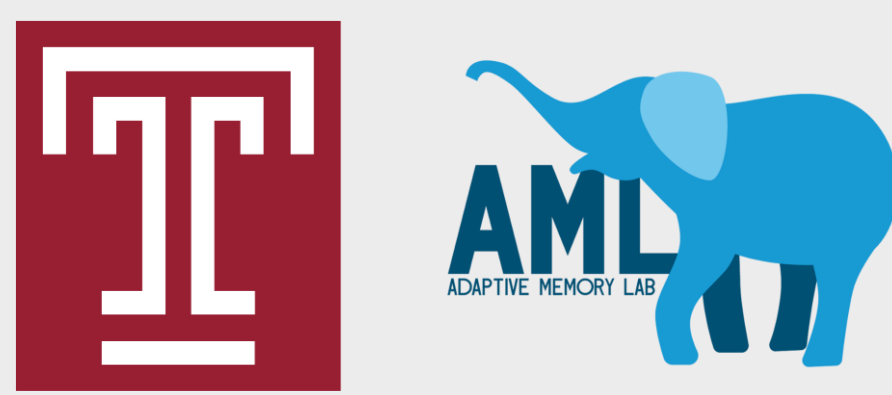


# Evidence for adult-like hippocampal pattern similarity across shared contexts in early childhood

Elizabeth A. Eberts<sup>1</sup>, Susan L. Benaer<sup>1</sup>, Chi T. Ngo<sup>2</sup>, Emily Cowan<sup>1</sup>, M. Catalina Camacho<sup>3</sup>, Susan B. Perlman<sup>3</sup>, Vishnu P. Murty<sup>1</sup>

<sup>1</sup>Temple University, <sup>2</sup>Max Planck Institute for Human Development, <sup>3</sup>Washington University of St. Louis



## Introduction

Hippocampus (HPC) supports discrimination between similar features of events

Overlapping events spark 'repulsion' or disambiguation in HPC representations and behavioral discrimination<sup>1,2,3</sup>

Hippocampal structure undergoes protracted development throughout childhood<sup>4,5,6</sup>

Behavioral data suggests that the ability to make similar representations distinct develops late in childhood<sup>7</sup>

There is a developmental transition from primarily extracting generalized knowledge to specificity of events<sup>7</sup>

Functional development of HPC and other MTL regions remains unknown

How do representations of related experiences in MTL regions change across development?

## Methods

Adults (n = 20); age: 20 – 44 (M = 26.65)

