

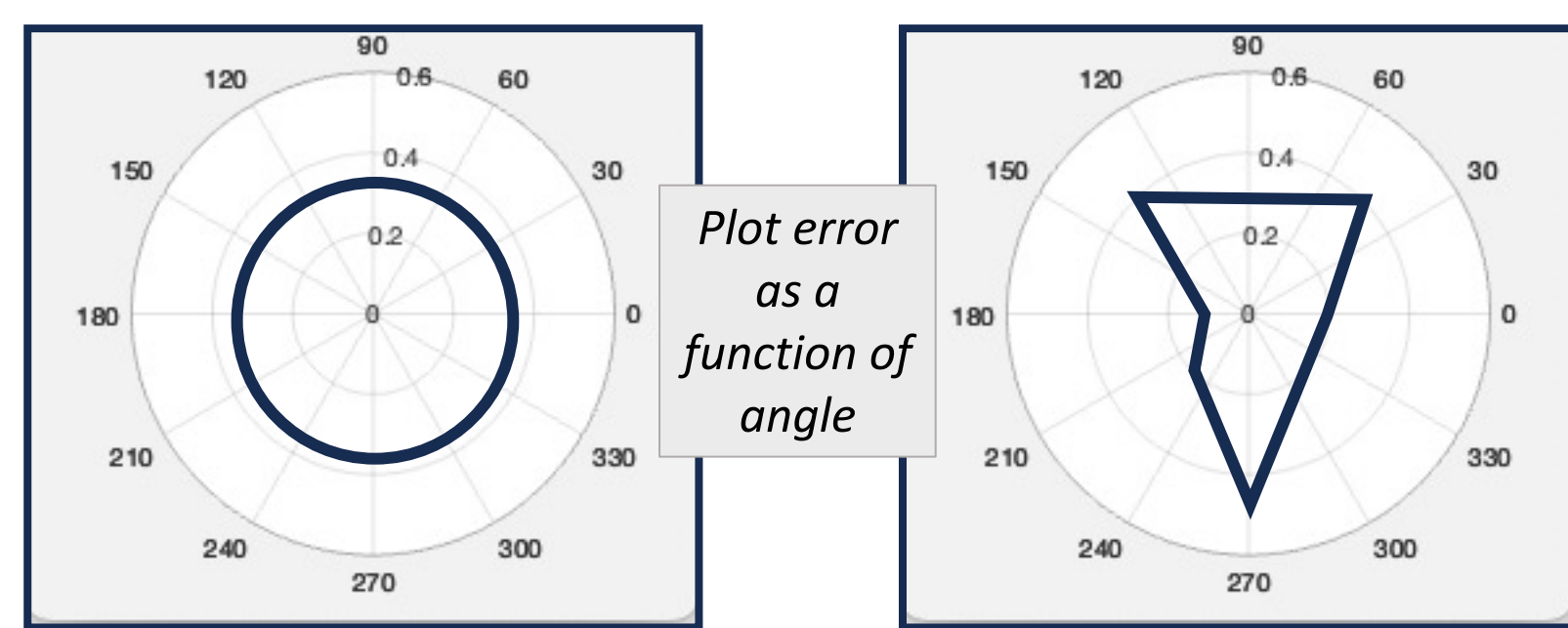
## Background

- Target eccentricity is positively correlated with both reaction time and error rates in visual search (Carrasco, et. al, 1998).
- The probability of making a saccade to a target at any given fixation point is only ~50% (Wu & Wolfe, 2022).
- The Functional Visual Field (FVF) is the area of a scene around fixation that can be processed (Sanders, 1970).

