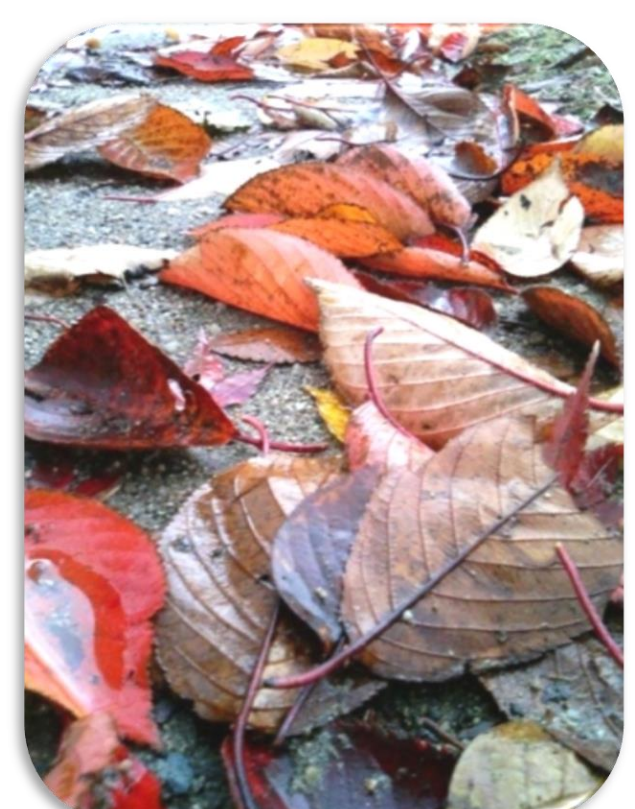


INTRODUCTION

Given a single image, humans can rapidly identify a material and its properties. This ability relies on various cues, including but not limited to color, texture, shape, and gloss. Here, we study the contribution of texture, and how it might relate to peripheral perception of materials.



Leaves, damp or soggy, relatively small, slippery



Stone, dry, rough, dense, hard, ambiguous size, possibly cut by people



Water, wet, middle-sized, clear, wavy, contains fish

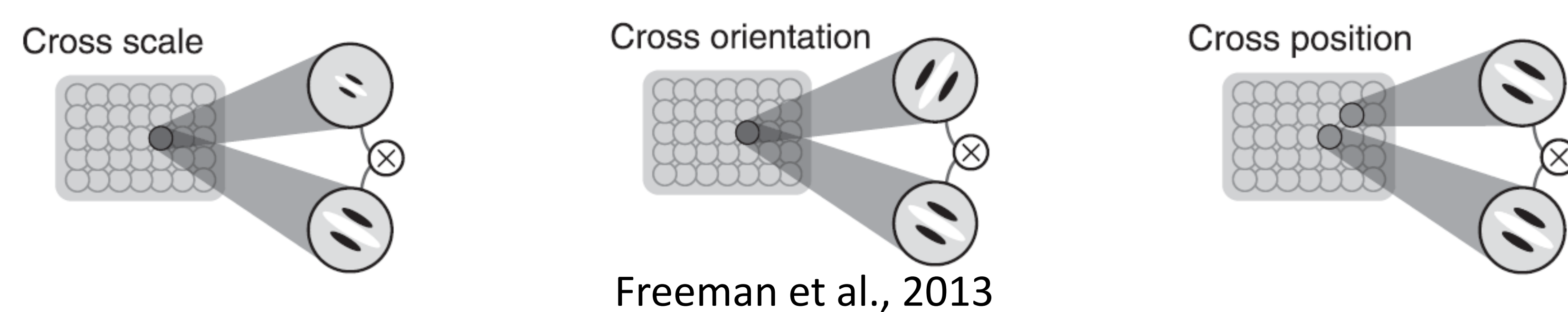
From the Flickr Materials Database (FMD) (Sharan et al., 2014)

Research questions:

- How well can a parametric texture model capture material category?
- How well can observers classify materials peripherally? Does it correlate with texture?

