

Generative network modeling reveals a first quantitative definition of bilateral symmetry exhibited by a whole insect brain connectome

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Acknowledgements



Mike
Powell



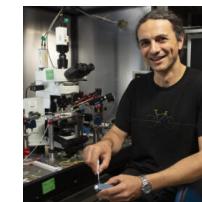
Eric
Bridgeford



Michael
Winding



Marta
Zlatic



Albert
Cardona



Carey
Priebe



Joshua
Vogelstein

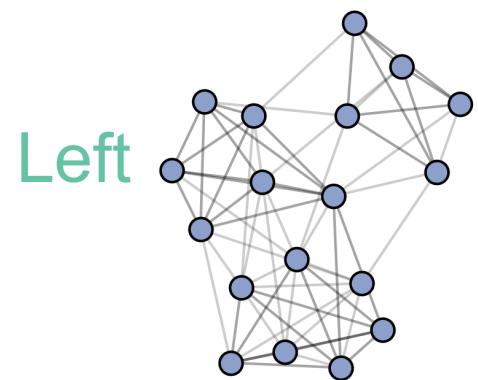
Drosophila larva brain connectome



Are the **left** and **right** sides of this connectome
different?

We reject even the simplest notion of symmetry

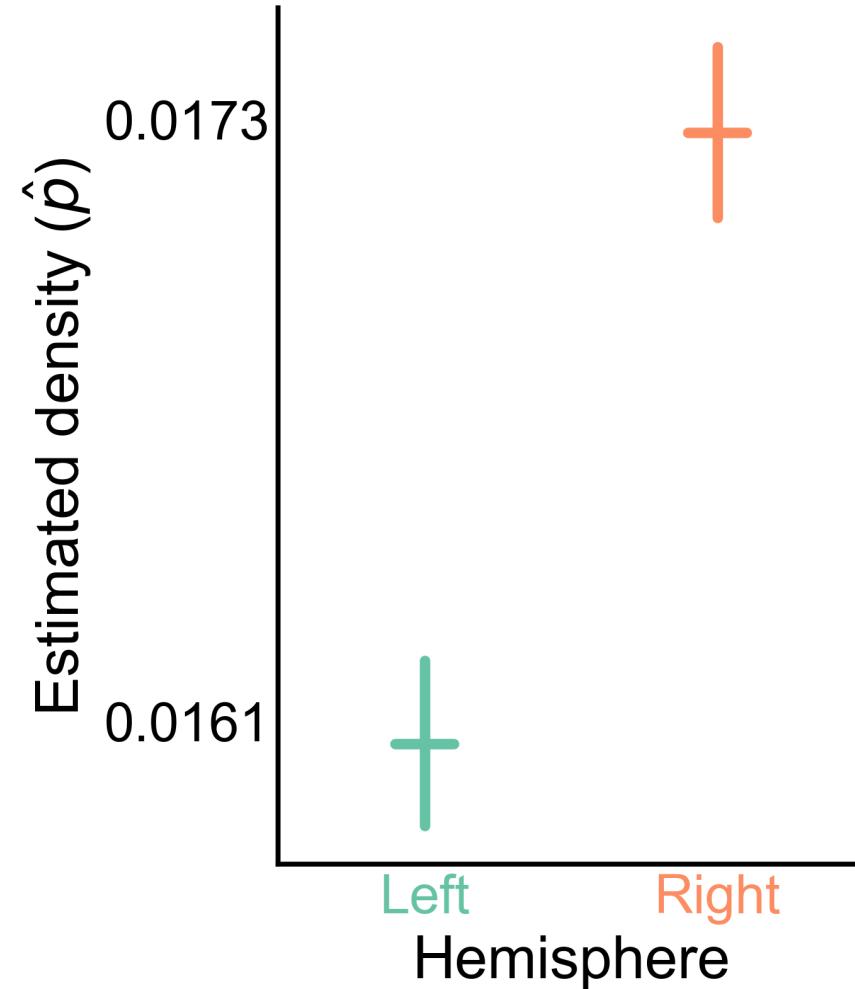
Compute global connection density



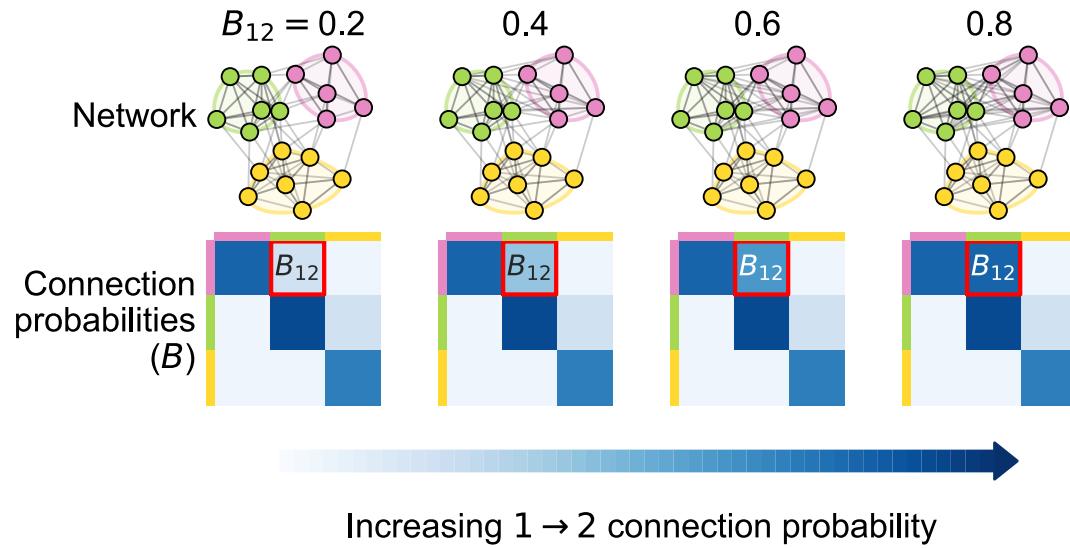
Compare ER models

$$p = \frac{\text{\# edges}}{\text{\# potential edges}}$$

$$\begin{aligned} H_0: p^{(L)} &= p^{(R)} \\ H_A: p^{(L)} &\neq p^{(R)} \end{aligned}$$