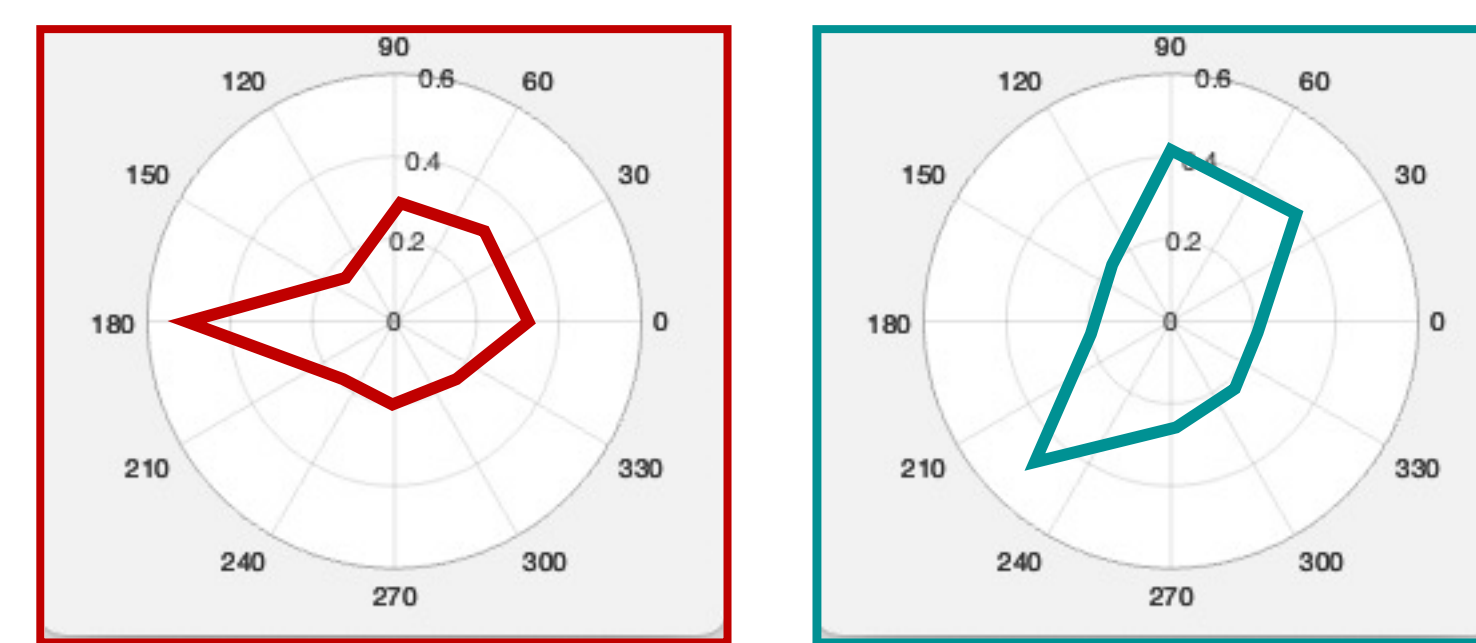
## Could processing within the FVF be heterogenous?

### Questions and Hypotheses

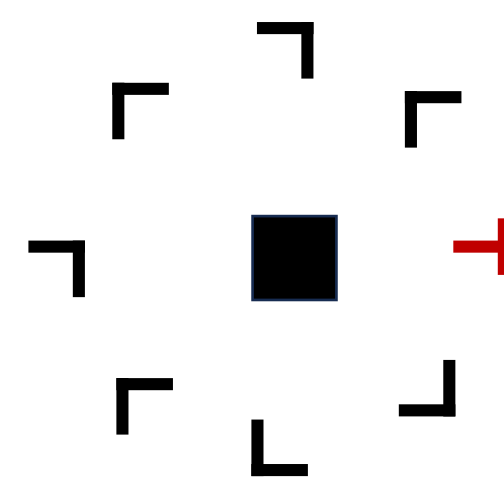
Is performance **homogeneous** or **heterogeneous**?



If heterogeneous, is performance **Idiosyncratic**?