Approach:

- Image statistics useful for modeling textures
- Here we use Portilla-Simoncelli (2000)
 - Marginal statistics of luminance
 - Autocorrelation
 - Cross-correlations of V1-like cell responses over location, orientation, & scale; phase correlation
- Also used to model peripheral vision (Balas et al., 2009; Freeman et al., 2011) and once for material classification (Balas, 2015)

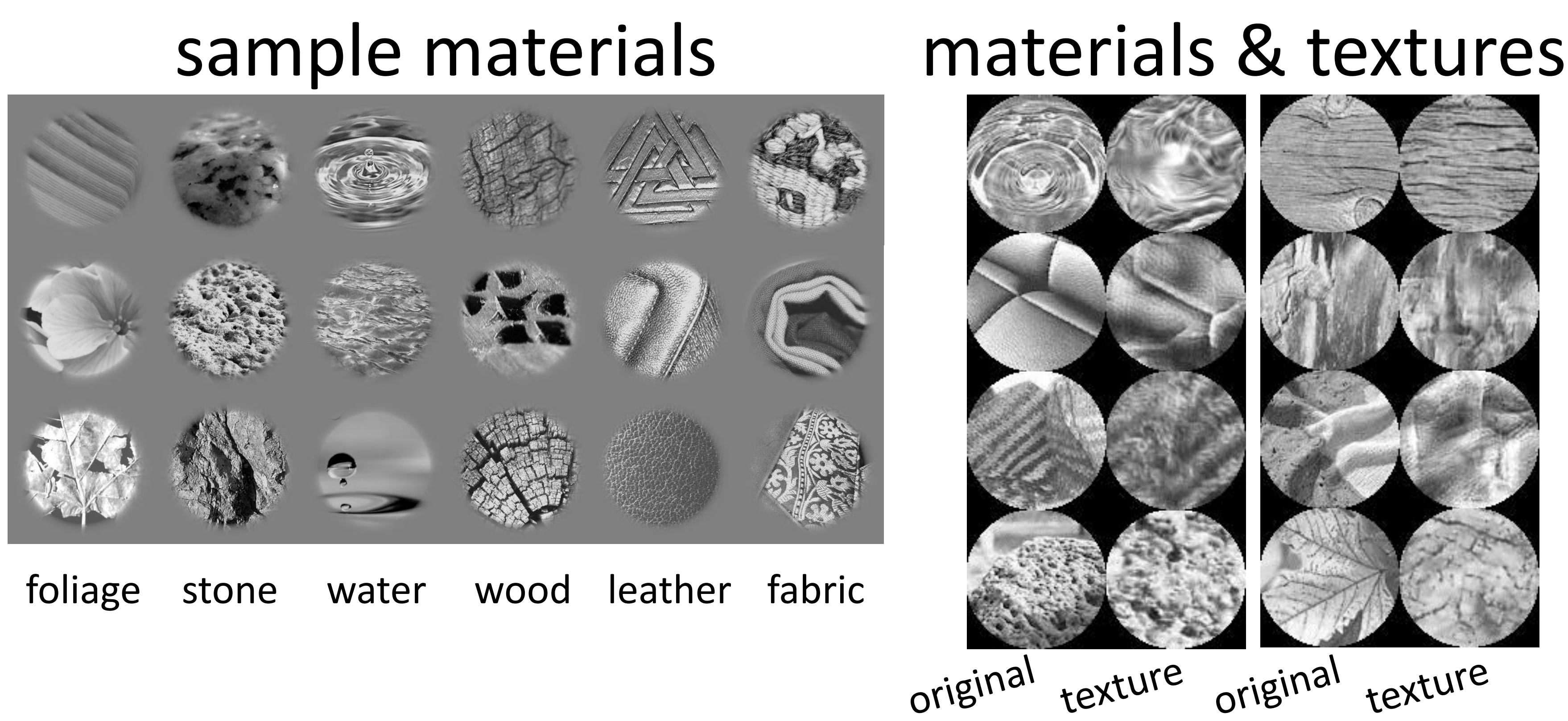


EXPERIMENTS

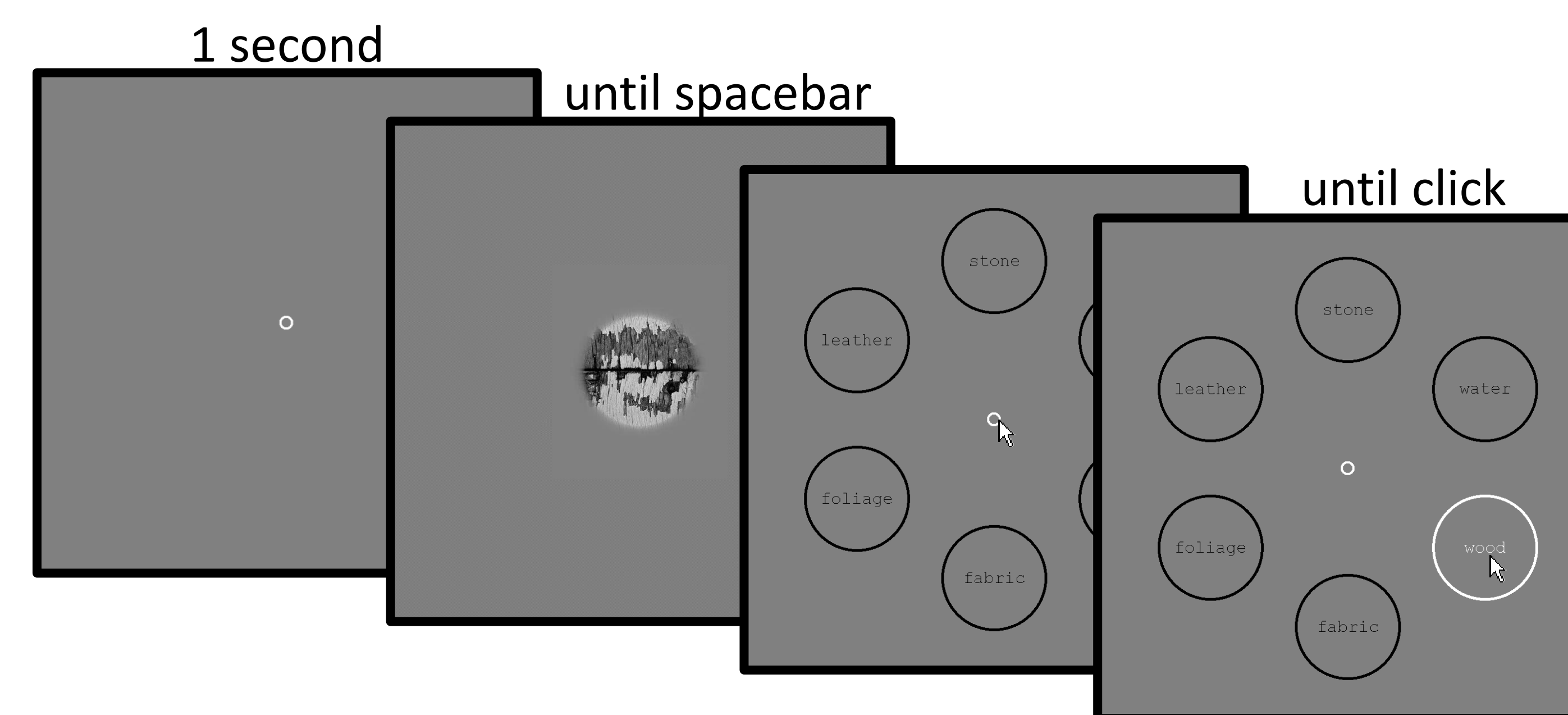
- **Baseline** material classification ($N = 5$)
- Material classification with **textures** ($N = 10$)
- **Peripheral** material classification ($N = 10$)

Experimental details:

