

# Engaging narratives evoke similar brainwaves and lead to similar perception of time

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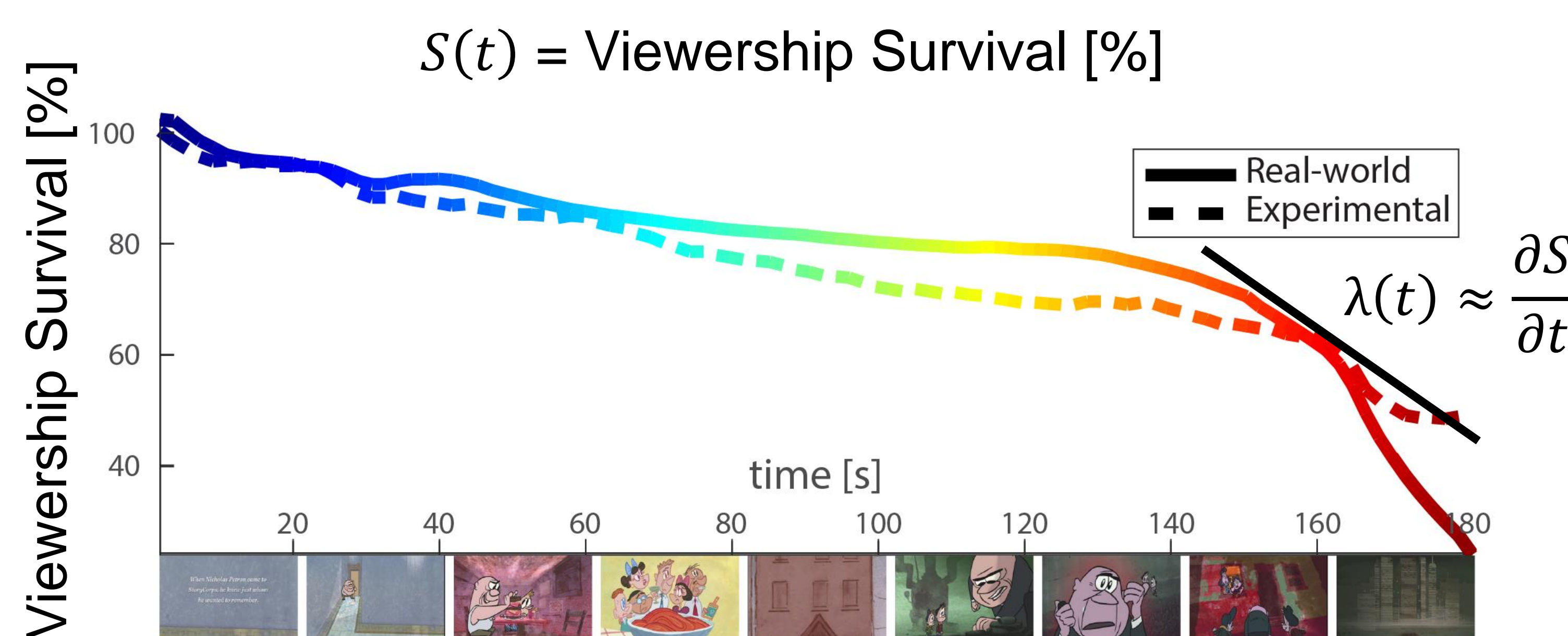
## Introduction

- It is said that we lose track of time - that “time flies” - when we are engrossed in a story.
- How does engagement with the story cause this distorted perception of time, and what are its neural correlates?