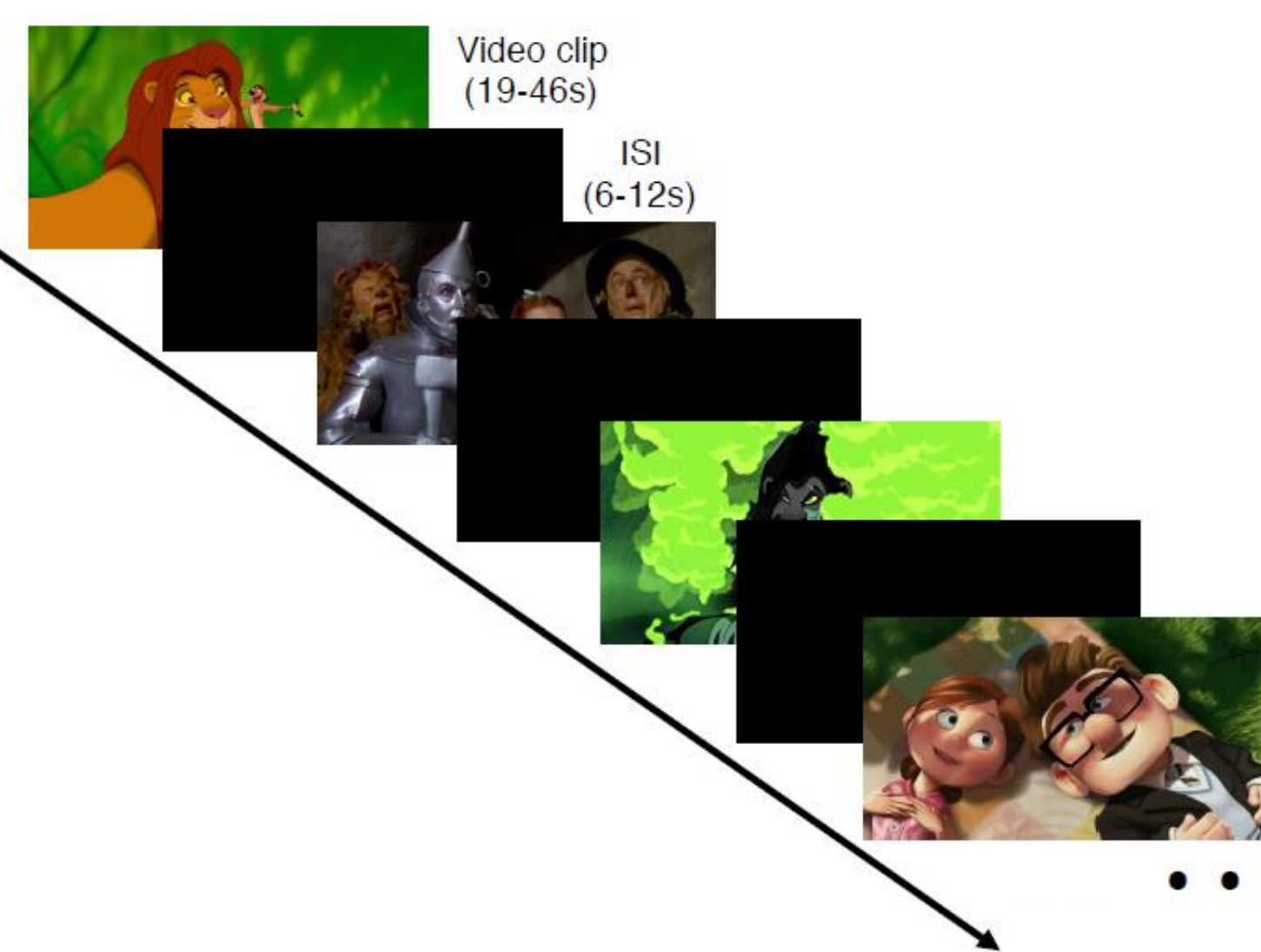
Children (n = 25); age: 4 – 10 (M = 7.36)

Watched 16 movie clips while in fMRI scanner (1 positive & 1 negative from each movie)

