

The Hutchinson Lab  
of Cognitive Neuroscience

# Network Configurations Underlying External Versus Internal Attention

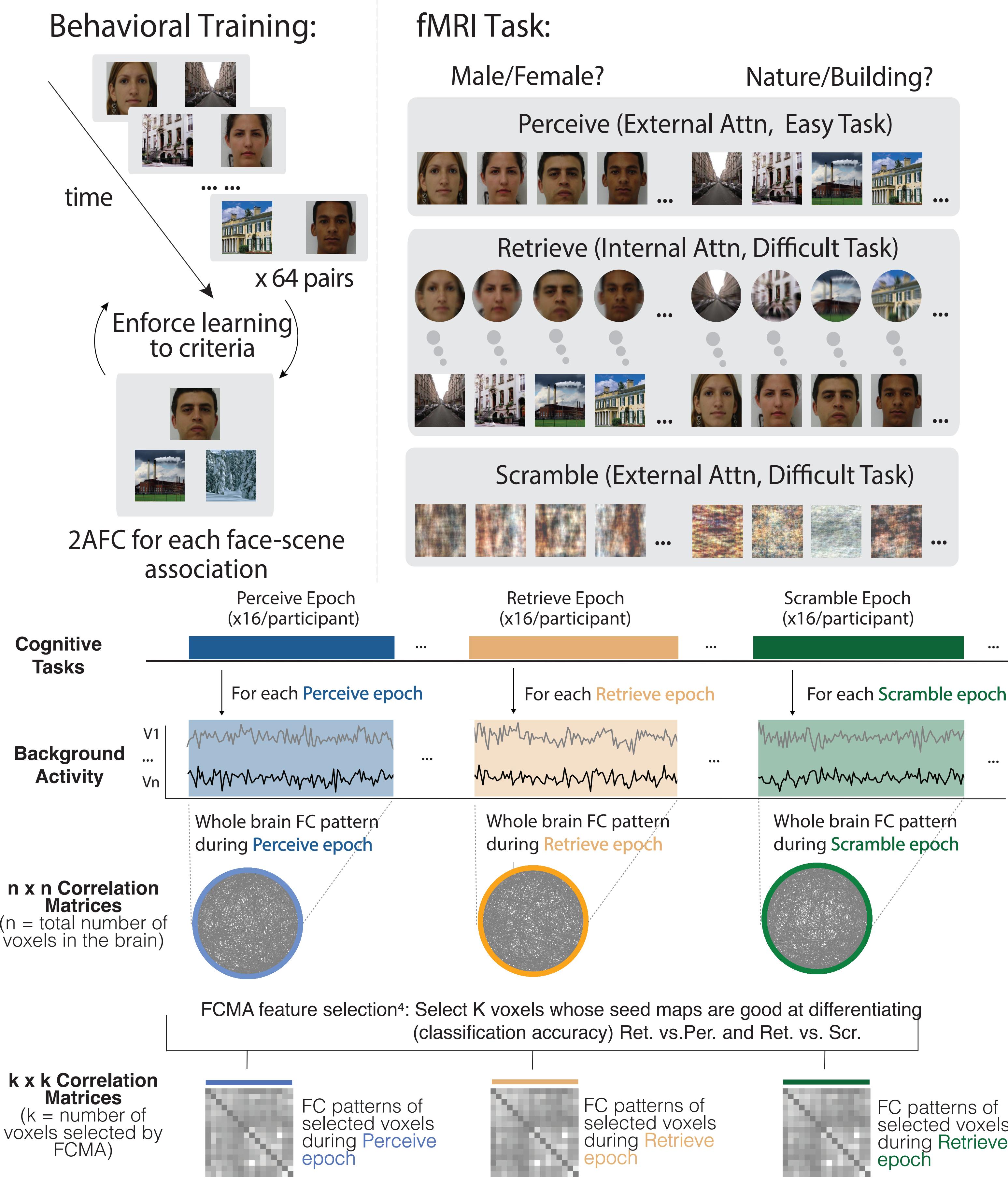
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## Introduction

