

DOES STRUCTURE IN NEURAL ACTIVITY MATCH ANATOMICAL STRUCTURE?

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INTRODUCTION

Information in the brain is carried in correlated network activity. Until recently, it has been difficult to record responses from multiple brain regions simultaneously. This meant that studies on network behaviour were restricted to studying only one region at a time. The development of ‘Neuropixels’ probes have allowed extracellular voltage measurements to be collected from multiple brain regions simultaneously. In this project, we used data collected from five different brain regions to compare distributions of correlated activity within these regions, and between these regions.

We then used these measurements to create networks between the neurons in these five regions. We used a cutting edge community detection algorithm to find communities in these networks. We are currently in the process of comparing these communities to the anatomical distribution of their constituents.

MAIN OBJECTIVES

1. To compare the distributions of spike count correlations (r_{SC}) and mutual information ($I(X;Y)$) in different regions.
2. To detect any communities in the networks created by these measurements, either within or between the anatomical regions.
3. To compare the communities detected in the spike count correlation networks to those detected in the mutual information networks.
4. To compare the network communities to their anatomical distribution.

DATA

MATERIALS AND METHODS

Fusce magna risus, molestie ut porttitor in, consectetur sed mi. Vestibulum ante ipsum primis in faucibus orci luctus et ultrices posuere cubilia Curae; Pellentesque consectetur blandit pellentesque. Sed odio justo, viverra nec porttitor vel, lacinia a nunc. Suspendisse pulvinar euismod arcu, sit amet accumsan enim fermentum quis. In id mauris ut dui feugiat egestas. Vestibulum ac turpis lacinia nisl commodo sagittis eget sit amet sapien.

MATHEMATICAL SECTION

Nulla vel nisl sed mauris auctor mollis non sed.

$$E = mc^2 \quad (1)$$

Curabitur mi sem, pulvinar quis aliquam rutrum. (1) edf (2), $\Omega = [-1, 1]^3$, maecenas leo est, ornare at. $z = -1$ edf $z = 1$ sed interdum felis dapibus sem. x set y ytruem. Turpis j amet accumsan enim y -lacinia; ref k -viverra nec porttitor x -lacinia.

Vestibulum ac diam a odio tempus congue. Vivamus id enim nisi:

$$\begin{aligned} \cos \bar{\phi}_k Q_{j,k+1,t} + Q_{j,k+1,x} + \frac{\sin^2 \bar{\phi}_k}{T \cos \bar{\phi}_k} Q_{j,k+1} = \\ - \cos \phi_k Q_{j,k,t} + Q_{j,k,x} - \frac{\sin^2 \phi_k}{T \cos \phi_k} Q_{j,k} \end{aligned} \quad (2)$$

and

$$\begin{aligned} \cos \bar{\phi}_j Q_{j+1,k,t} + Q_{j+1,k,y} + \frac{\sin^2 \bar{\phi}_j}{T \cos \bar{\phi}_j} Q_{j+1,k} = \\ - \cos \phi_j Q_{j,k,t} + Q_{j,k,y} - \frac{\sin^2 \phi_j}{T \cos \phi_j} Q_{j,k}. \end{aligned} \quad (3)$$

Nulla sed arcu arcu. Duis et ante gravida orci venenatis tincidunt. Fusce vitae lacinia metus. Pellentesque habitant morbi. $A\xi = \underline{\beta}$ Vim ξ enum nidi $3(P+2)^2$ lacinia. Id feugain A nun quis; magno.

RESULTS

Treatments	Response 1	Response 2
Treatment 1	0.0003262	0.562
Treatment 2	0.0015681	0.910
Treatment 3	0.0009271	0.296

Table 1: Table caption

Nulla ut porttitor enim. Suspendisse venenatis dui eget eros gravida tempor. Mauris feugiat elit et augue placerat ultrices. Morbi accumsan enim nec tortor consectetur non commodo. Pellentesque condimentum dui. Etiam sagittis purus non tellus tempor volutpat. Donec et dui non massa tristique adipiscing. Quisque vestibulum eros eu. Phasellus imperdiet, tortor vitae congue bibendum, felis enim sagittis lorem, et volutpat ante orci sagittis mi. Morbi rutrum laoreet semper. Morbi accumsan enim nec tortor consectetur non commodo nisi sollicitudin.