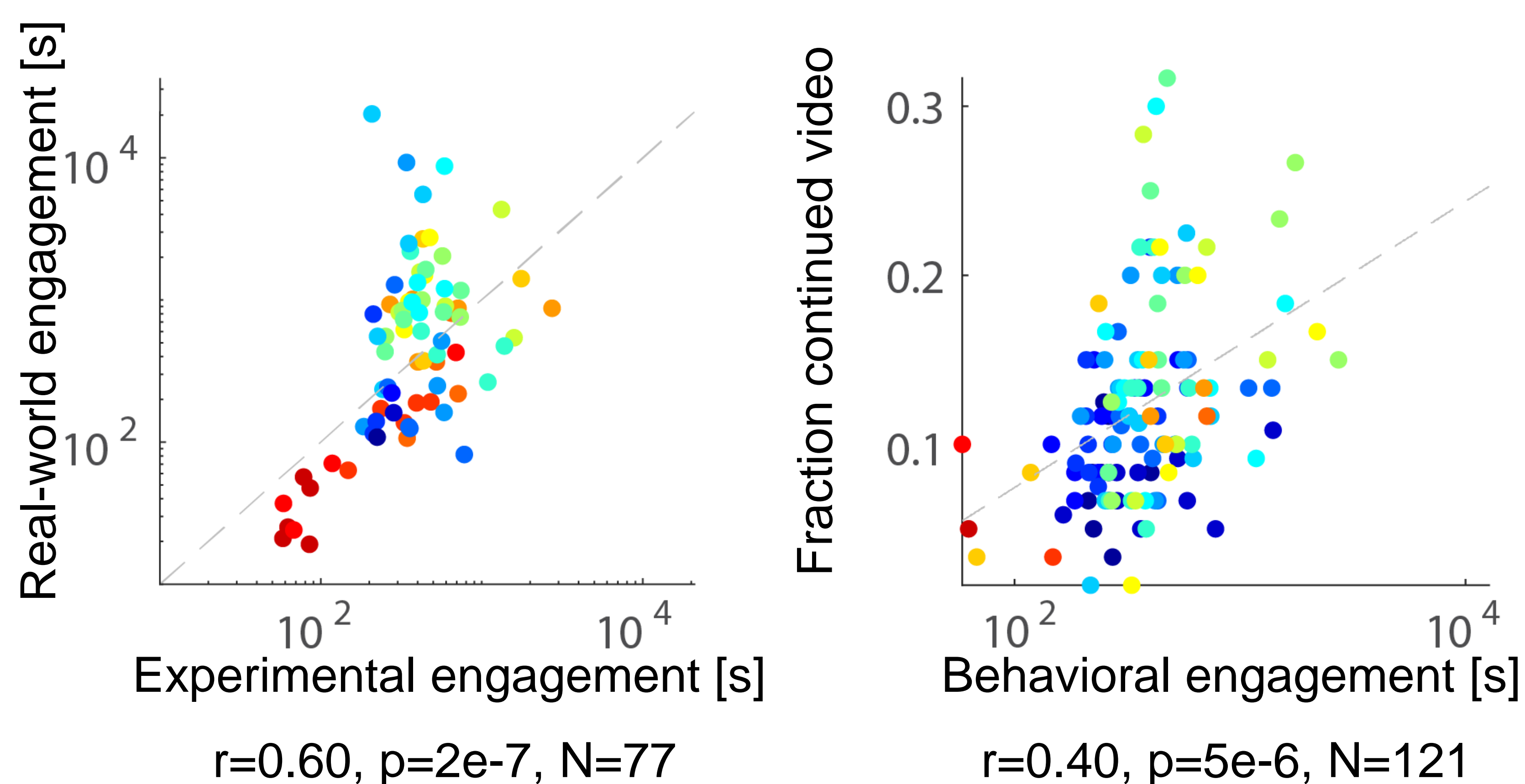
## Experimental measure of engagement behavior