- The same input information can be either the target of perception or additionally the cue that triggers retrieval.
- Selective attention account<sup>1</sup>:
  - Deploy attention externally:** Selectively attend to perceptual features related to the input information.
  - Deploy attention internally:** Selectively attend to self-generated, mnemonic episodes associated with the input information.
- Attention strengthens the coupling, as measured by background functional connectivity between goal-relevant areas<sup>2,3</sup>.
- How does the brain implement external versus internal attention?

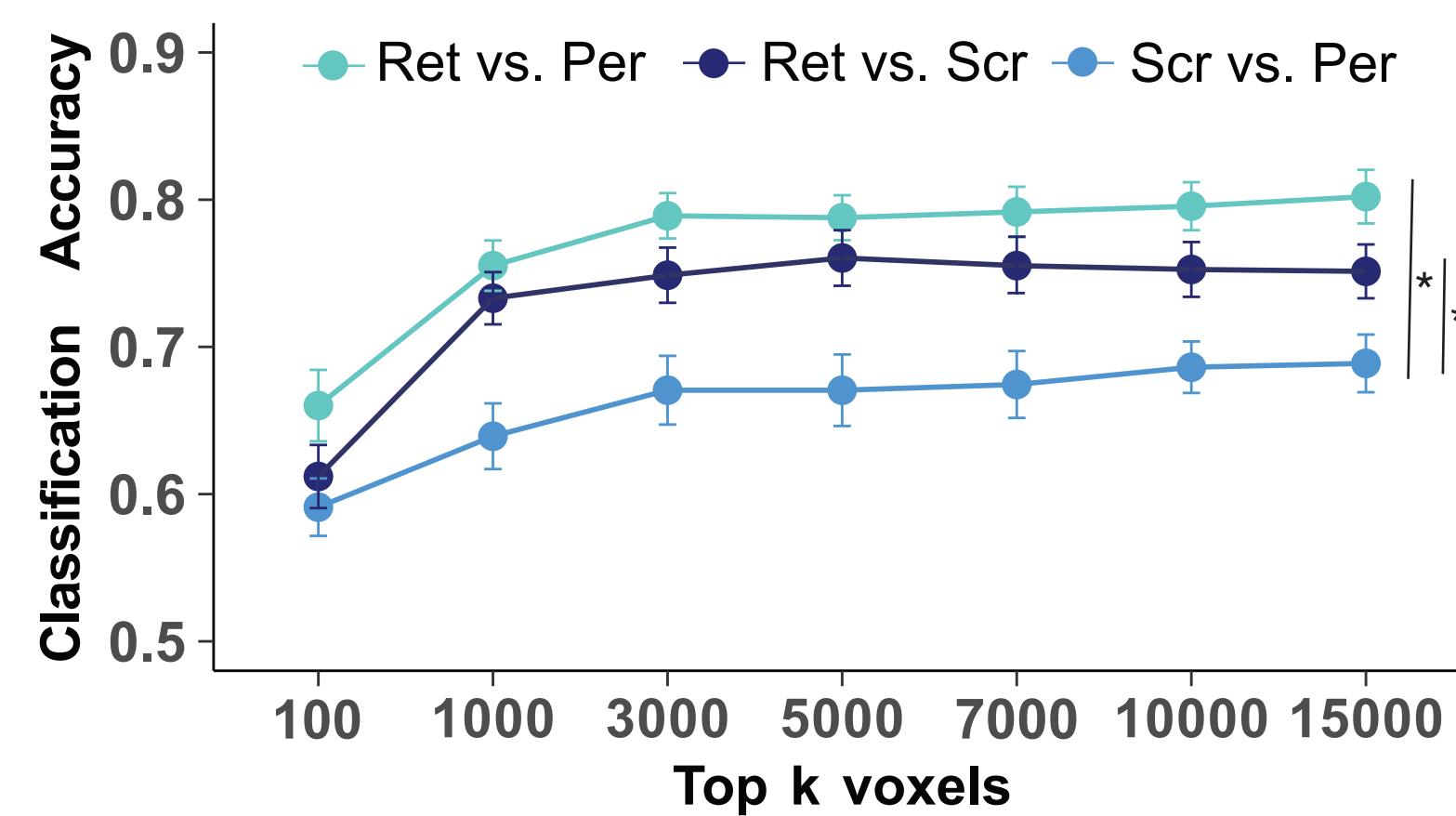
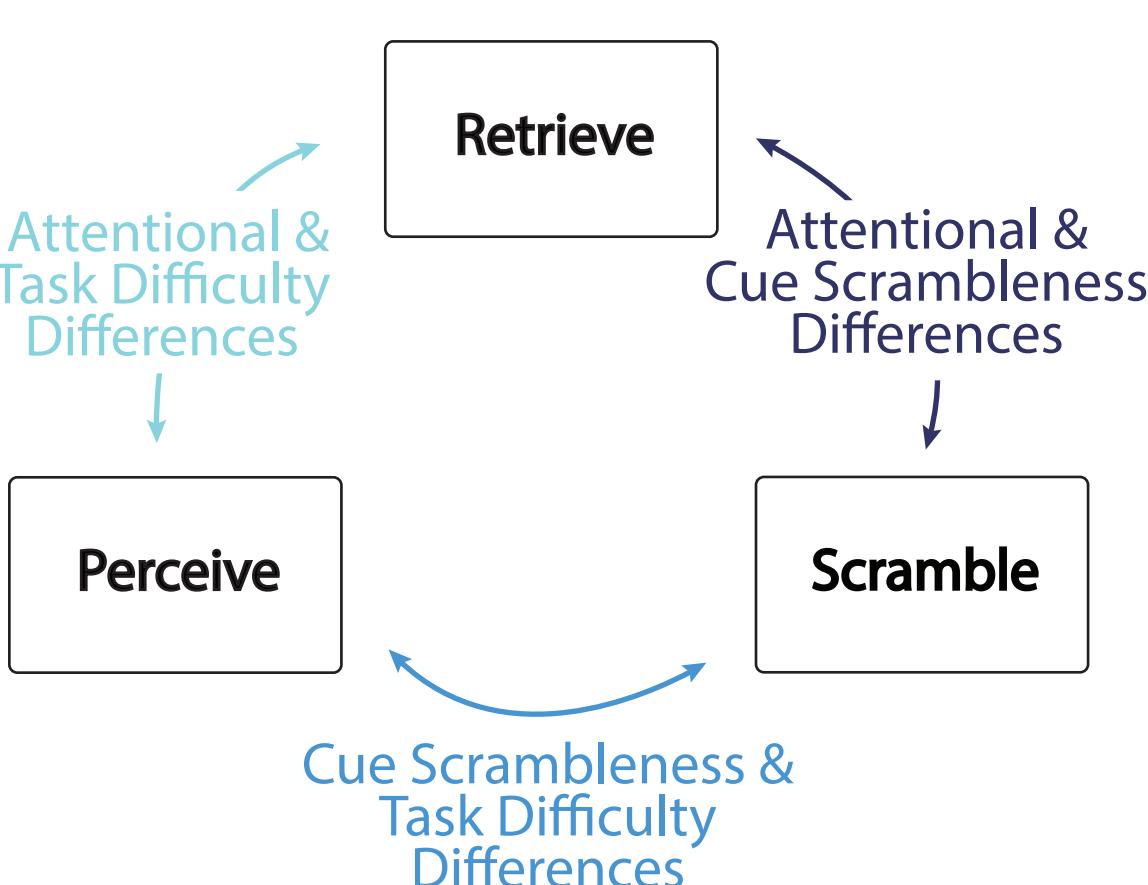
## Task Paradigm / Analysis Pipeline



