking behavior is **different**
 - What we look at is **similar**
 - **BUT** we look at more **linear, concave** structures when we need to make cross-modal judgments

Details.

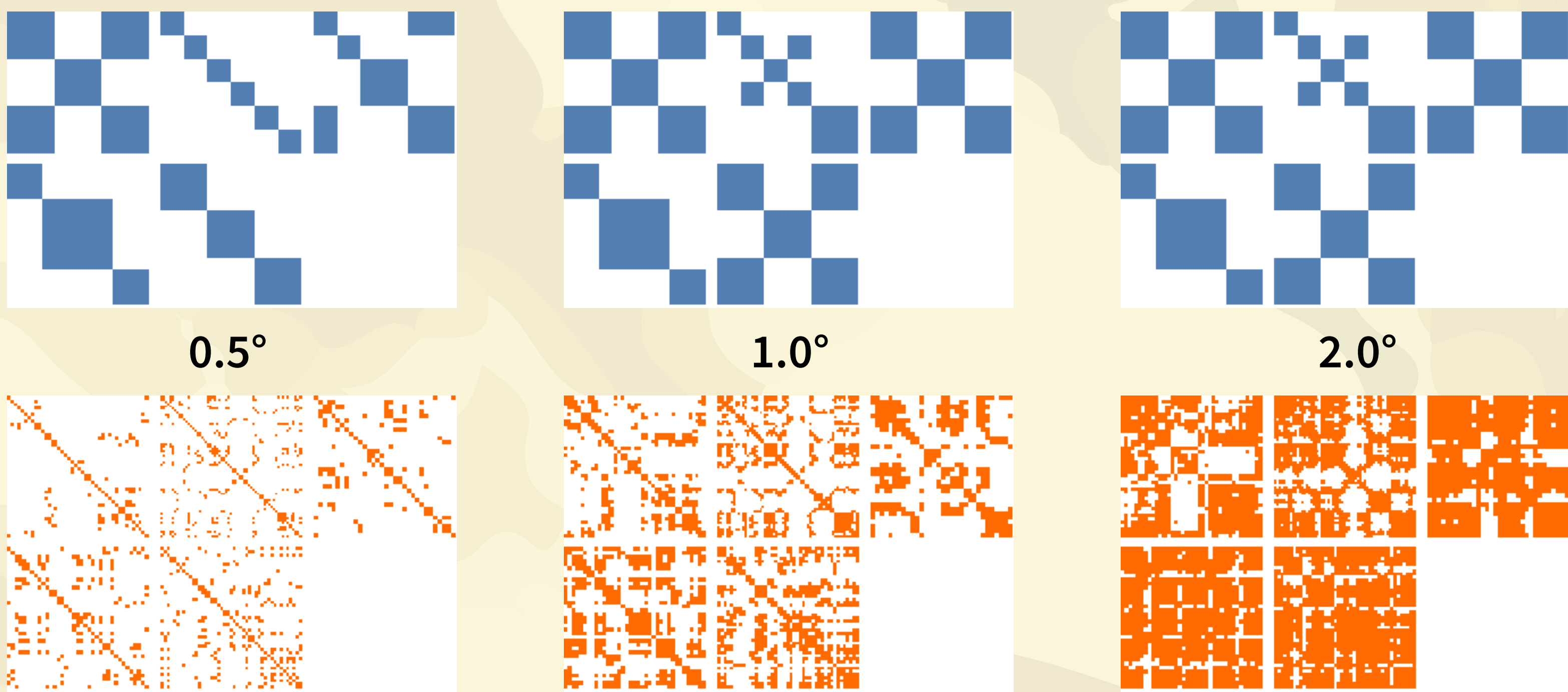


How do we look?

	Visual-Visual	Visual-Haptic
fixations / stimulus	3.2 (2.3)	59.4 (33.9)
trial time	2.25 (1.6) s	26.8 (12.7) s
frequency	1.4 / s	2.2 / s



Recurrence - 5 trials, same stimulus



What are we looking at?