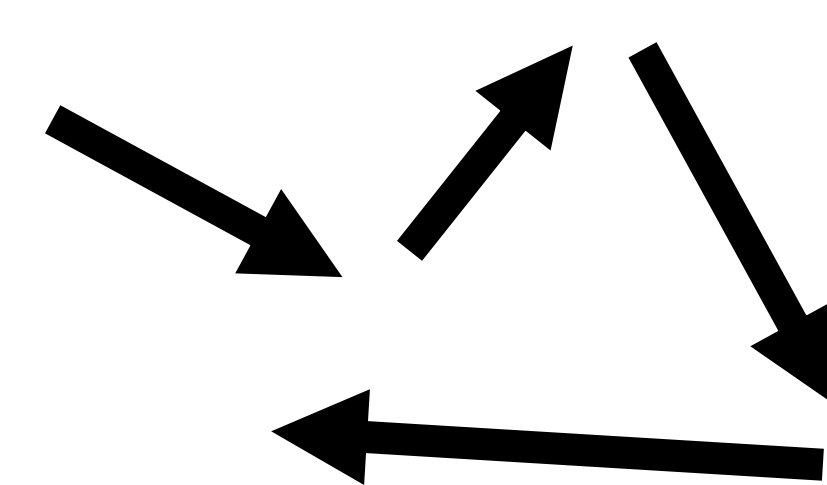


Would the heterogeneity go away if the target was uniquely **red**?



Persistent heterogeneity might indicate a retinal, not attentional cause

Does it matter if the eyes move before each trial?

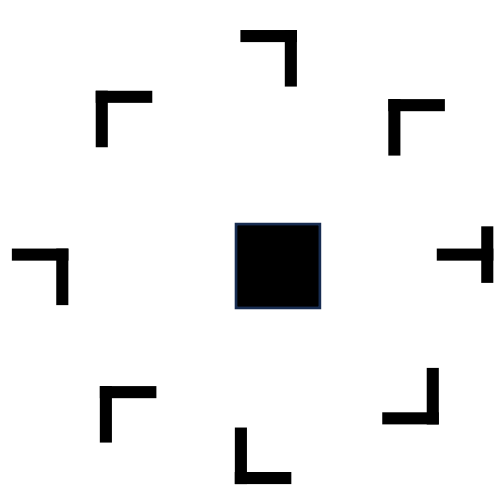


Maybe there is a saccadic momentum effect

## Methods

### Task

- 1) Move eyes to fixation
- 2) 7 Ls and 1 T flash in ring for 150 msec around fixation (masked)



- 3) Os make a 4AFC decision about T orientation

### Parameters

- 1) 2 different radii (It didn't matter)
- 2) 2 conditions and 2 sessions for each (ABAB/BABA order)
- 3) Fixation point could be stationary or move to a different spot on each trial
- 4) The dependent measure is error rate as a function of radial position of the target