## FC Captures Attentional Differences

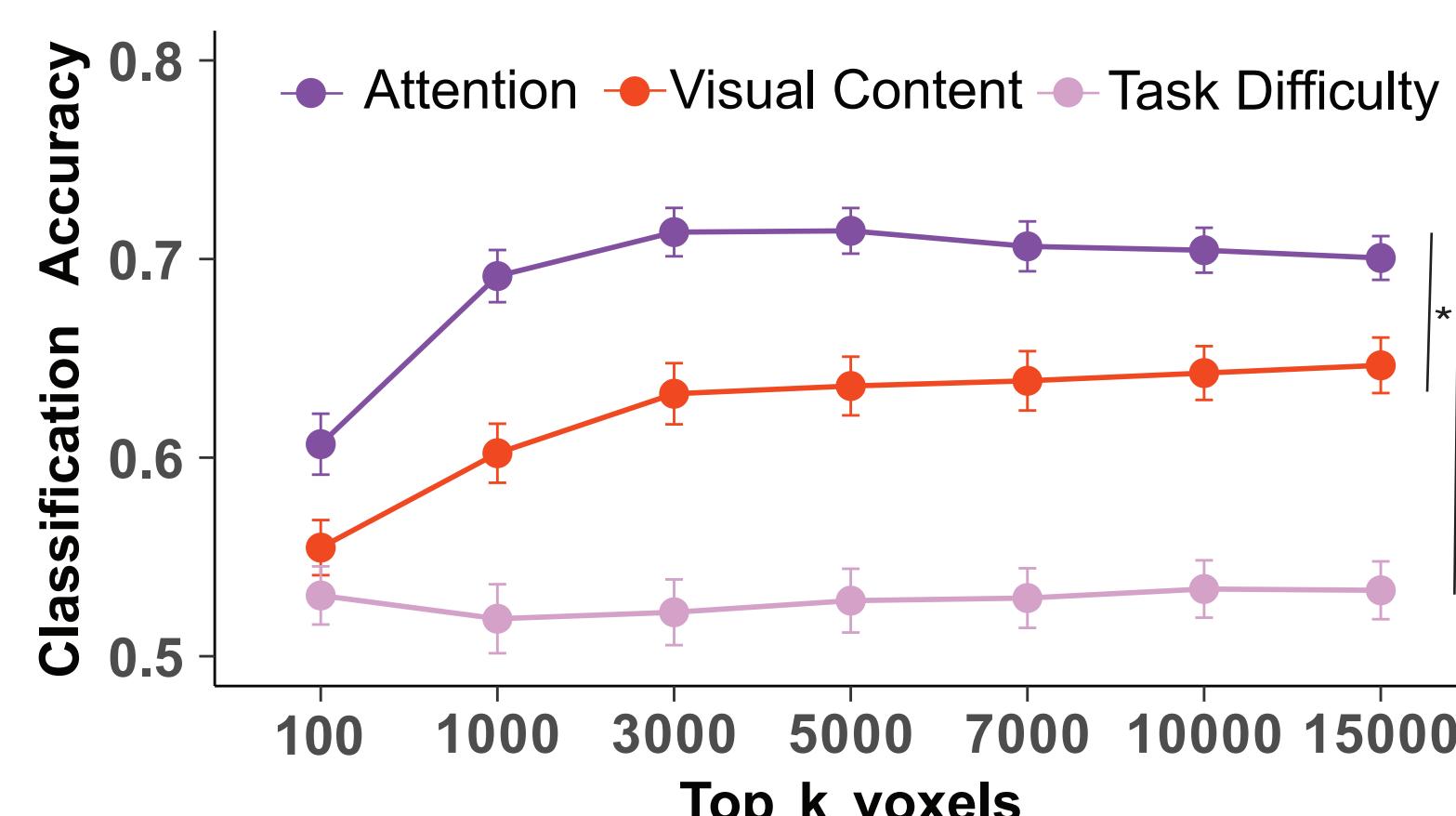