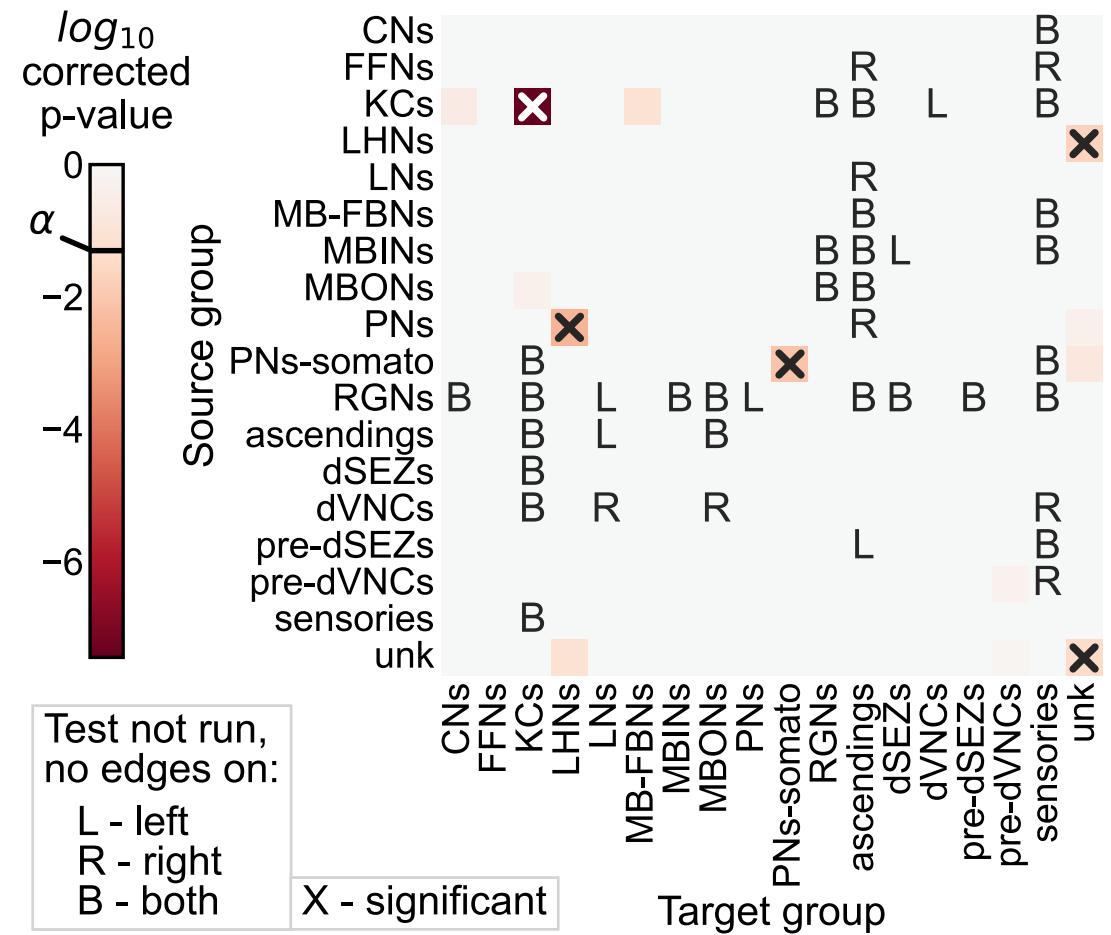


Localizing differences to cell type connections



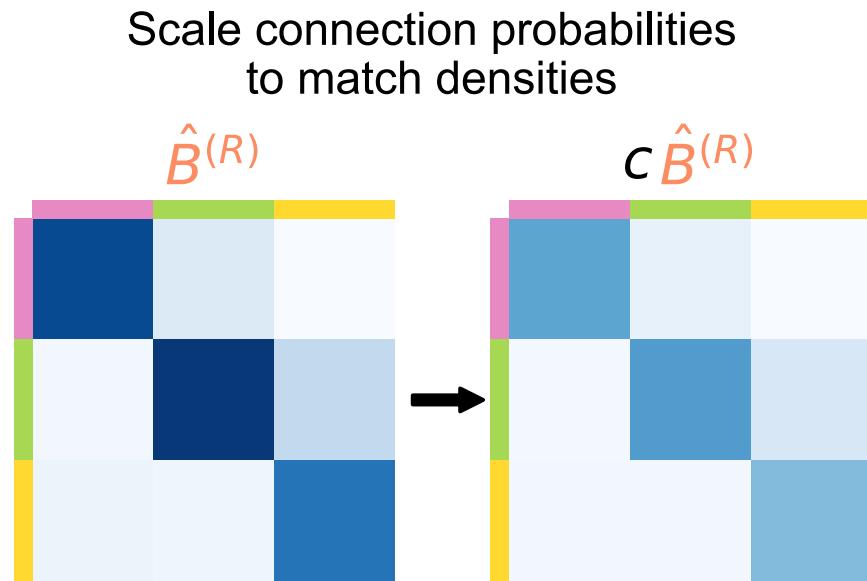
$H_0 :$

$H_A :$



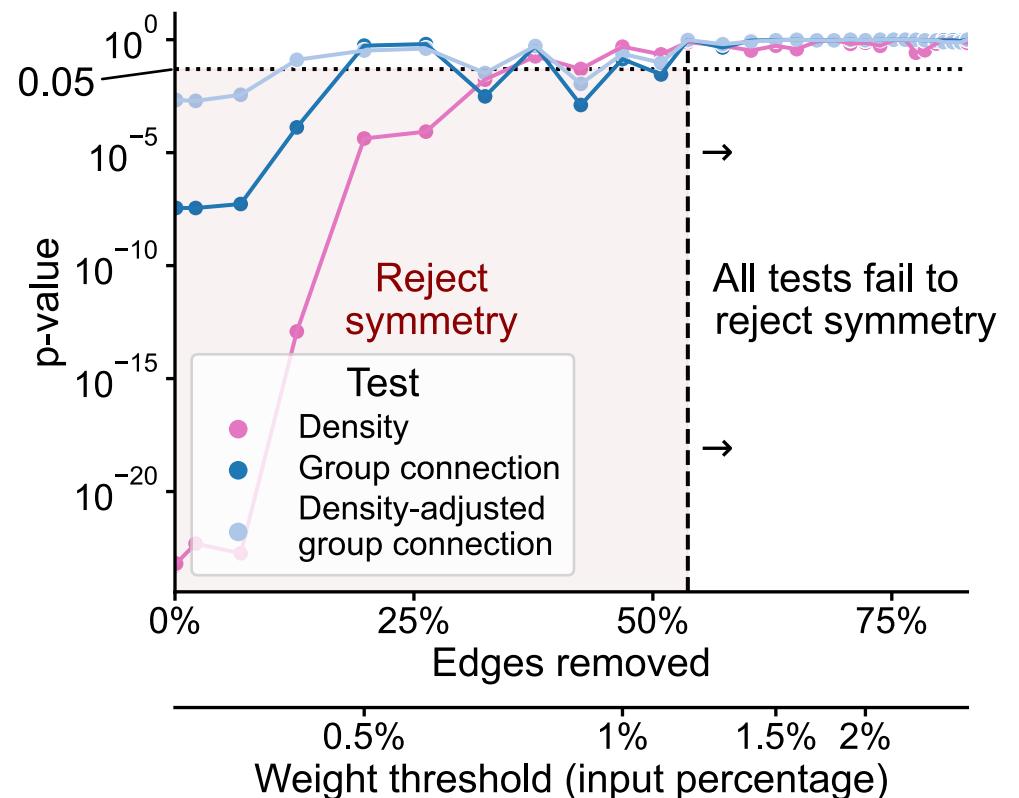