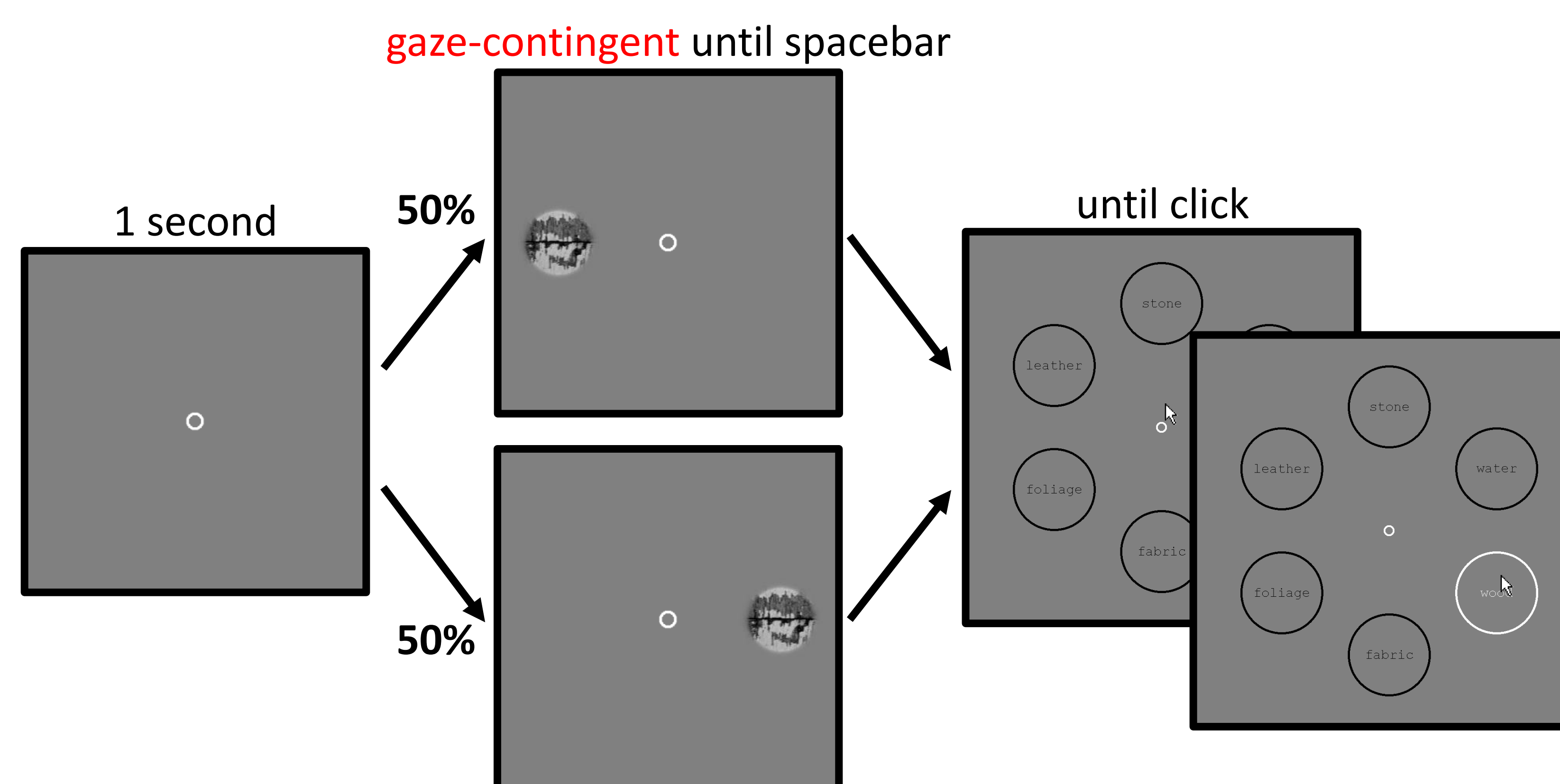
- 6 material categories from FMD (stone, water, wood, fabric, foliage, leather)
- 50 examples from each category (leaving out "object-like" images), 300 trials
- Grayscale (Luminance channel from LAB space)
- Feedback on only first 25 trials
- **Texture** used one synthetic texture (made using P-S algorithm) per original
- **Peripheral** used gaze-contingent display (enforced 2 deg radius to center, Eyelink 2000) with stimuli at 10 deg eccentricity
- **Peripheral** and **texture** done as separate blocks in one session



