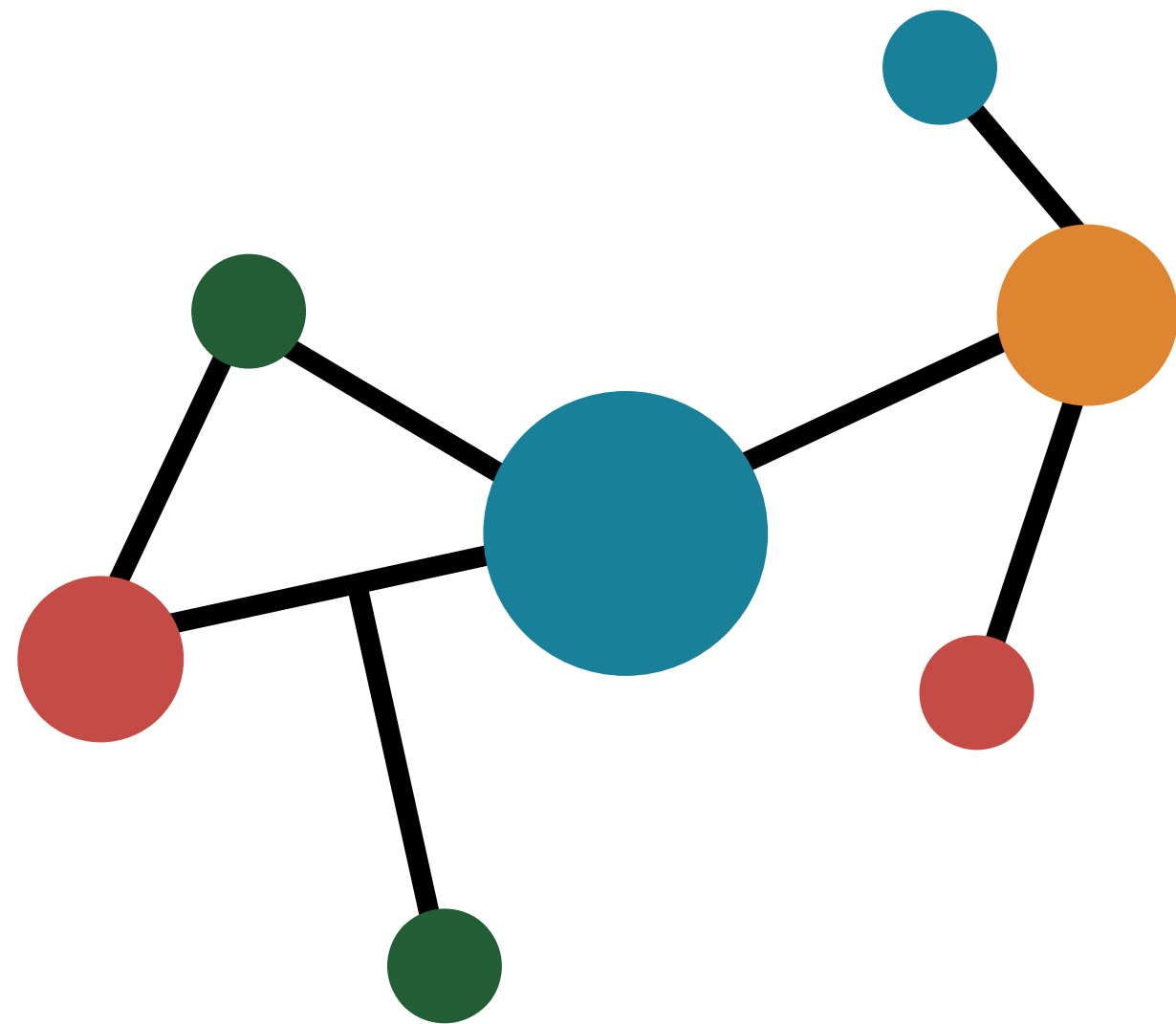


Lelia Erscoi  
Data Science 2023

# Brain Area Proximity

Graph-Physical Distance





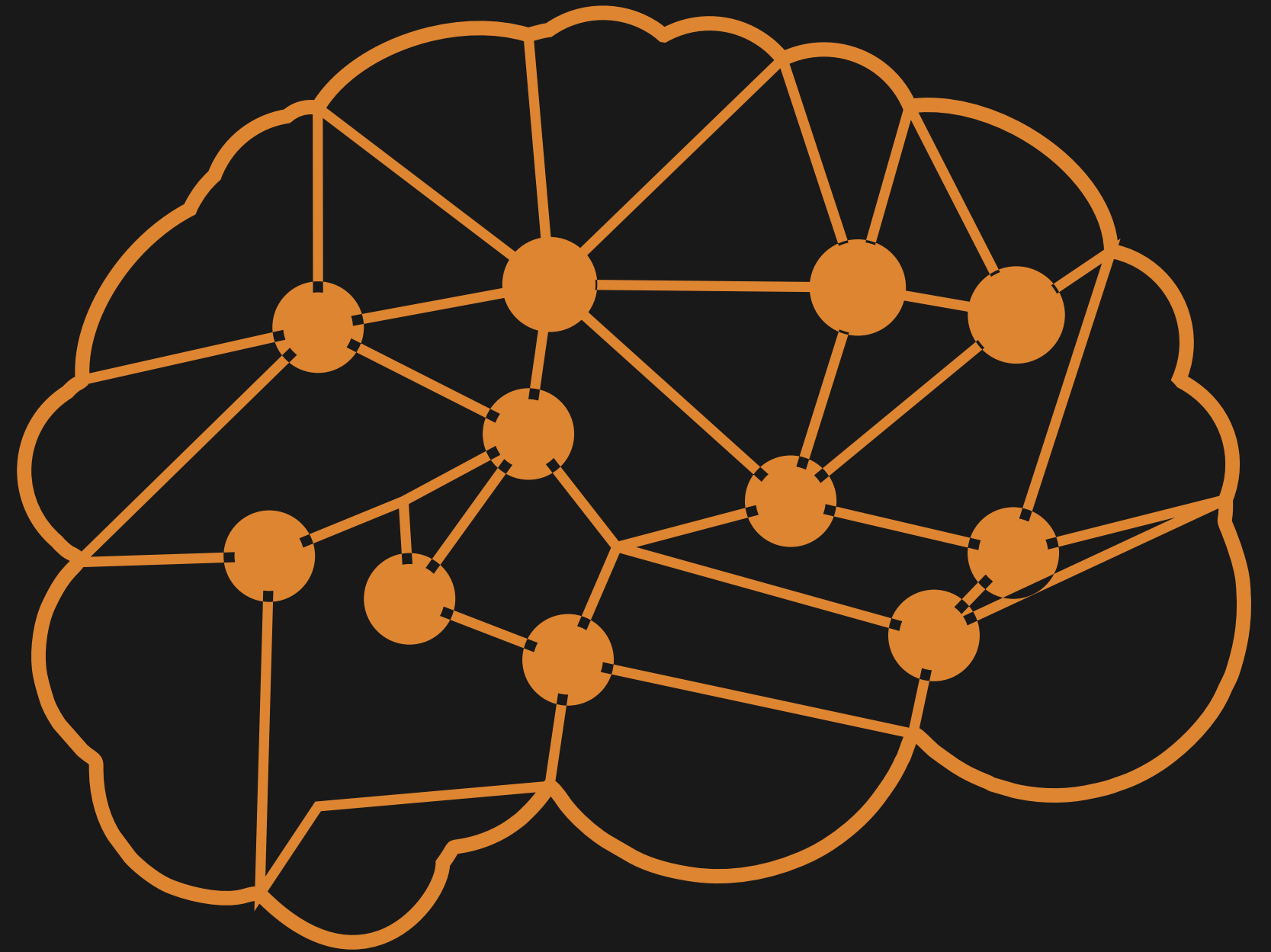
# Research Question

Is there a **correlation** between the physical proximity of brain regions in the brain and their proximity in a network created from those regions?