## Results

### Exp. 1

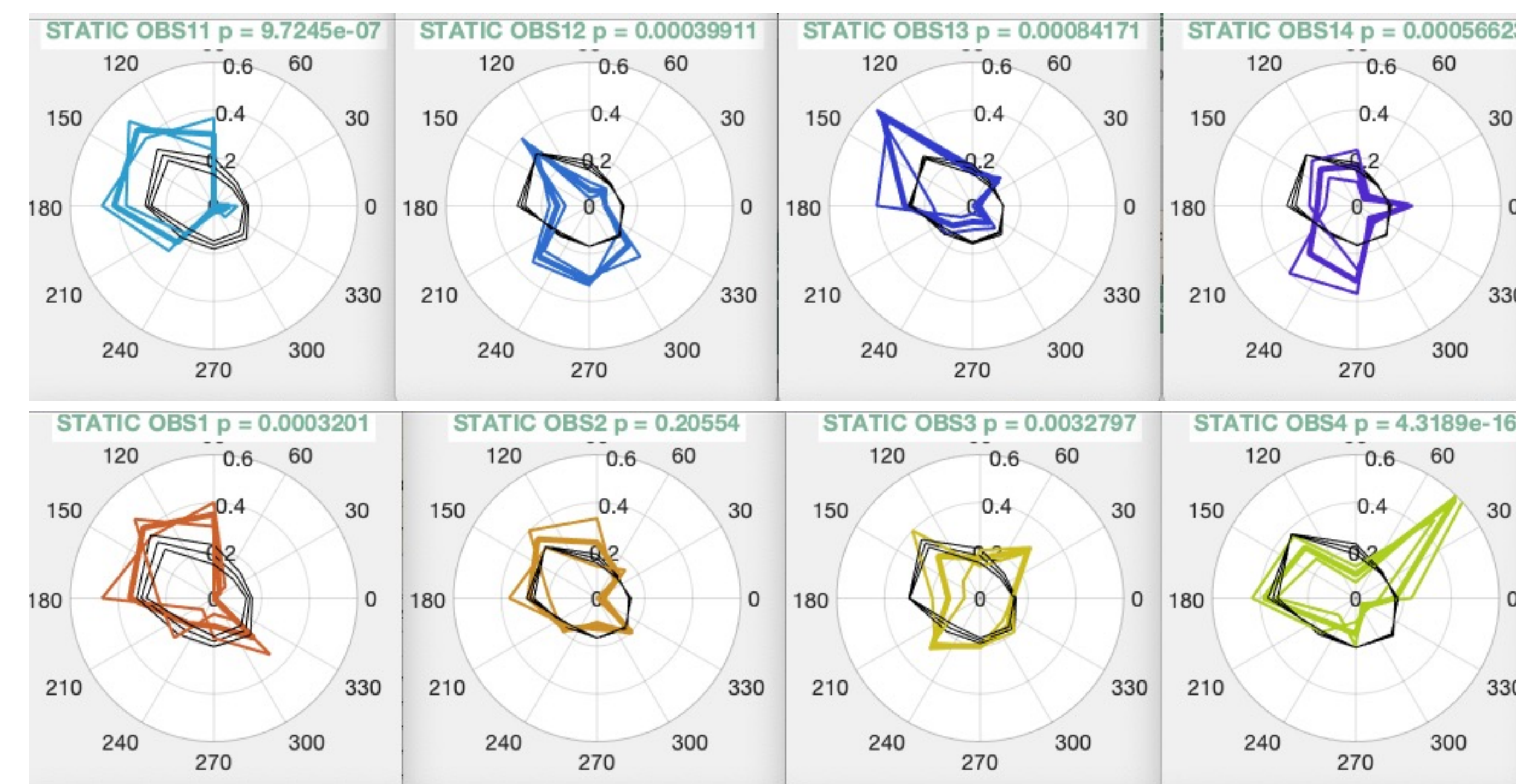
N=20

Each graph is one observer (sampled from larger dataset)