- Collapsed across valence for all analyses

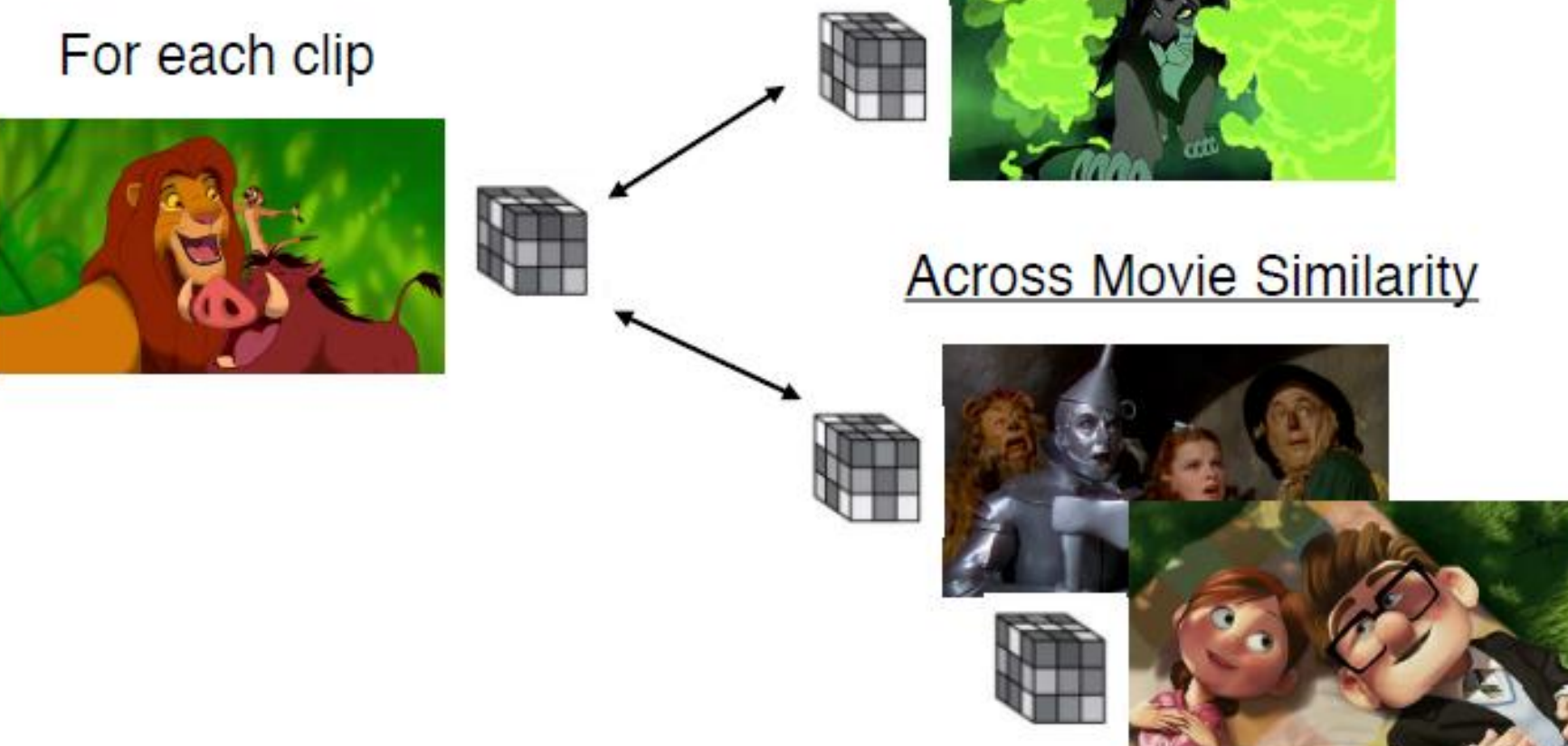
Rated familiarity for each movie

- Low familiarity:
- "never seen it"
  - "seen only parts"
- High familiarity:
- "seen it once or twice"
  - "watch it often"