# Why?

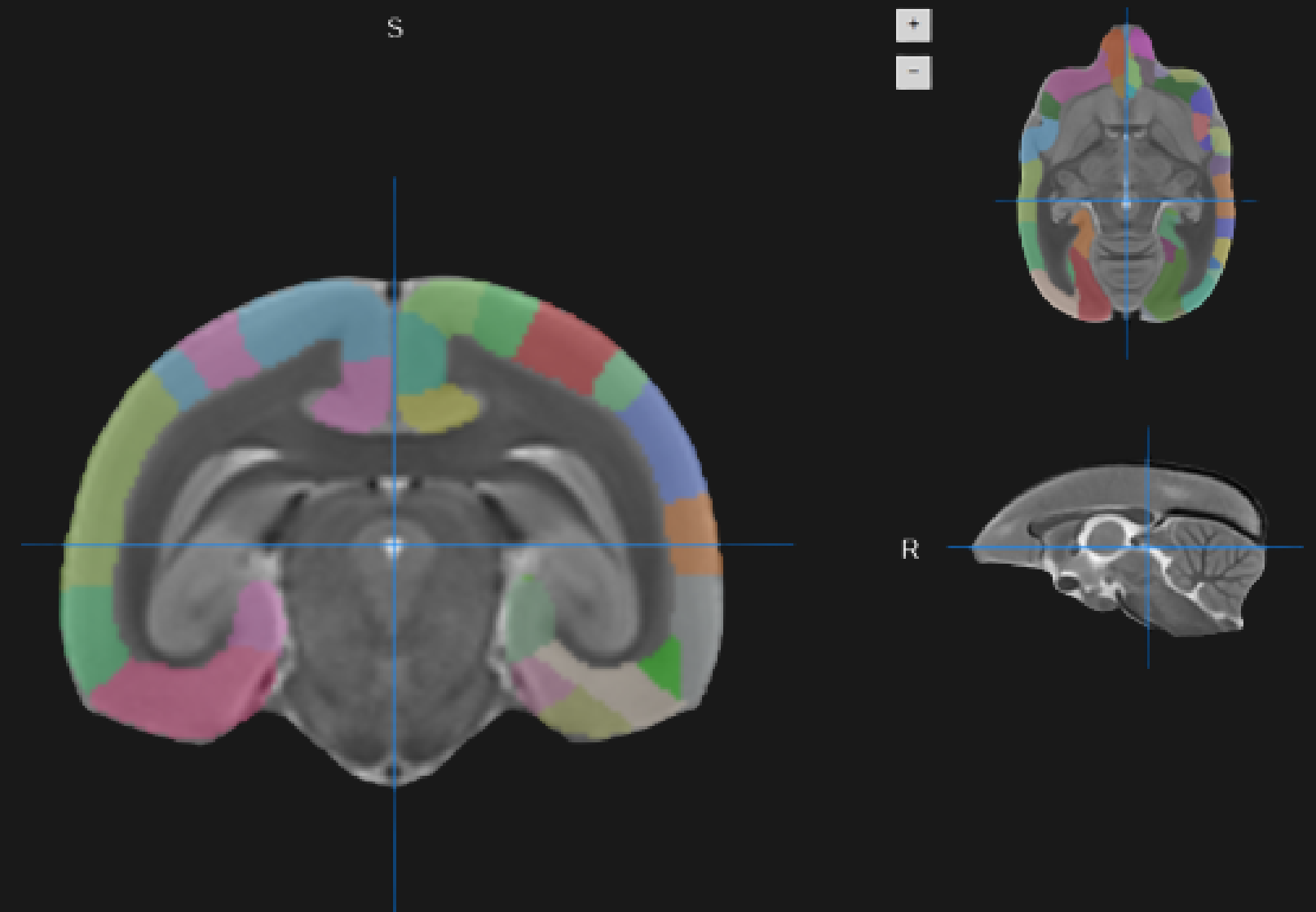
Examine the relationship between **functionality** and **topology**.