baseline or texture

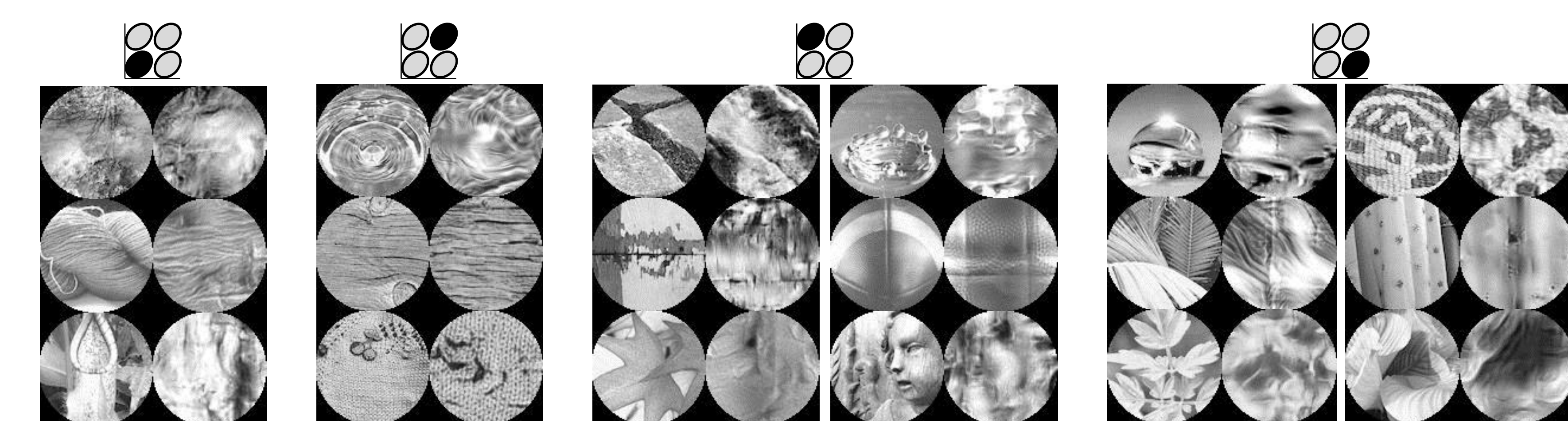
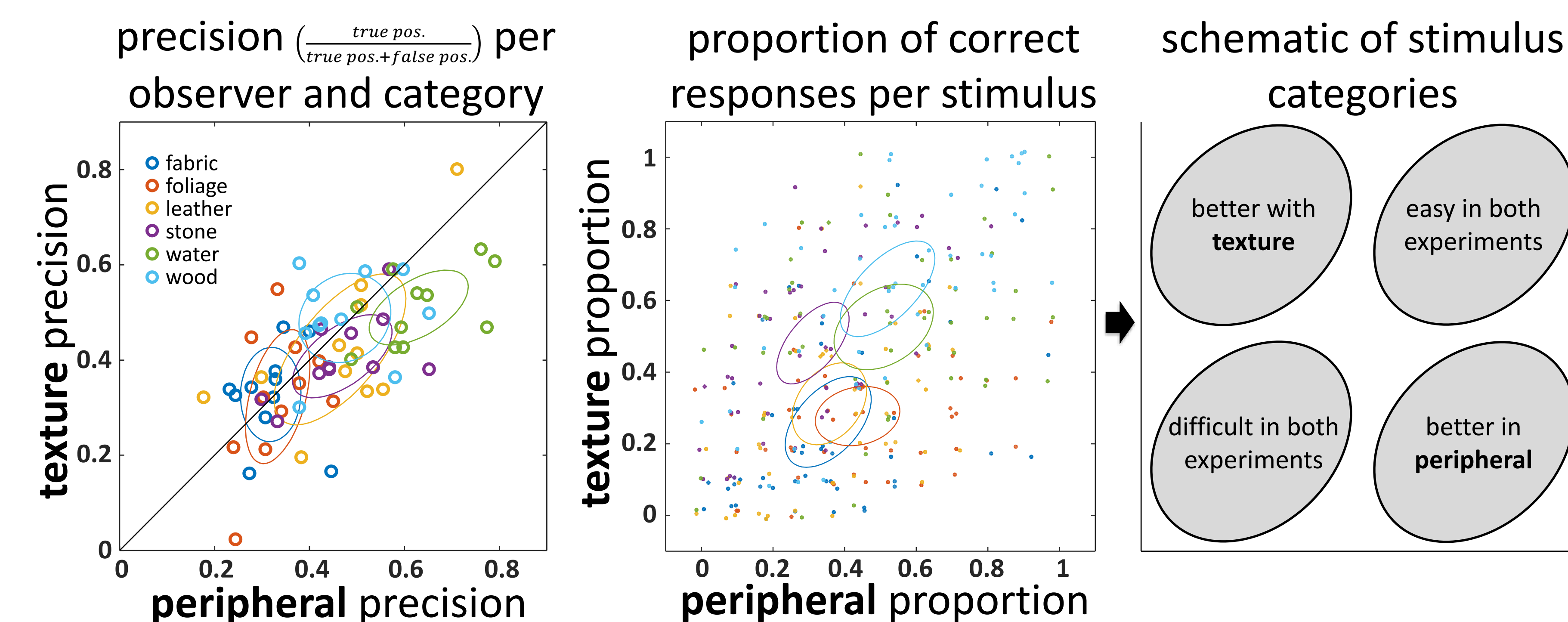
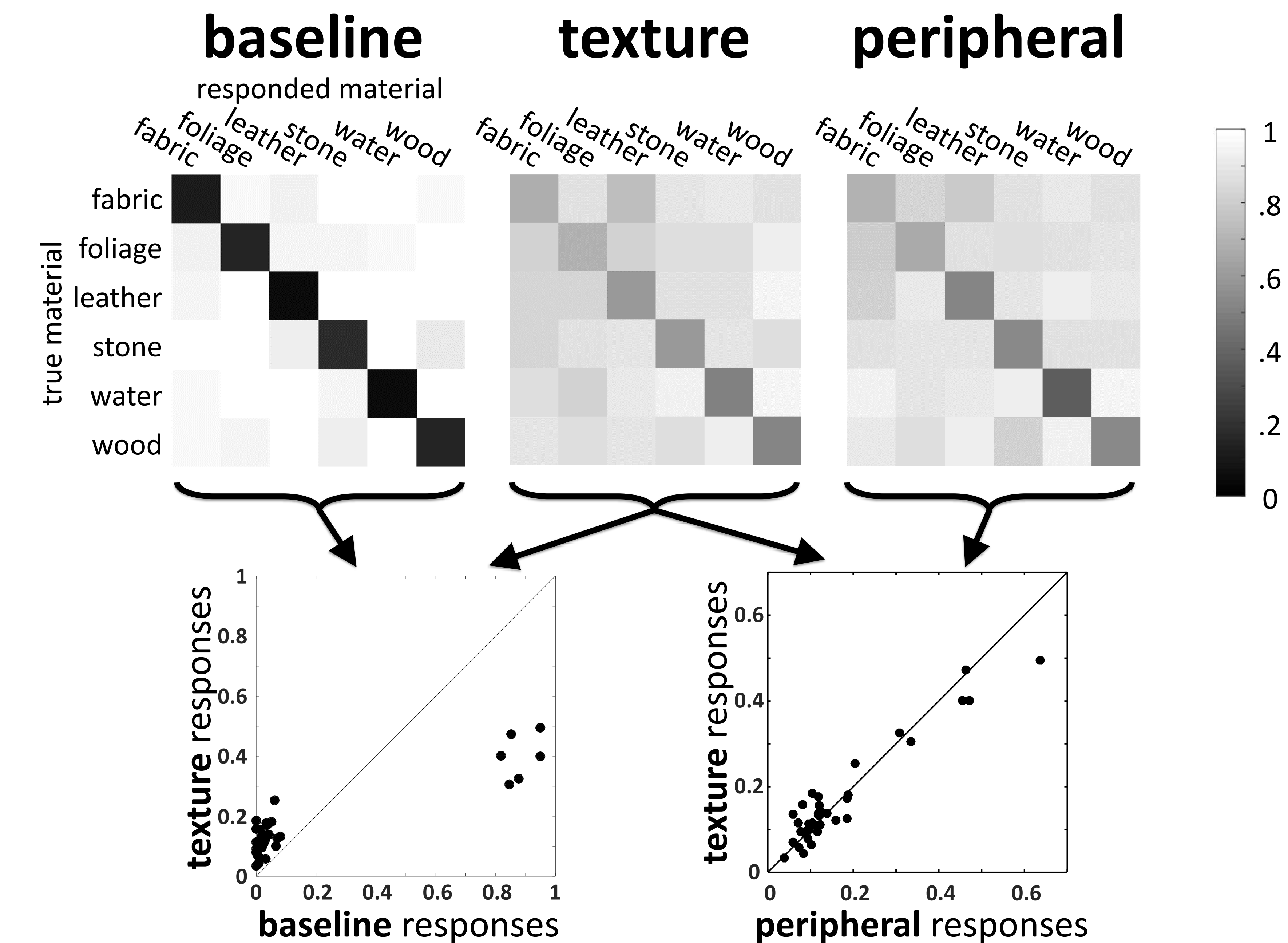


peripheral



RESULTS

Performance: **baseline: 88.2%**
texture: 40% **peripheral: 44%**
 All categories significantly above chance (1/6)



CONCLUSIONS

Texture captures some fraction of performance
 Peripheral is correlated with texture, perhaps due to sharing a statistical representation