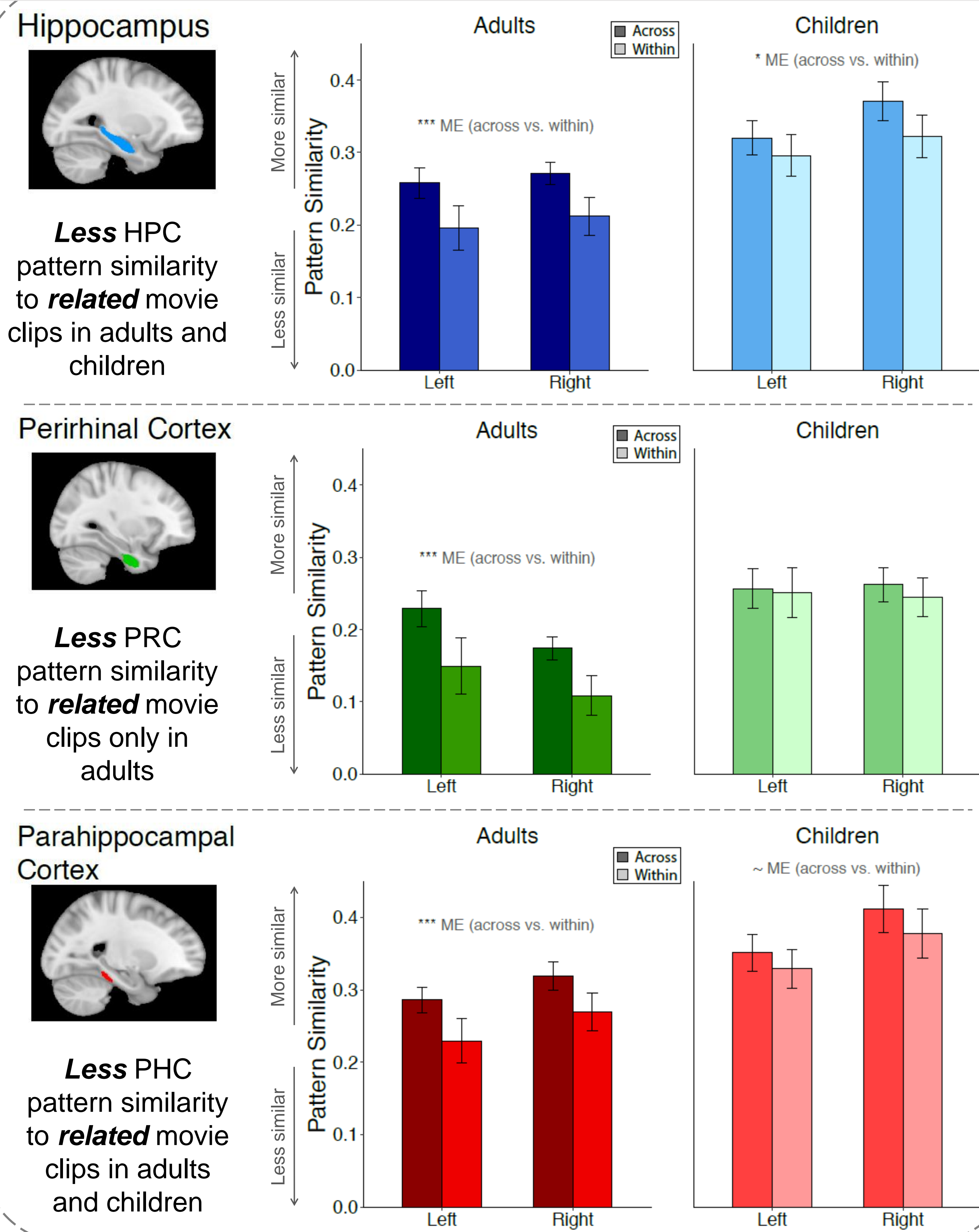
Within Movie Similarity

Across Movie Similarity

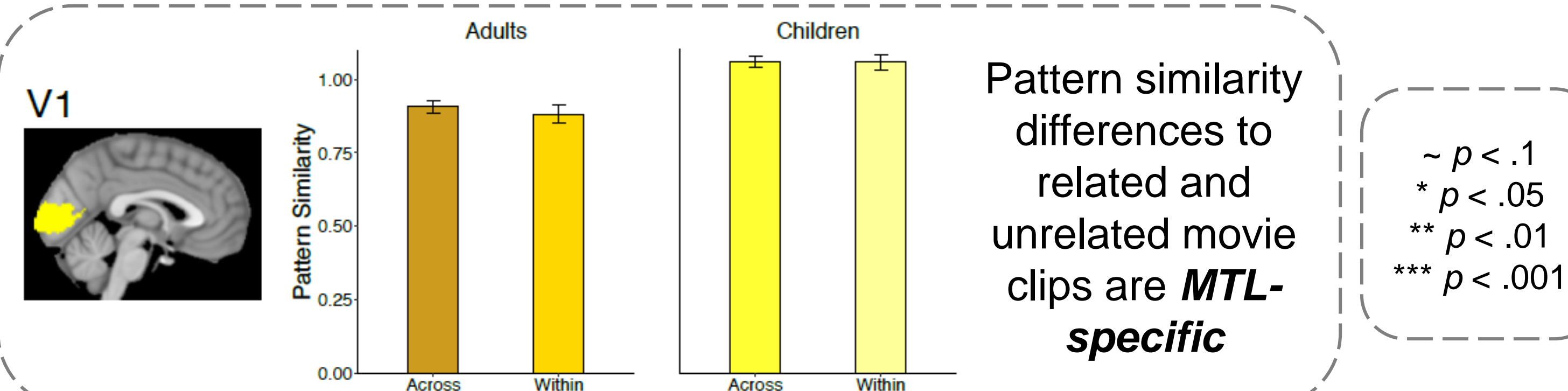
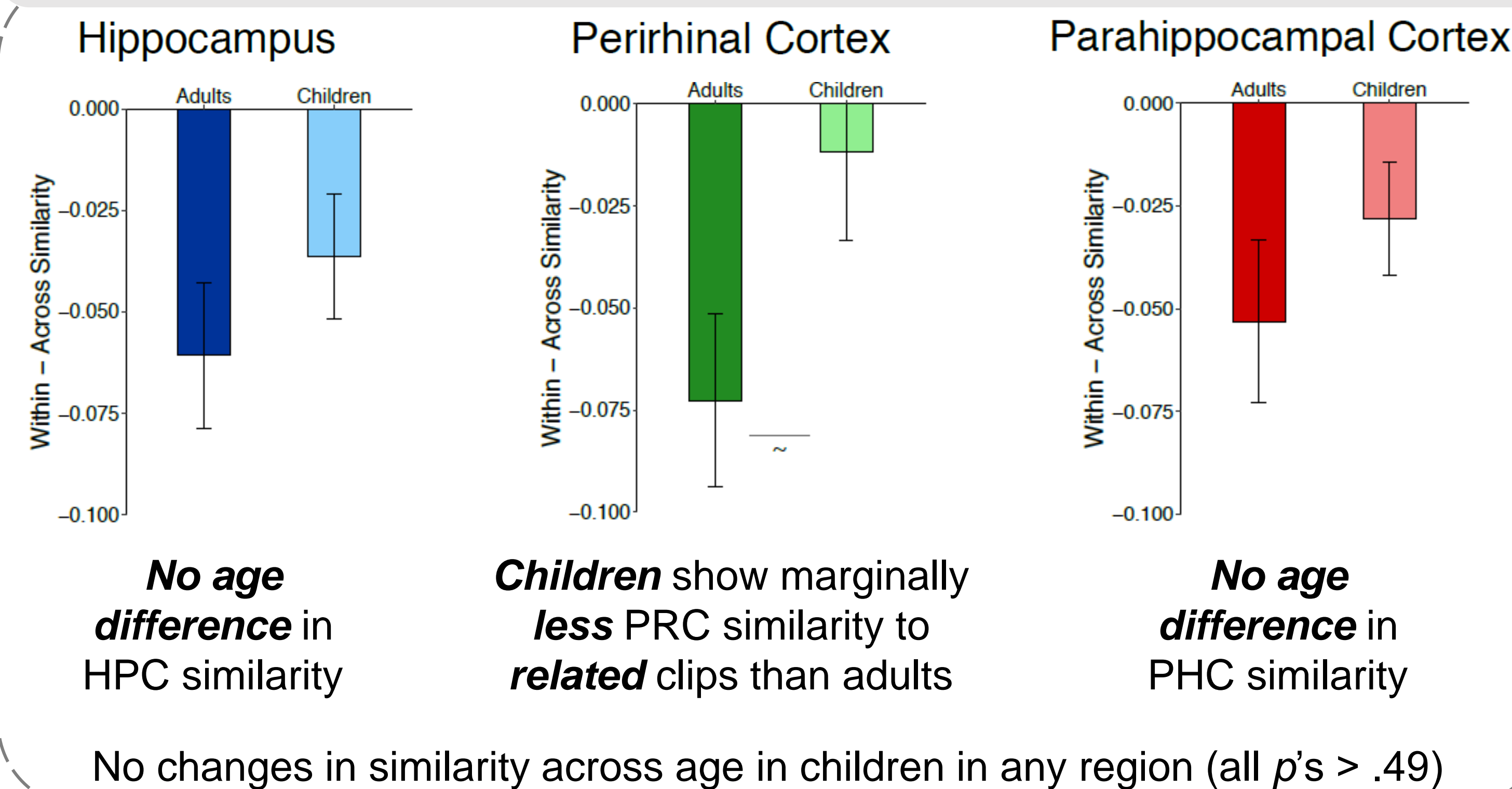


Representational Similarity Analysis (RSA) used to compare pattern similarity within (**related**) and across (**unrelated**) movies