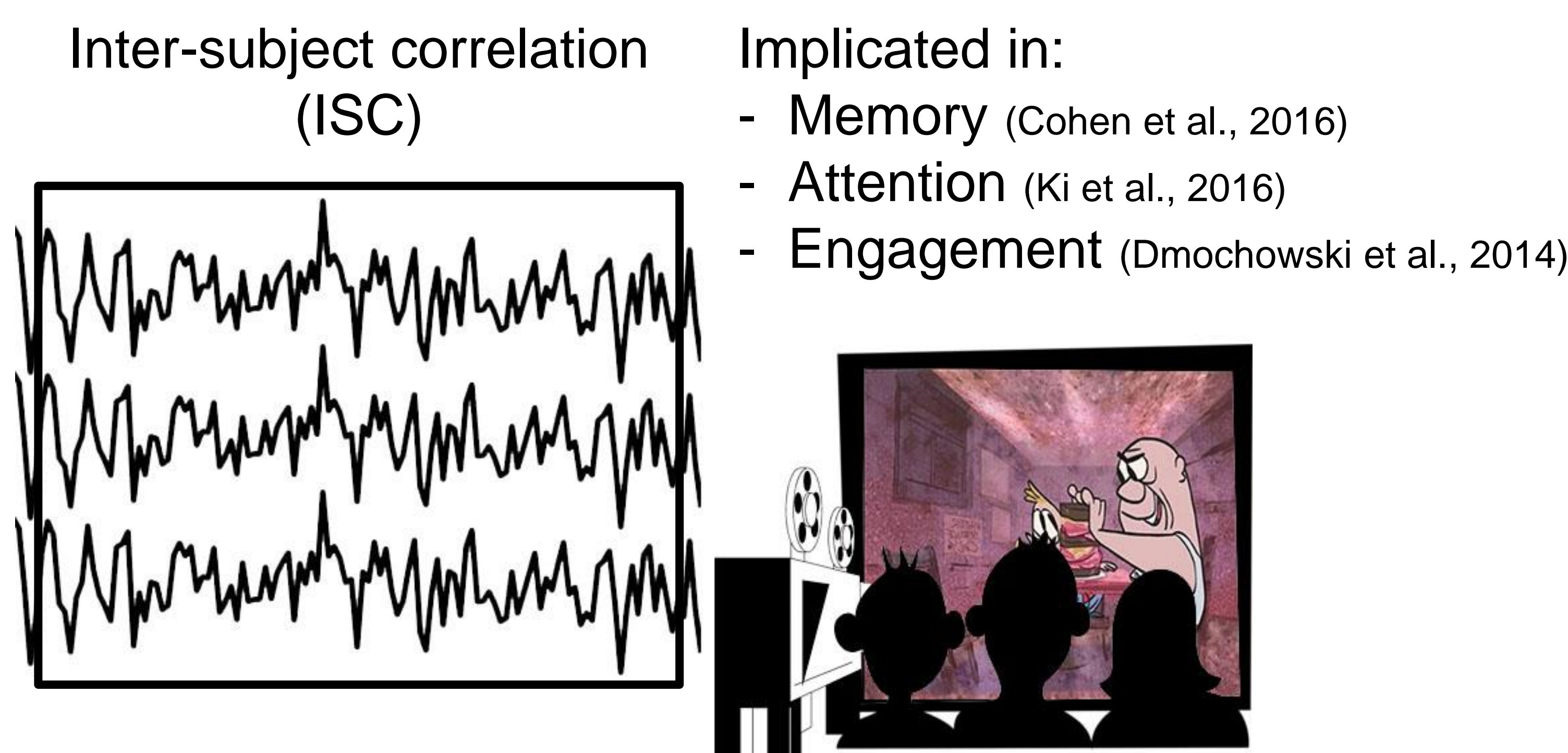
## Engagement as committed or “surviving” viewers



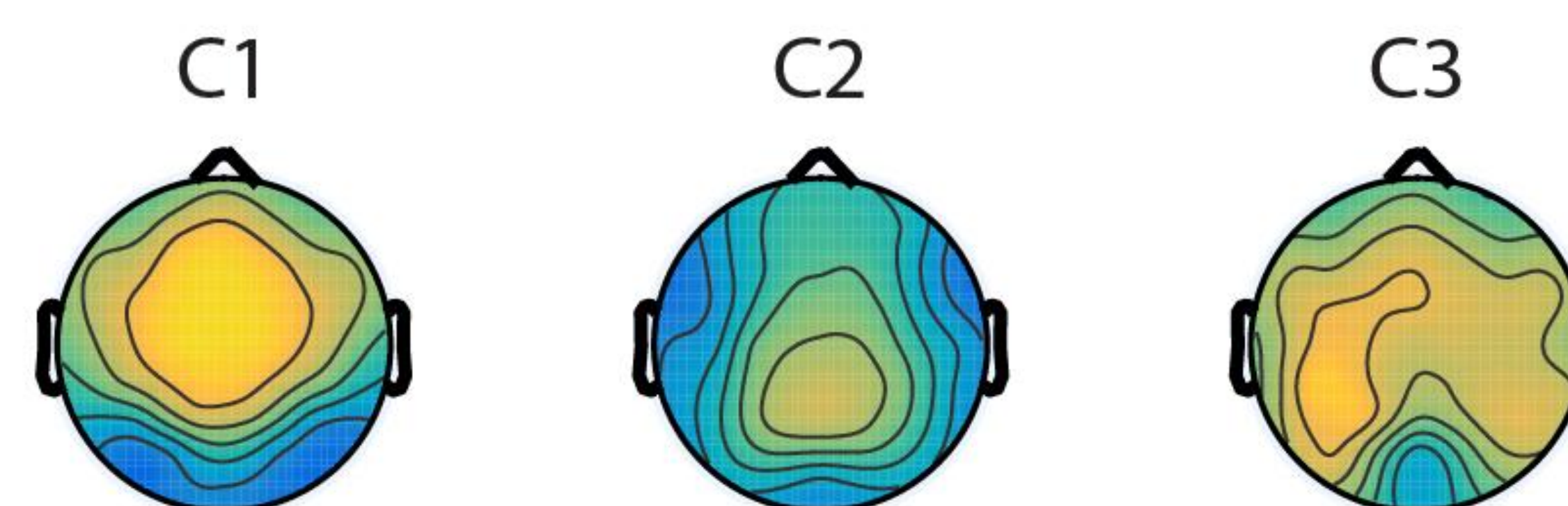
## Behavioral engagement in “experimental” cohort mimics “real-world” behavior.