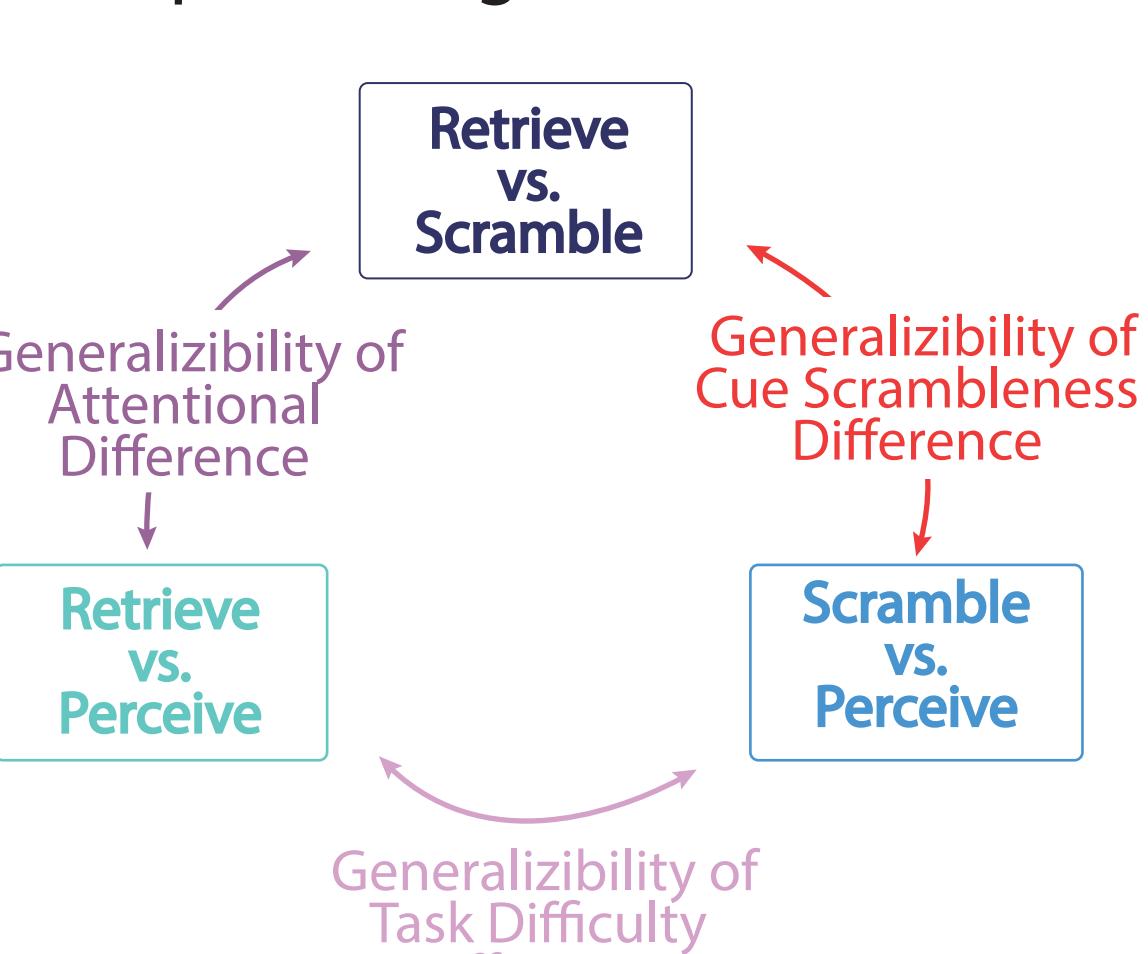
Train/test condition-wise classifiers:

