Dynamic shifts in internal and external hippocampal processing during event perception

Karen Sasmita, Ruiyi Chen, & Khena M. Swallow | Department of Psychology & Cognitive Science Program, Cornell University

AMP ATTENTION, MEMORY & PERCEPTION
amp-lab.psych.cornell.edu

CORNELL UNIVERSITY FOUNDED A.D. 1865

Event models guide event perception[1]

- Active representations of the current situation (event models) may guide event perception via predictive processing.
- For accuracy, event models need to be updated when the event changes (i.e., at event boundaries).
- **Does updating involve integrating information from the external world with internal knowledge about how events typically unfold?**

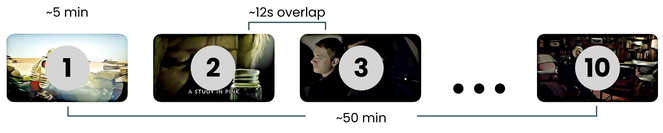
We examined **dynamic functional connectivity**[2] (dFC) between a region involved in **event representations**[3] (hippocampus; Hipp) and networks[4] associated with:

- More **internal** (DMN) vs **external** (visual) information processing.
- **Modulation** of attention to internal vs external processing[5] (VAN).

Sherlock imaging dataset[6] (n = 14)

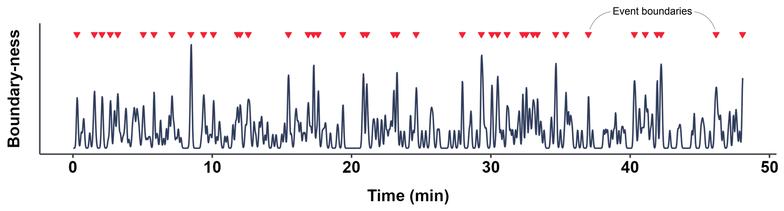
- participants viewed BBC Sherlock ep.1 in scanner.

Segmentation task - coarse (n = 11)

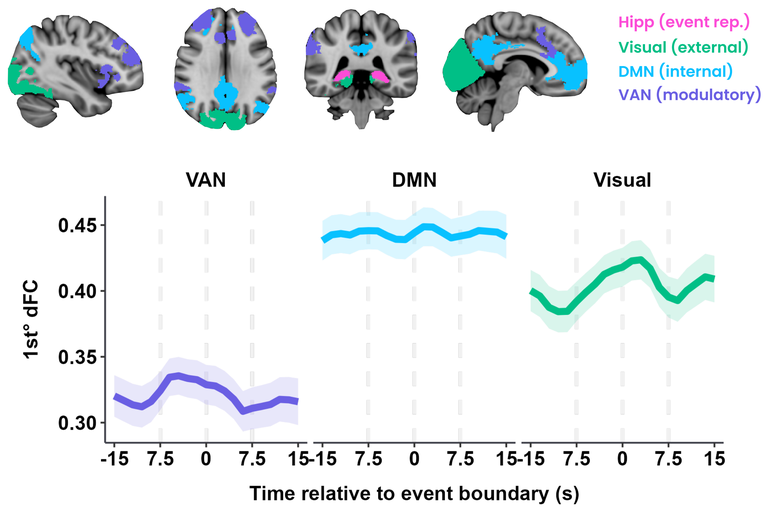


"Press the *spacebar* when one event ends and another begins."

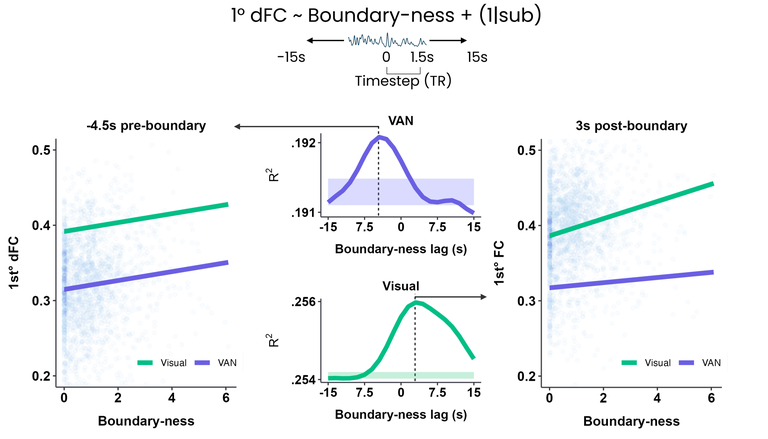
Event boundaries: peaks in group button press density estimates.



1° Hipp dFC transitions from modulatory to external around event boundaries.



Boundary-ness explains 1° Hipp dFC to modulatory and external networks at different times



- Boundary-ness does not explain hipp-DMN dFC.

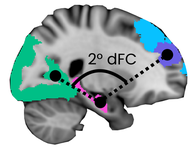
References

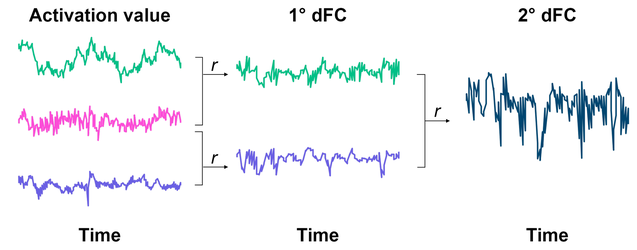
1. Zacks, et al., (2007). *Psych Bull,* 133(2): 273-293.
2. Owen, et al., (2021). *Nat Comms.* 12: 5728.
3. Richmond & Zacks (2017). TiCS, 21(12): 962 - 980.
4. Schaefer, et al., (2018). *Cereb Cortex,* 28(9): 3095 - 3114.
5. Sestieri, et al., (2017). *NatRevNeuro,* 18(2): 183-192.
6. Chen, et al., (2017). *Nat Neuro,* 20: 115 - 125.

Download a copy

ss3837@cornell.edu

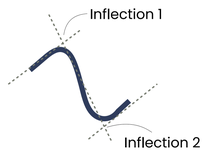
2° Hipp dFC changes across event boundaries.

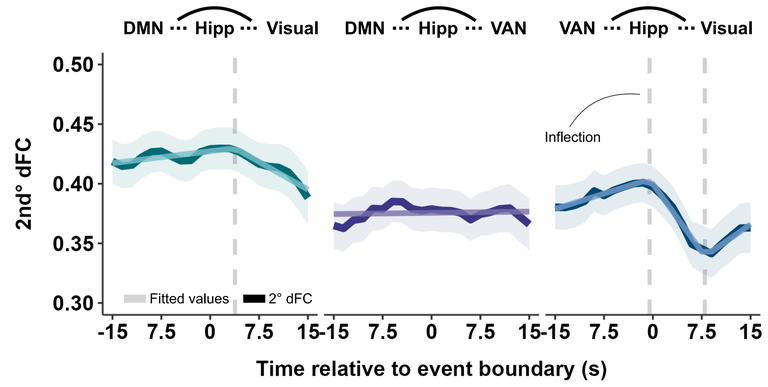




- Piecewise regression:

$$2° \text{ dFC} = \beta_0 + \beta_1 \text{ t-to-bound} + \beta_2 (\text{t-to-bound - inflect1}) + \beta_3 (\text{t-to-bound - inflect2})$$





- 2° dFC between hipp-DMN & hipp-VAN remains constant across event boundary.

Conclusion

Hippocampal dFC is modulated by event structure:

- Stronger association with modulatory/ control network **precedes** increases with external network.
- Disengage both modulatory and external networks **following** event boundaries.
- **Constant** engagement with internal network.