## Inter-subject correlation in EEG as a measure of “neural engagement”



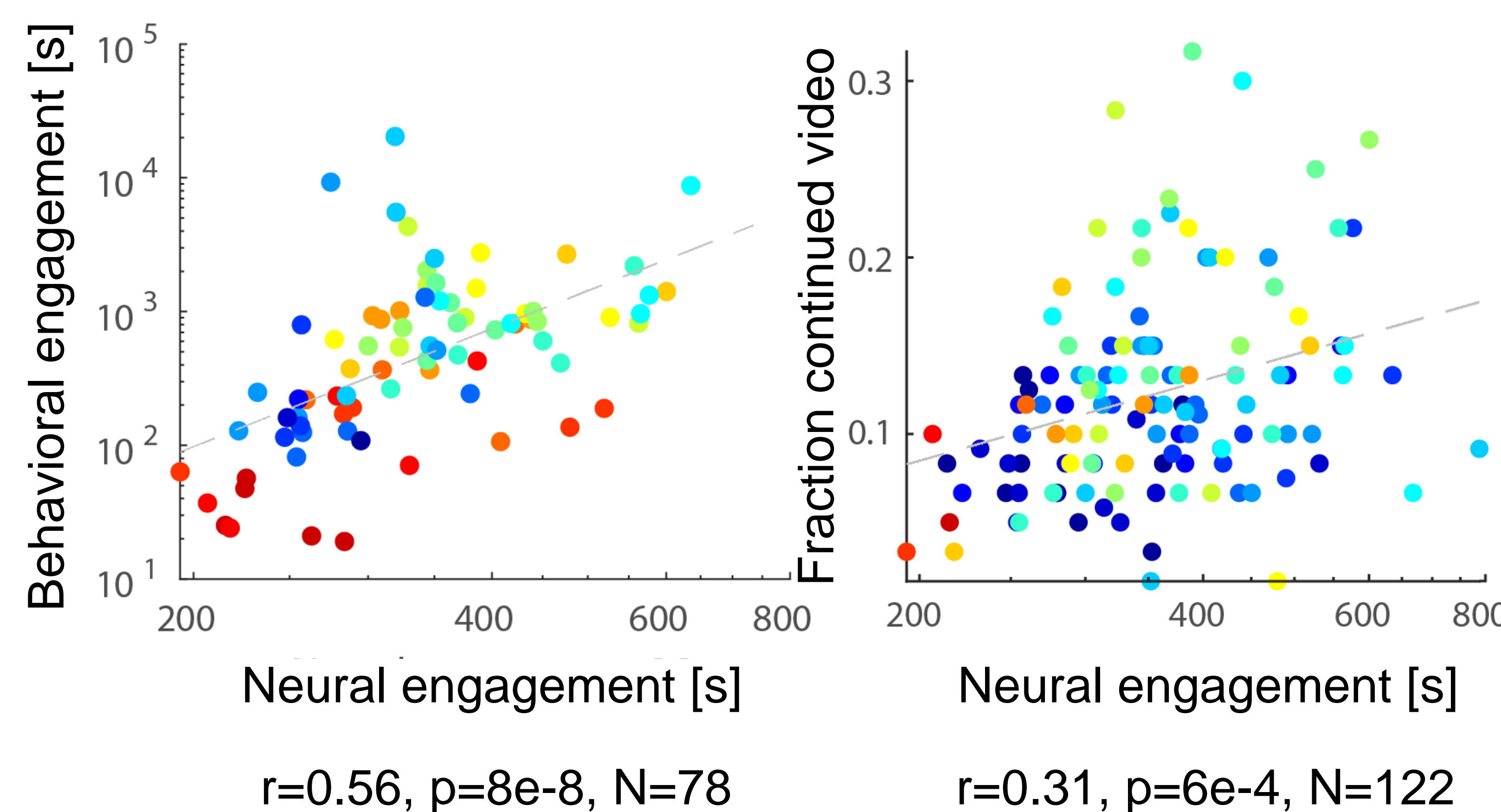
## Spatial distribution of the three EEG components with maximal inter-subject correlation