- FC patterns preferentially capture external vs. internal attentional differences.



Train/test generalization classifiers:

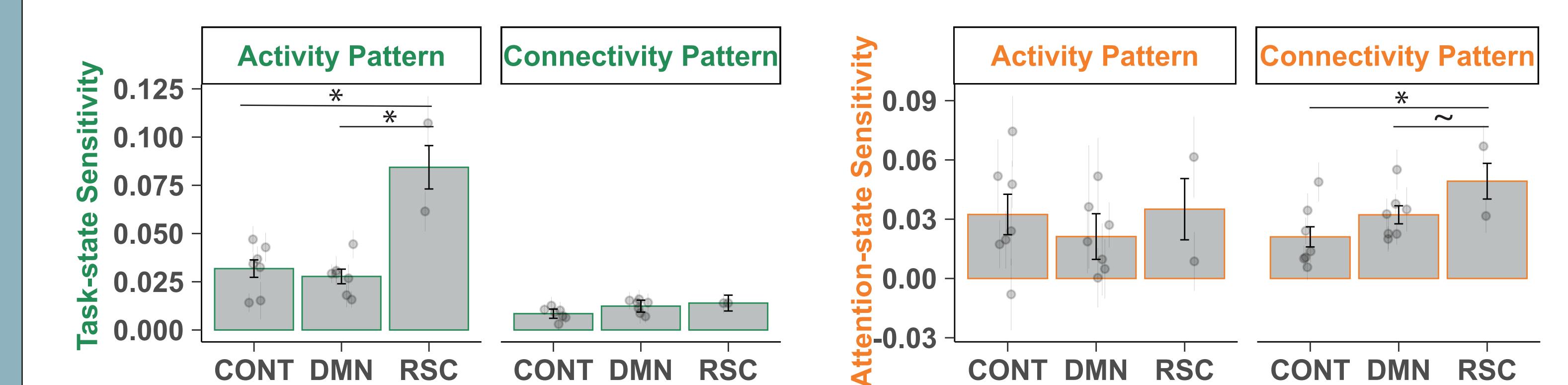
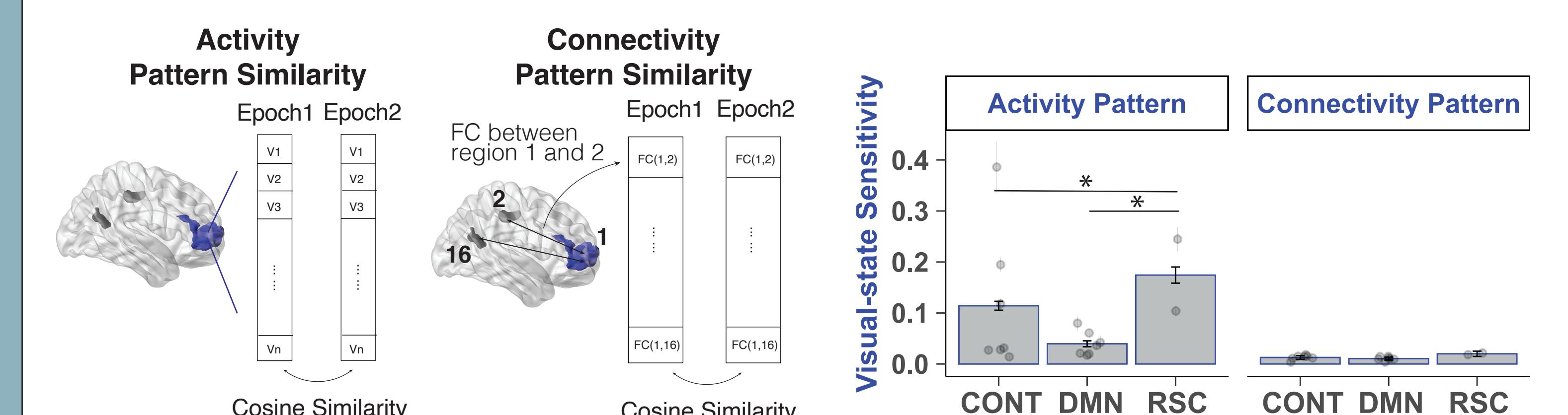
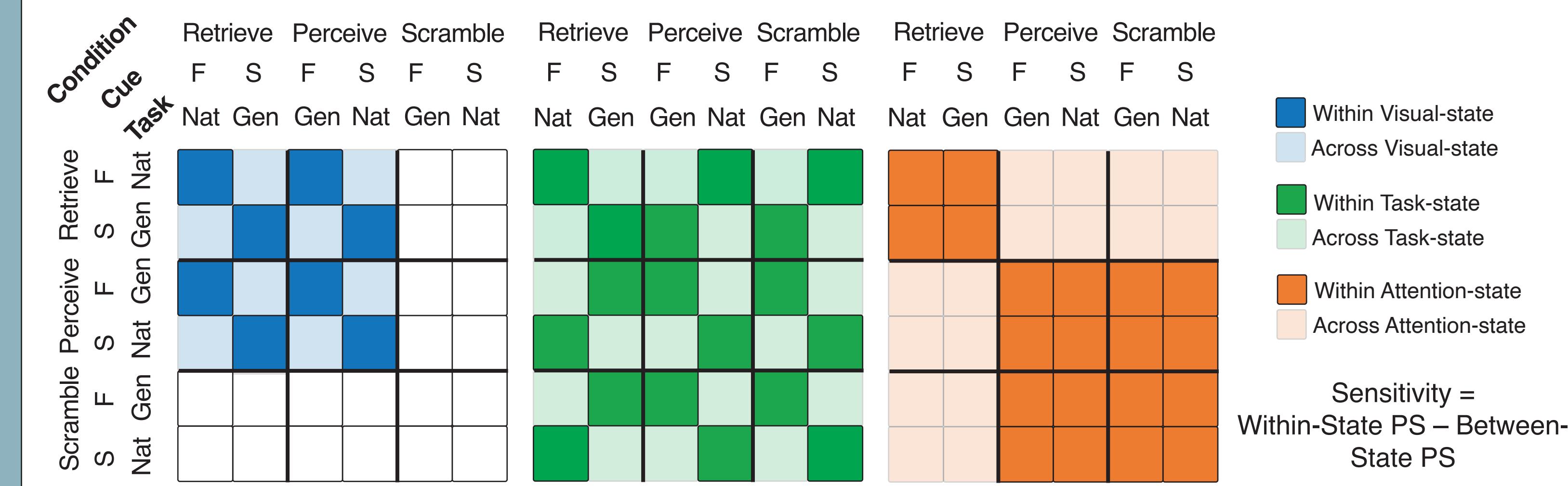
- FC patterns generalize in terms of attention more so than other factors.



## RSC Plays an Important Role

What information does each functional community capture?

- What is currently being presented --- Face or Scene ?
- What is the current task goal --- Gender or Naturalness ?
- How to achieve the goal --- Attend externally or Attend Internally ?



- RSC activity patterns showed the greatest sensitivity to both the current perceptual experience and task goals.
- RSC connectivity patterns showed the greatest sensitivity to attention (i.e., external vs. internal).

## Discussion

- External attention is characterized by stronger within Control network connectivity density and stronger coupling between RSC and DMN.
- Internal attention is characterized by stronger within DMN connectivity density and stronger coupling between RSC and Control network.
- Retrosplenial cortex may play an important role in integrating external and internal information<sup>5</sup>, which parallels function bridging sensory and MTL in formation in rodent literature.

### References

1. Chun et al. (2011) *Annu. Rev. Psychol.*
2. Al-Aidroos et al. (2012) *PNAS*
3. Turk-Browne (2013) *Science*
4. Wang et al. (2015) *J. Neurosci. Method*
5. Ranganath & Ritchey (2012) *Nat. Rev. Neurosci.*
6. Bicanski & Burgess (2018) *Elife*