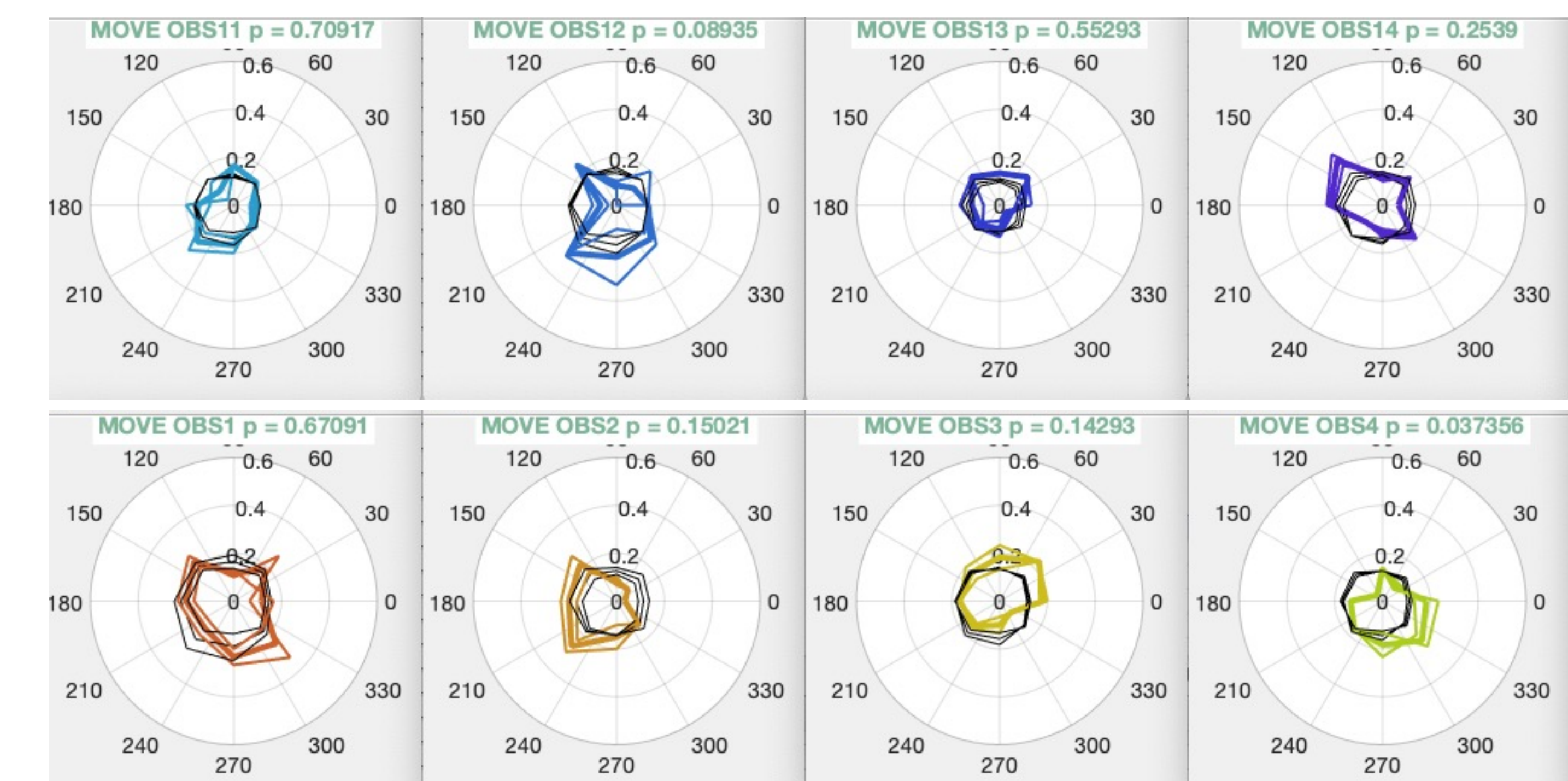
3 colored lines averaged across radii within session (1,2, and average)