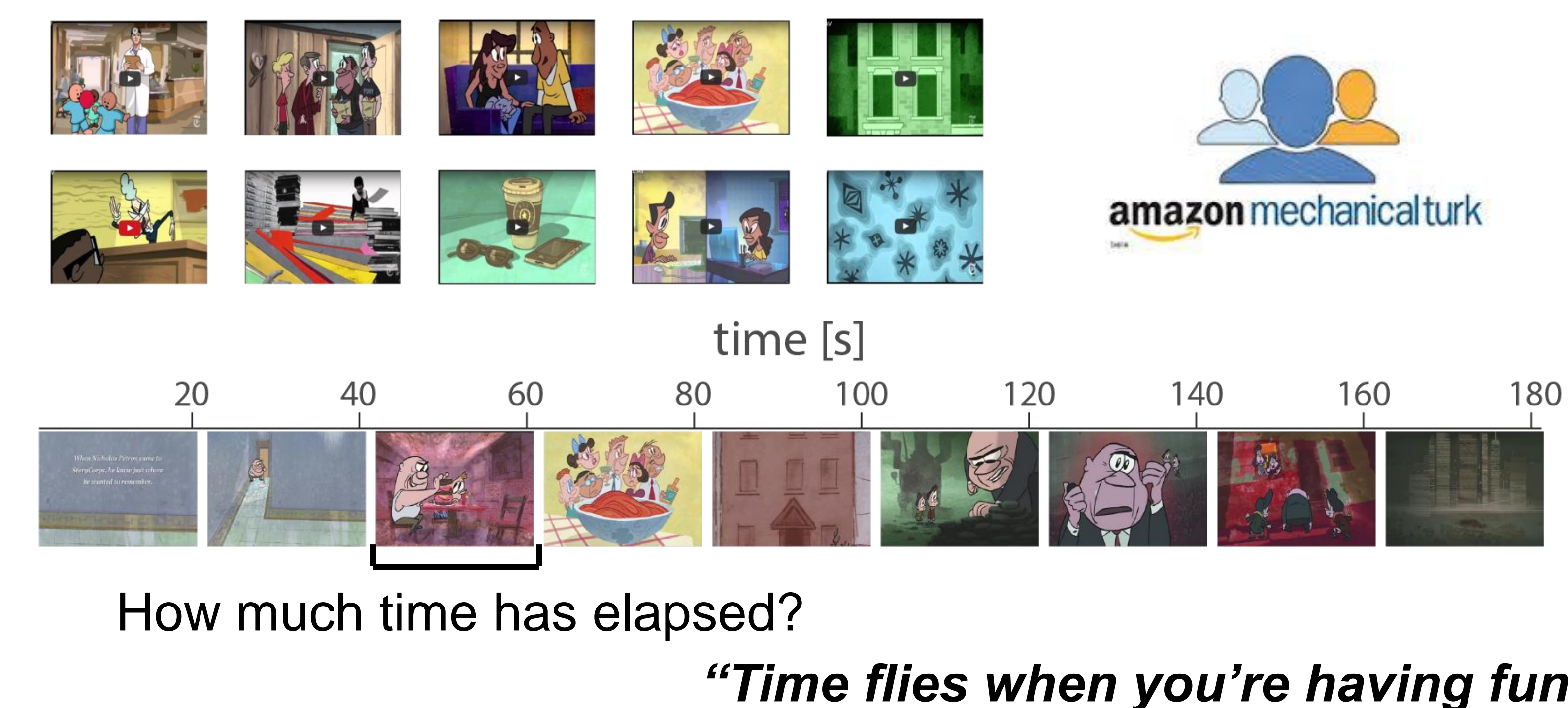
## Neural engagement predicts behavioral engagement

“Neural Engagement”  $\approx$  (Baseline Engagement)  $\times$  (“ISC”)