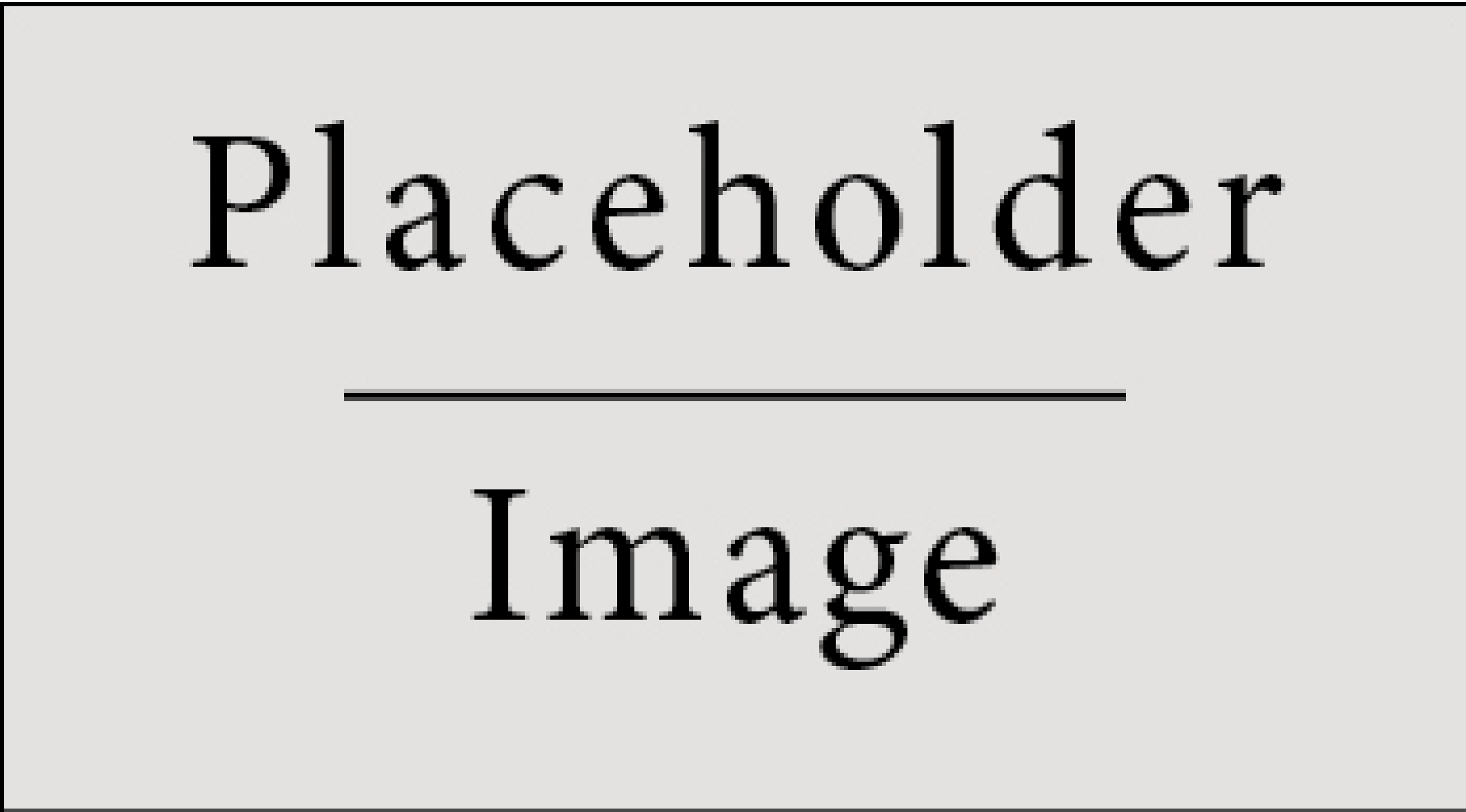


Figure 1: Figure caption

In hac habitasse platea dictumst. Etiam placerat, risus ac. Adipiscing lectus in magna blandit:

Treatments	Response 1	Response 2
Treatment 1	0.0003262	0.562
Treatment 2	0.0015681	0.910
Treatment 3	0.0009271	0.296

Table 2: Table caption

Vivamus sed nibh ac metus tristique tristique a vitae ante. Sed lobortis mi ut arcu fringilla et adipiscing ligula rutrum. Aenean turpis velit, placerat eget tincidunt nec, ornare in nisl. In placerat.