Modified definitions of symmetry which ARE exhibited

Rescaled connection probabilities AND
removing Kenyon cells



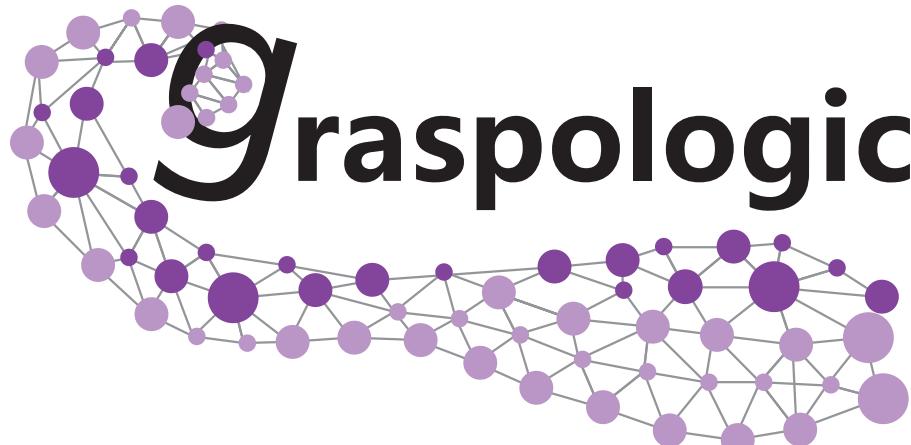
$$H_0: B^{(L)} = cB^{(R)}$$
$$H_A: B^{(L)} \neq cB^{(R)}$$