Easily build highly-relevant **models**.



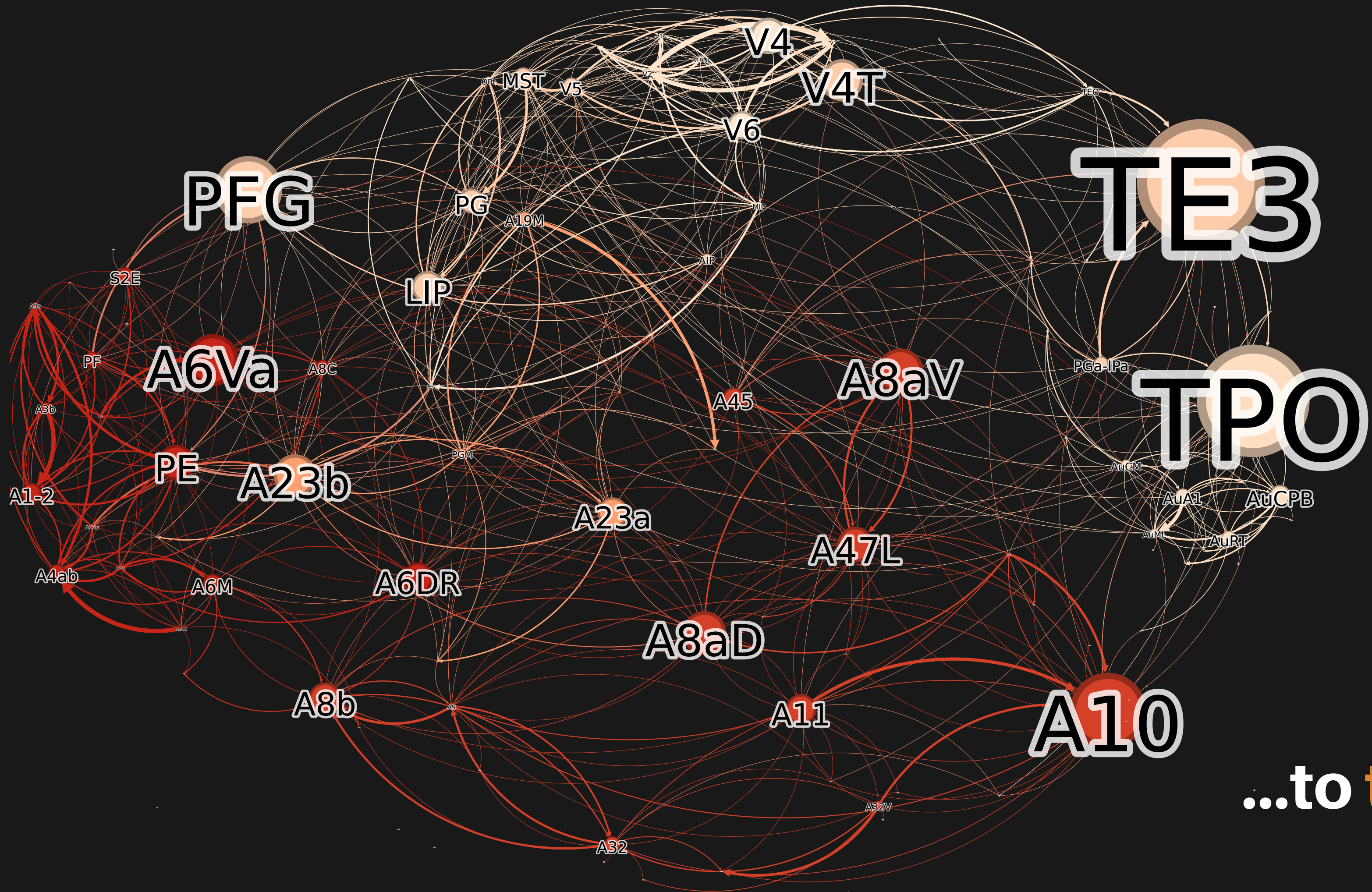
# How?