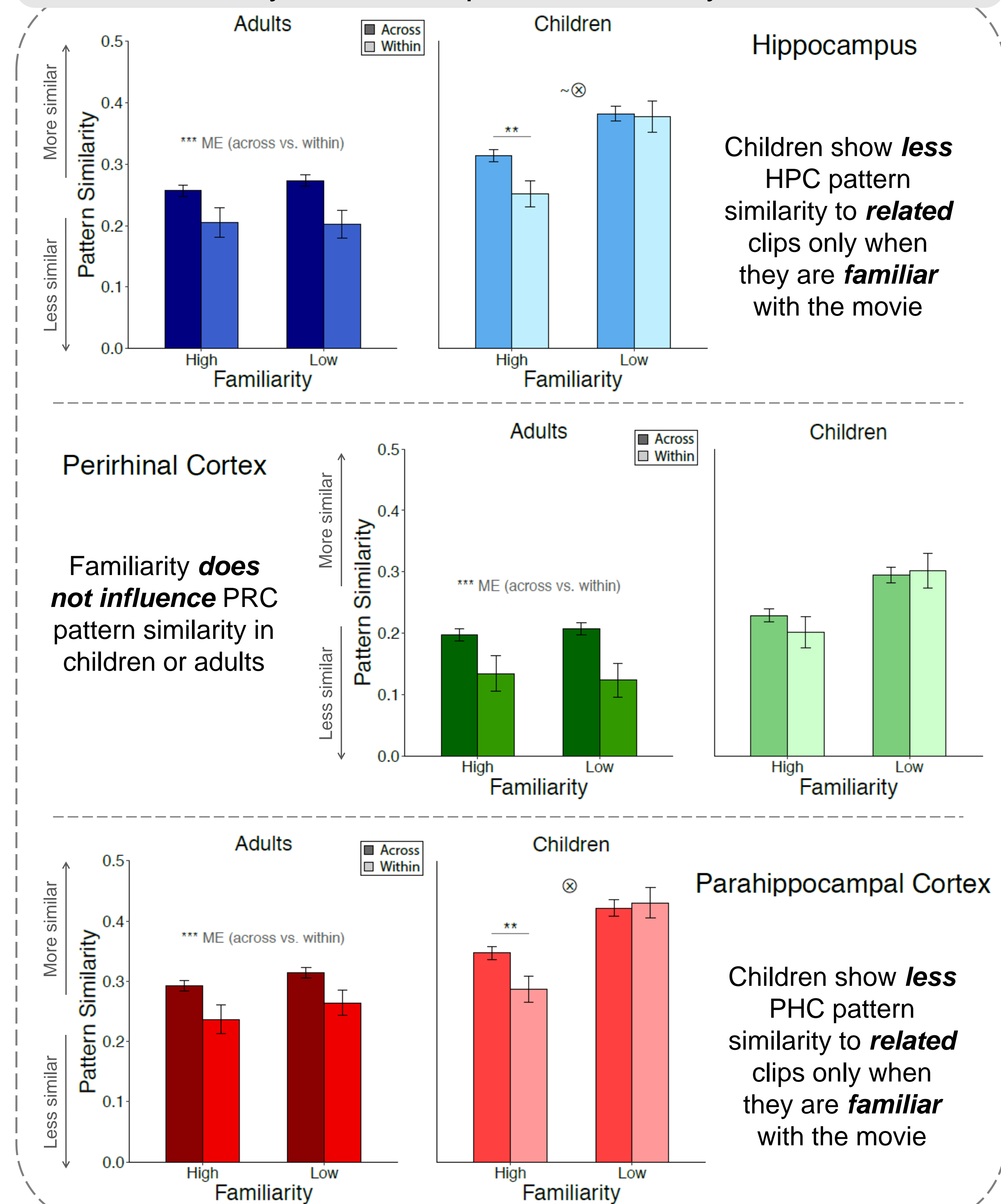
## Decreased pattern similarity for related (*within*) events



## No age differences in HPC and PHC pattern similarity



## Familiarity influences pattern similarity in children



## Discussion

Adults show less pattern similarity to related events across MTL regions, suggesting discrimination rather than integration of similar representations

Children show this pattern in HPC and PHC at an adult-like level only when they are highly familiar with the event

Evidence that some hippocampal mechanisms may reach adult-like levels in young children

Development of event representation discrimination in PHC may progress similarly to HPC

Pattern separation-like processes may develop earlier than expected but may not be fully mature until later in childhood; memory data is needed to confirm

## References

1. Favila et al. (2016). *Nat Commun*. 2. Chanales et al. (2017). *Curr Biol*. 3. Chanales et al. (2020). *bioRxiv*. 4. Pfluger et al. (1999). *Epilepsia*. 5. Lavenex & Banta Lavenex. (2013). *Behav Brain Res*. 6. Canada et al. (2019). *Cereb Cortex*. 7. Keresztes et al. (2018). *Trends Cogn Sci*.