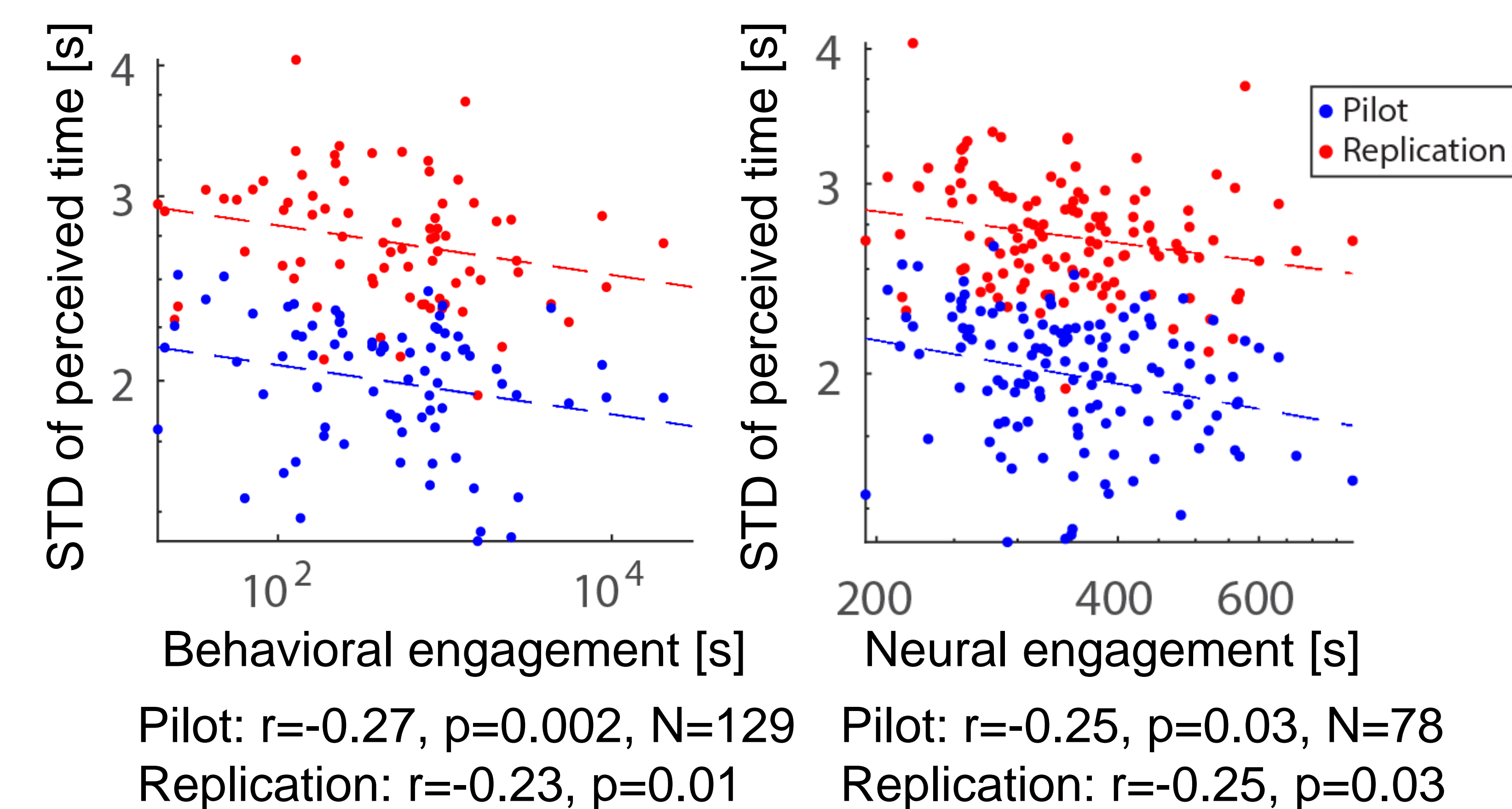
Train parameters on experimental behavioral engagement...  
Test parameters on real-world behavioral engagement



## Does engagement alter time perception?



## Correlated brains perceive time more uniformly



## Conclusions

- Engagement can be objectively quantified in terms of time commitment.
- The inter-subject correlation of evoked brain responses predicts behavioral engagement.
- Similar neural processing correlates with similar time perception.

## References

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Dmochowski, J. P., Sajda, P., Dias, J., & Parra, L. C. (2012). Correlated components of ongoing EEG point to emotionally laden attention – a possible marker of engagement? *Frontiers in Human Neuroscience*, 6(112), 1–9.  
Ki, J., Kelly, S., & Parra, L. C. (2016). Attention strongly modulates reliability of neural responses to naturalistic narrative stimuli. *Journal of Neuroscience*.  
Petroni, A., Cohen, S., Langer, N., Henin, S., Vanderwal, T., Milham, M. P., Parra, L. C. (2016). Age and sex affect intersubject correlation of EEG throughout development. *bioRxiv*.

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