From **this**...



...to **this**...







**Density: 0.4**

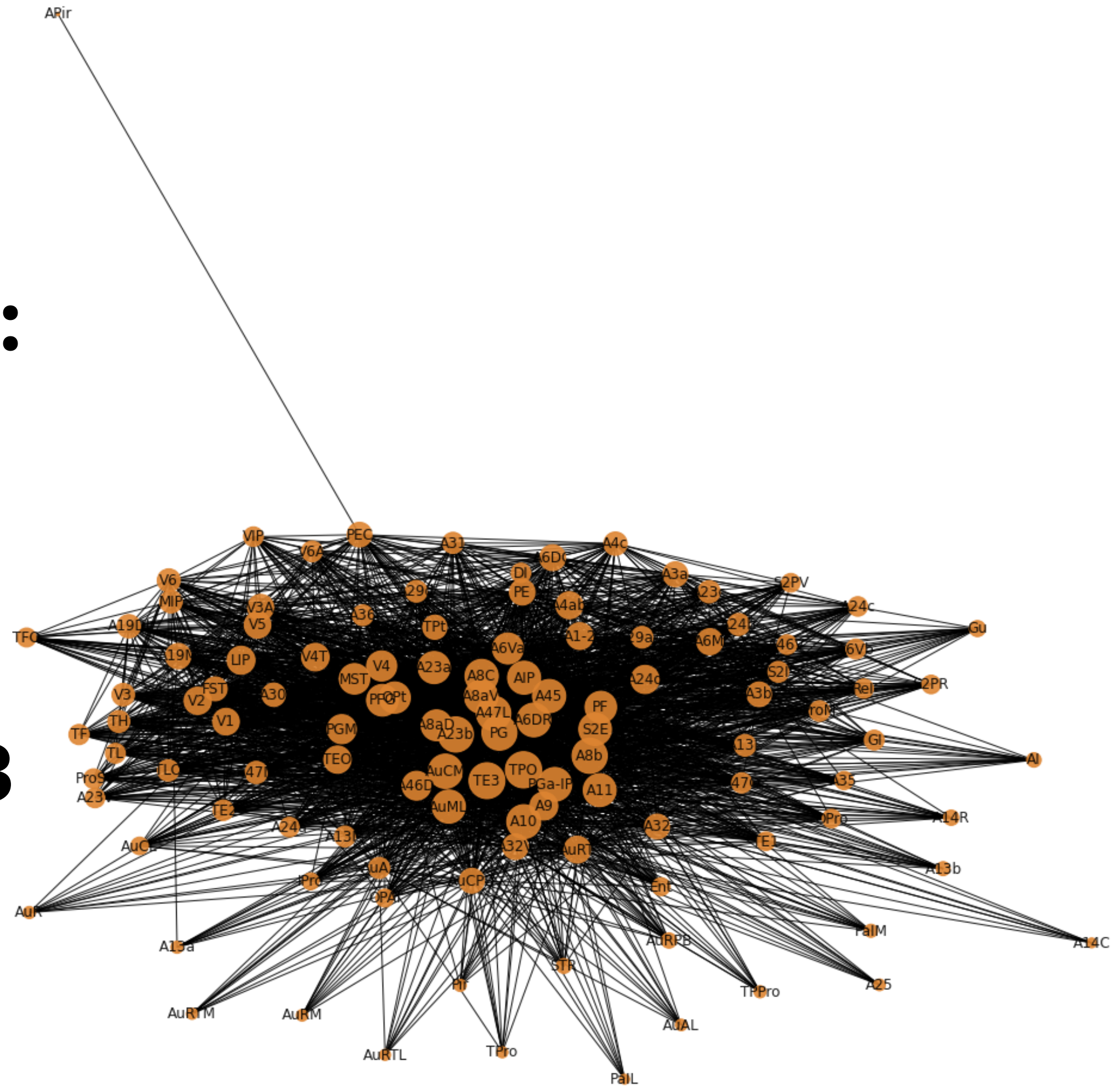
**Transitivity: 0.59**

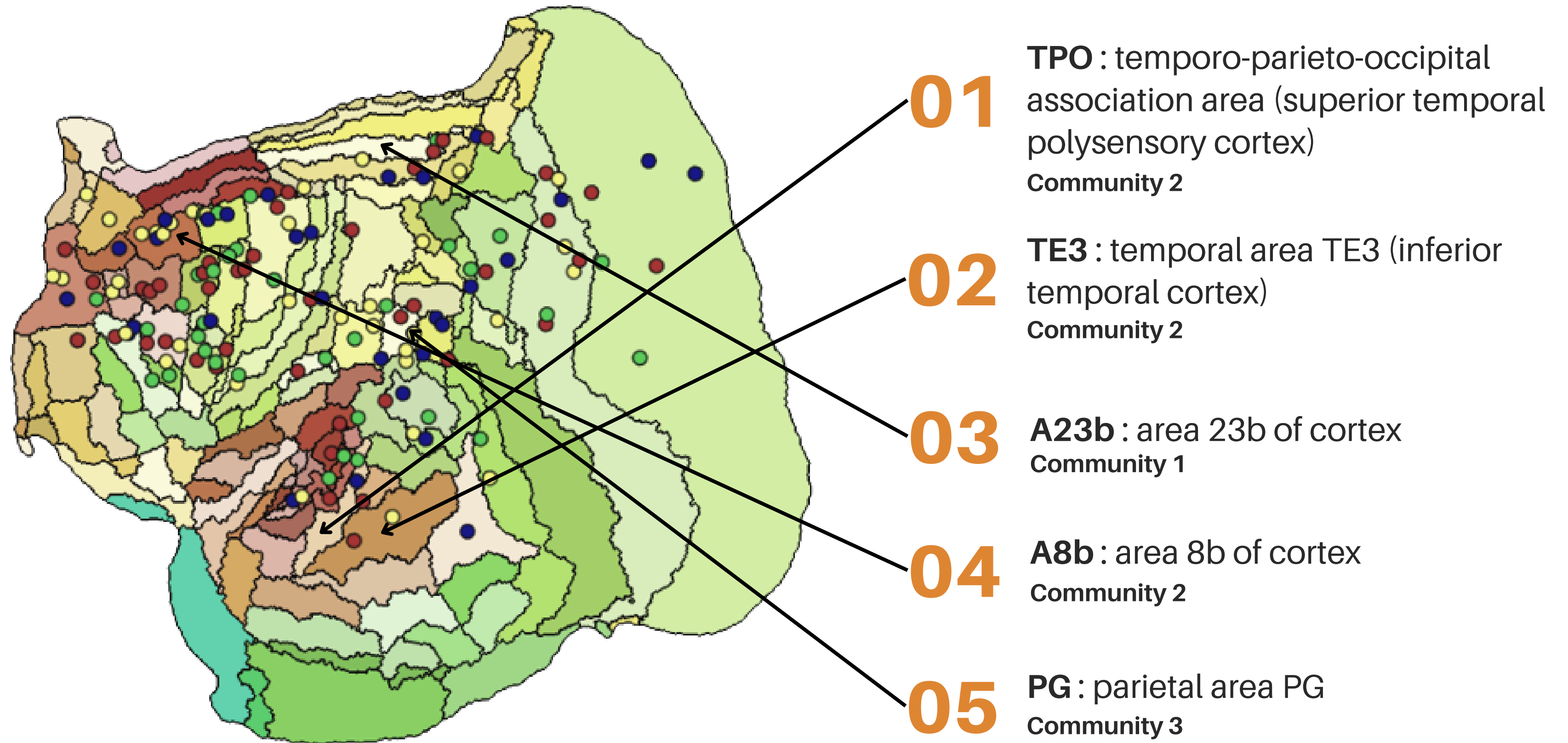