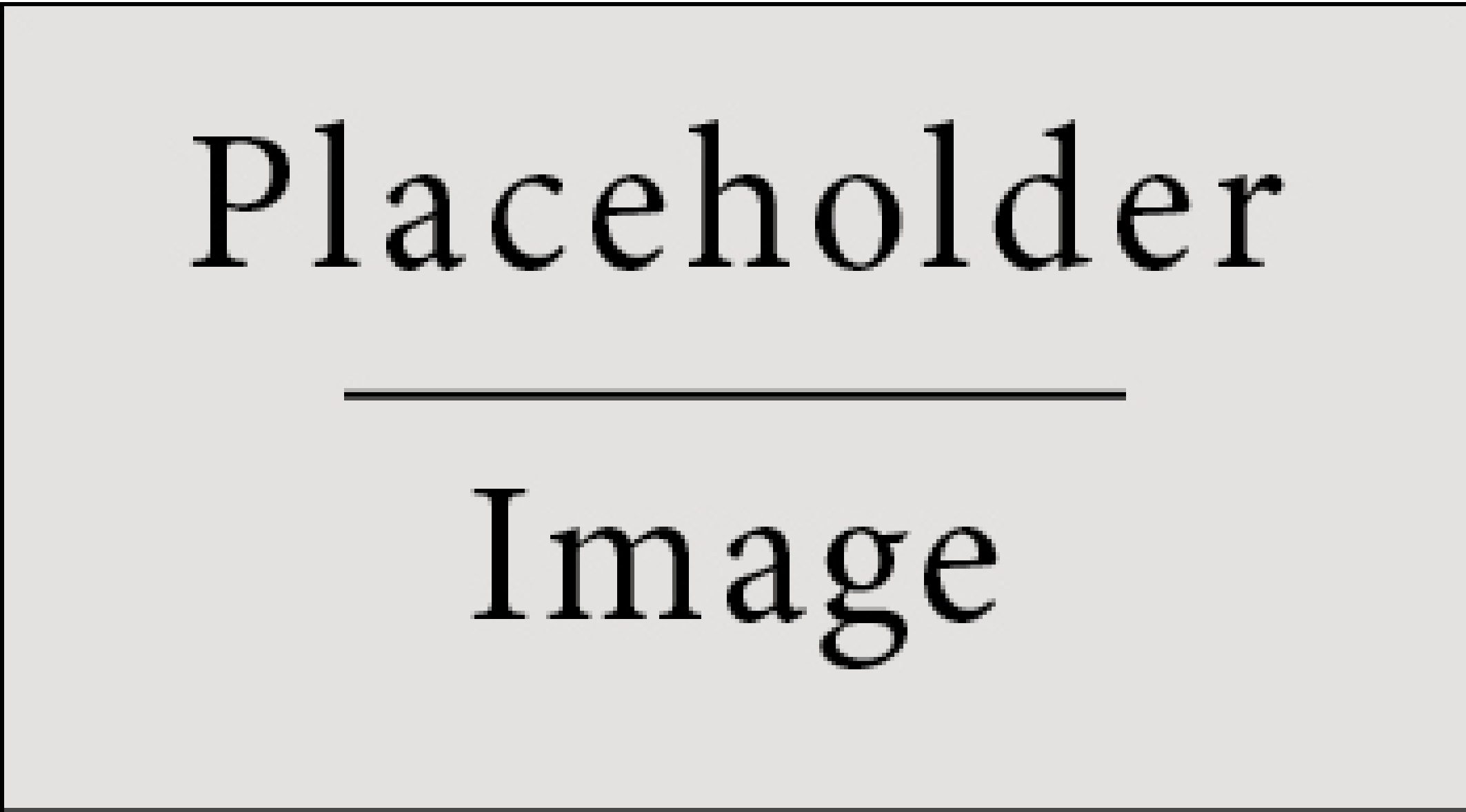


Figure 2: Figure caption

CONCLUSIONS

- Pellentesque eget orci eros. Fusce ultricies, tellus et pellentesque fringilla, ante massa luctus libero, quis tristique purus urna nec nibh. Phasellus fermentum rutrum elementum. Nam quis justo lectus.
- Vestibulum sem ante, hendrerit a gravida ac, blandit quis magna.
- Donec sem metus, facilisis at condimentum eget, vehicula ut massa. Morbi consequat, diam sed convallis tincidunt, arcu nunc.
- Nunc at convallis urna. isus ante. Pellentesque condimentum dui. Etiam sagittis purus non tellus tempor volutpat. Donec et dui non massa tristique adipiscing.

FORTHCOMING RESEARCH

Vivamus molestie, risus tempor vehicula mattis, libero arcu volutpat purus, sed blandit sem nibh eget turpis. Maecenas rutrum dui blandit lorem vulputate gravida. Praesent venenatis mi vel lorem tempor at varius diam sagittis. Nam eu leo id turpis interdum luctus a sed augue. Nam tellus.

ACKNOWLEDGEMENTS

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References

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