The thin black lines are avg data for all Os

Static with Black T produces idiosyncratic heterogeneity



Moving with Red T produces less heterogeneity

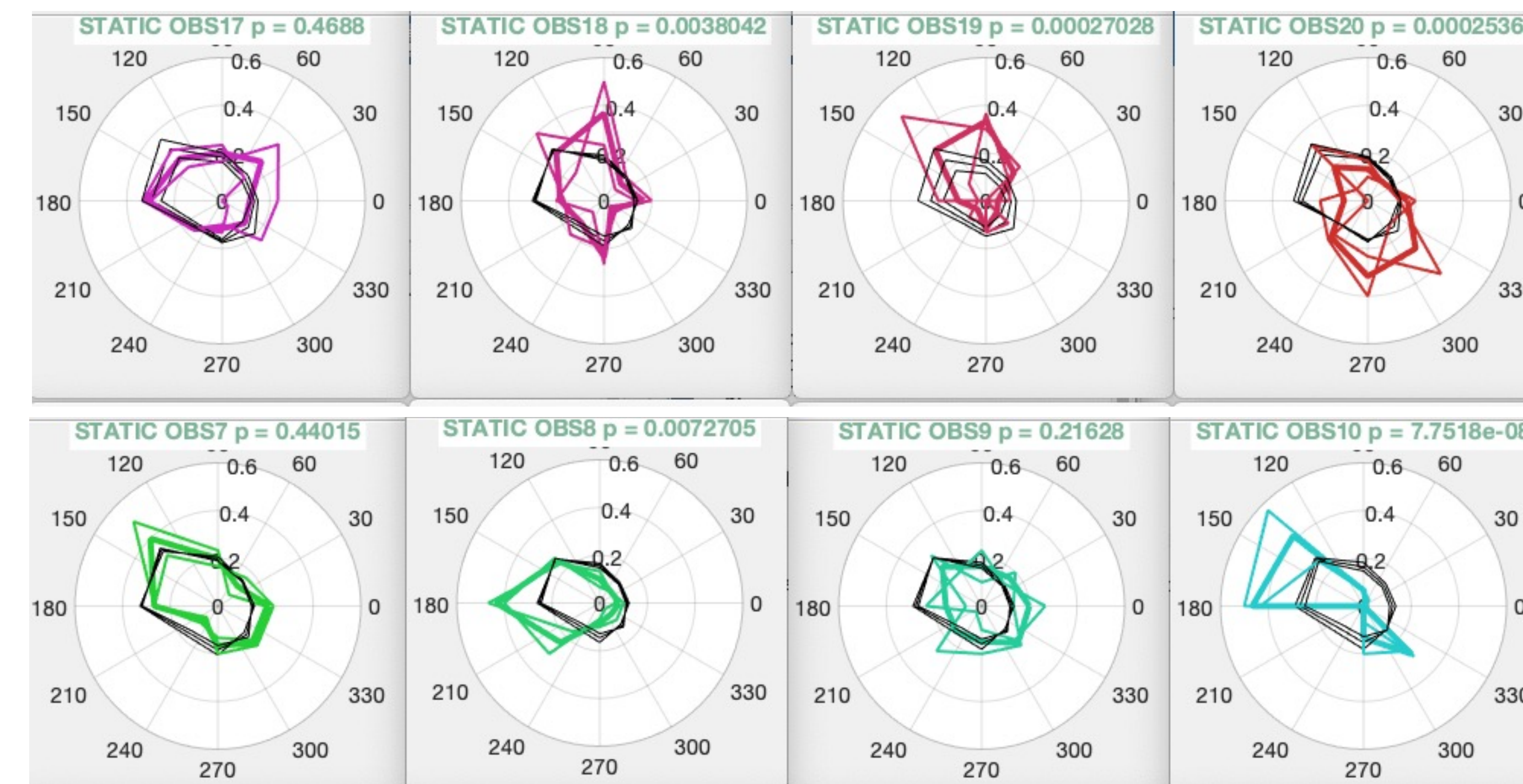


### Exp. 2

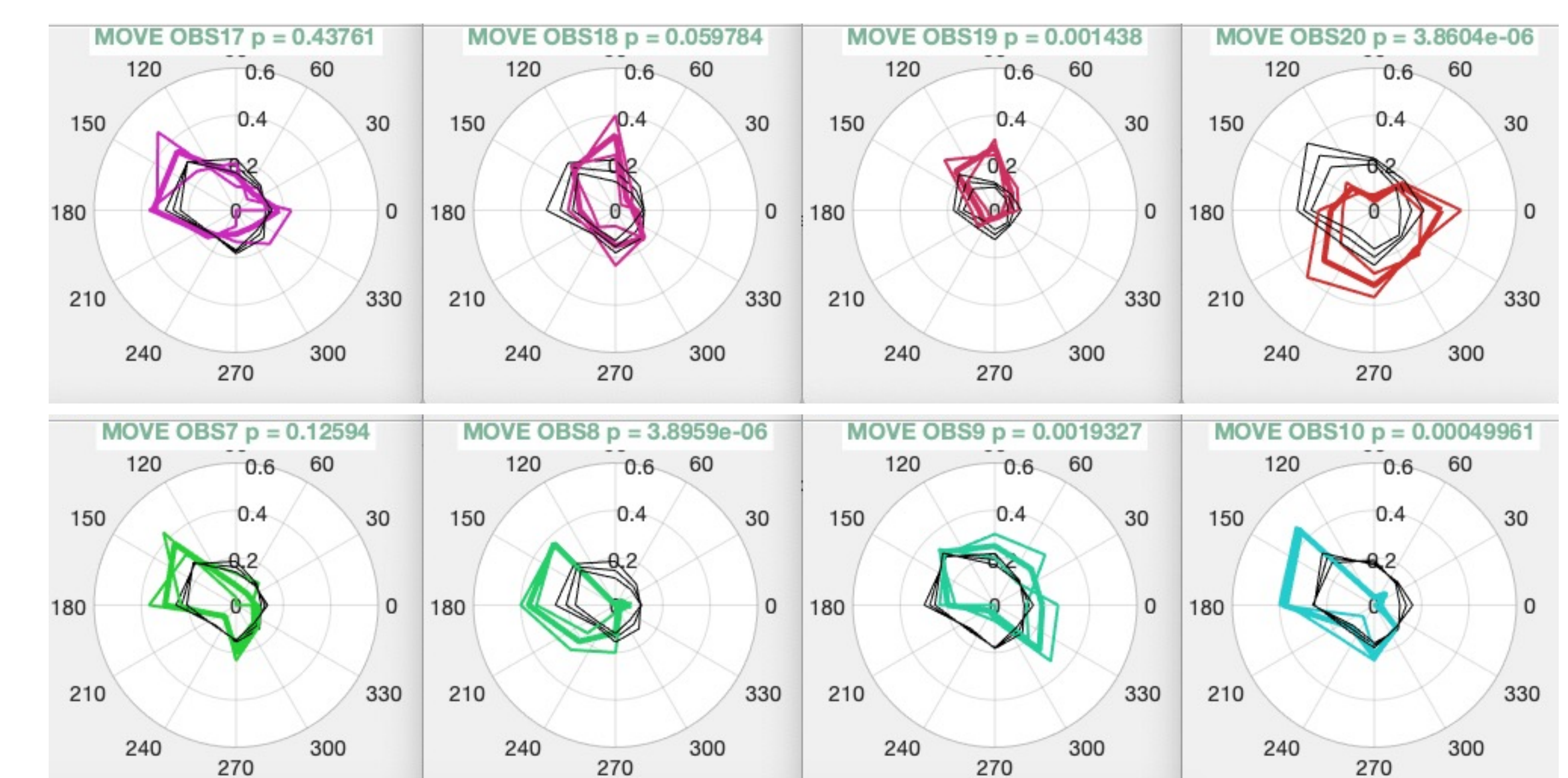
N=20

Pale green p-value is a chi-sq test against homogeneity

Static with Black T produces idiosyncratic heterogeneity (replication)



Moving with Black T produces similar heterogeneity for each observer



## Conclusions

- Our results suggest that processing within the FVF is heterogenous.
- Pop-out search largely abolishes idiosyncratic error patterns, suggesting that heterogenous FVF processing is a result of idiosyncratic biases in covert attention deployment (either in series or in parallel, you choose)
- The saccades between trials do not markedly affect idiosyncratic patterns of errors.
- Could these idiosyncrasies produce errors? Might we have attentional blindspots?

## References

- Carrasco, M., McLean, T. L., Katz, S. M., & Frieder, K. S. (1998). Feature asymmetries in visual search: Effects of display duration, target eccentricity, orientation and spatial frequency. *Vision Research*, 38(3), 347–374. [https://doi.org/10.1016/S0042-6989\(97\)00152-1](https://doi.org/10.1016/S0042-6989(97)00152-1)
- Wu, C.-C., & Wolfe, J. M. (2022). The Functional Visual Field(s) in simple visual search. *Vision Research*, 190, 107965. <https://doi.org/10.1016/j.visres.2021.107965>
- Sanders, A. F. (1970). Some Aspects of the Selective Process in the Functional Visual Field. *Ergonomics*, 13(1), 101–117. <https://doi.org/10.1080/00140137008931124>

## Acknowledgement

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