Using only top ~50-percentile edges by
input proportion



graspologic:

github.com/microsoft/graspologic



downloads 121k



250

contributors 46

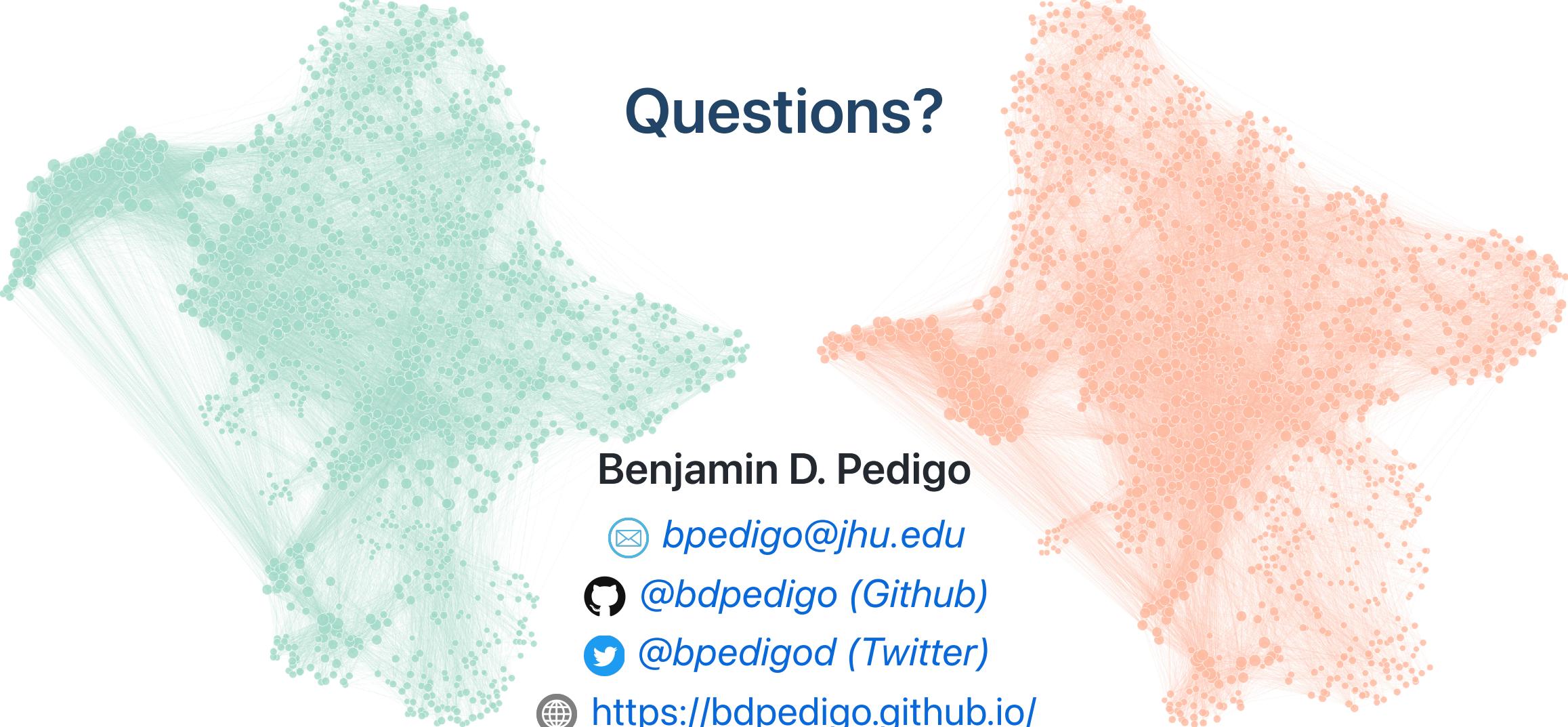
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This work:

github.com/neurodata/bilateral-connectome

A screenshot of a Jupyter book page titled "The Erdos-Renyi (ER) model". The page includes a sidebar with the Neurodata logo, a search bar, and navigation links for "Abstract", "PRELIMINARIES", "Introduction", "Outline", "Unmatched vs. matched networks", and "Larval Drosophila melanogaster brain connectome". The main content area contains text about the Erdos-Renyi model, a mathematical formula $P[A_{ij} = 1] = p_{ij} = p$, and a note about global connection probability p .

 jupyter book



Questions?

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Left

Right