Mapping Spatial Frequency Preferences in the Human Visual Cortex

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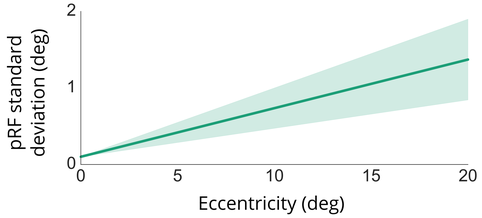
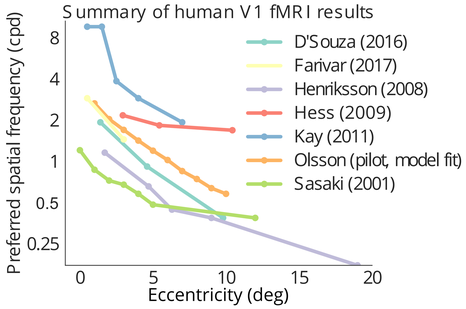
How do spatial frequency preferences change with eccentricity?

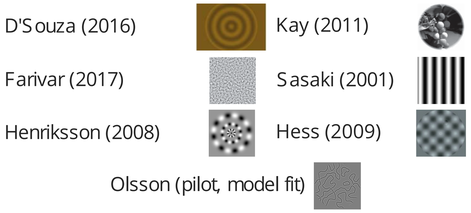
- V1 population receptive field size grows linearly with eccentricity



- Previous results show peak spatial frequency decreases with eccentricity, but actual numbers vary by two to three octaves!



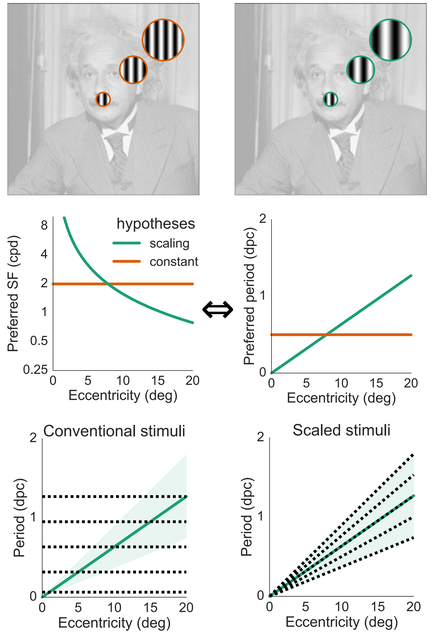
- Variability perhaps due to inconsistent stimuli



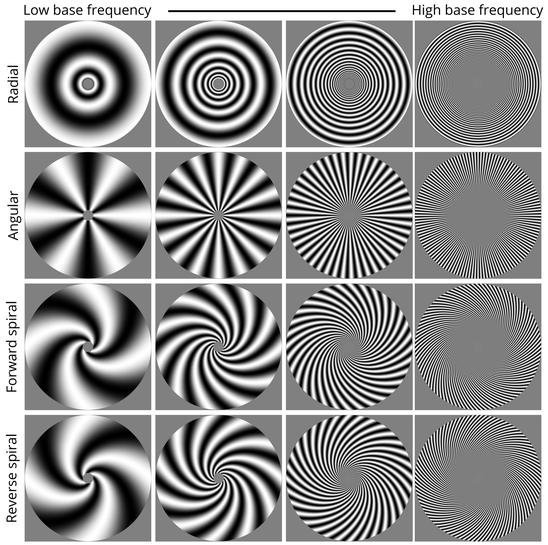
Extreme Possibilities

SF preferences constant across visual field

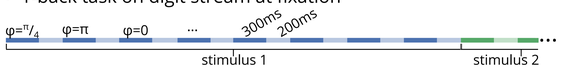
SF preferences scale with eccentricity



Stimuli and Task

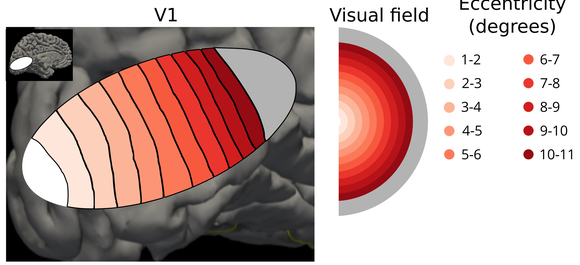


- 40 stimuli (10 base frequencies in 4 categories), 8 phases each
- Spanned 1 to 12 degrees
- Presented once in each of 12 runs in random order
- 1-back task on digit stream at fixation

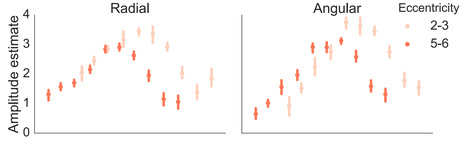


Analysis

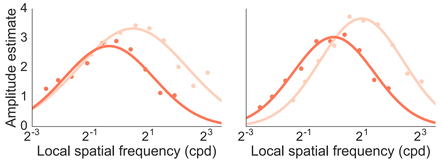
- GLMdenoise to estimate a (bootstrapped) response amplitude per voxel per stimulus
- Bayesian retinotopy to estimate an eccentricity and angle for each voxel's population receptive field



Extract data and average by eccentricity band

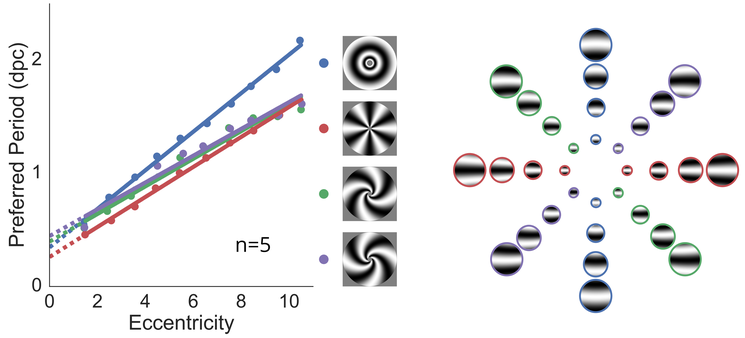


Fit log-normal tuning curve to each bootstrap

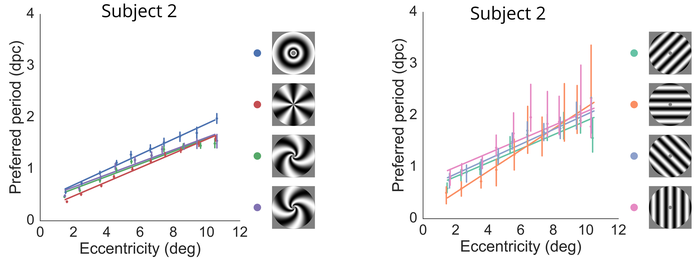
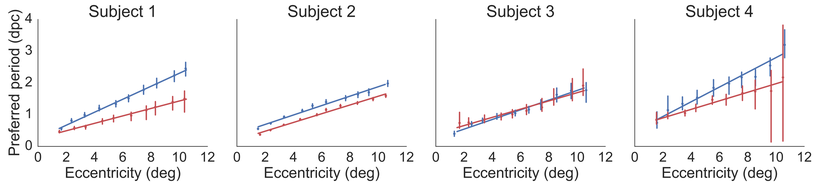


Results

V1 preferred period grows linearly with eccentricity and local orientation information matters



Conventional full-field gratings produce similar results, but with much larger error bars



Subjects all show similar patterns, though data quality varies