**Top nodes by degree:**

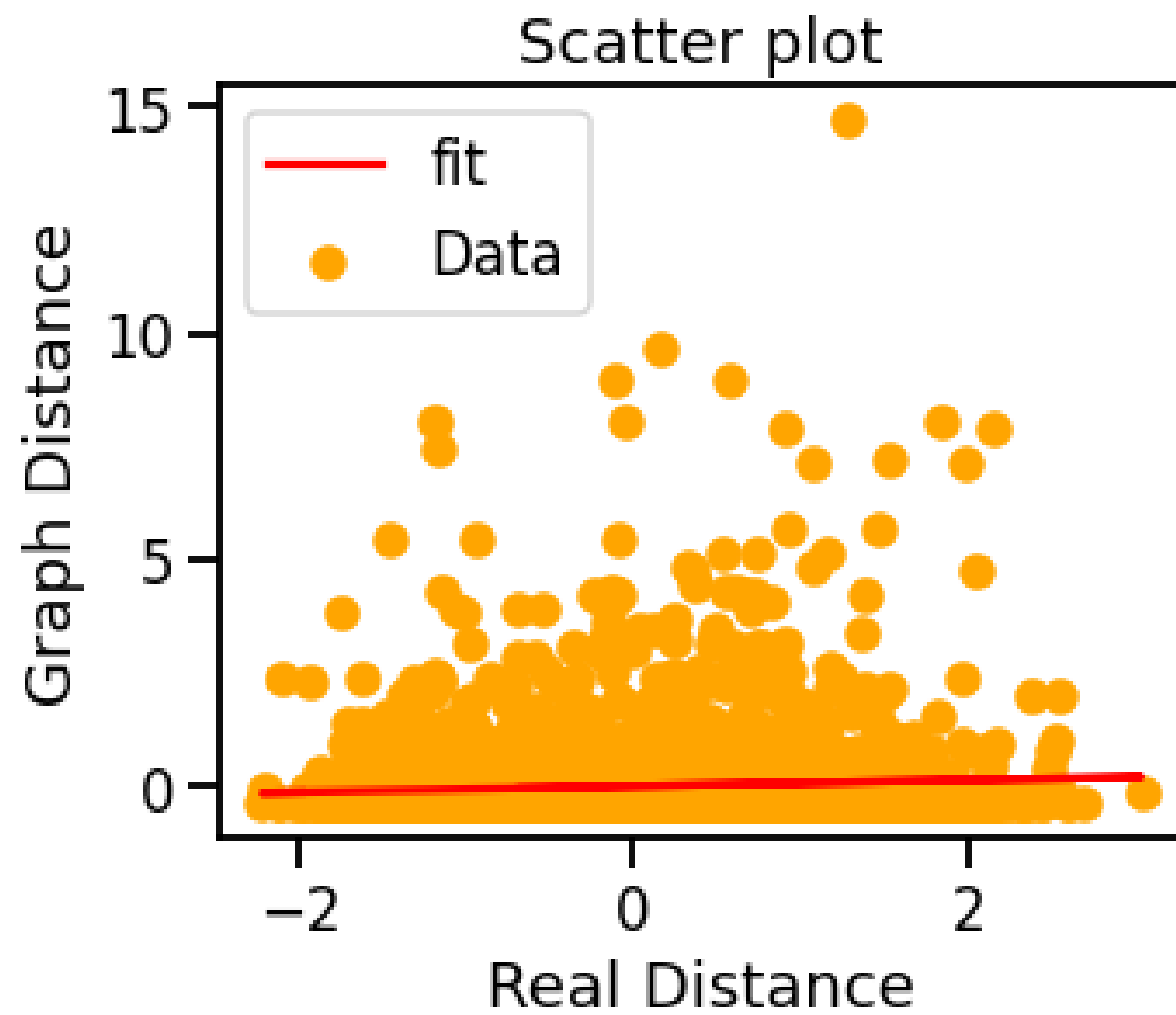
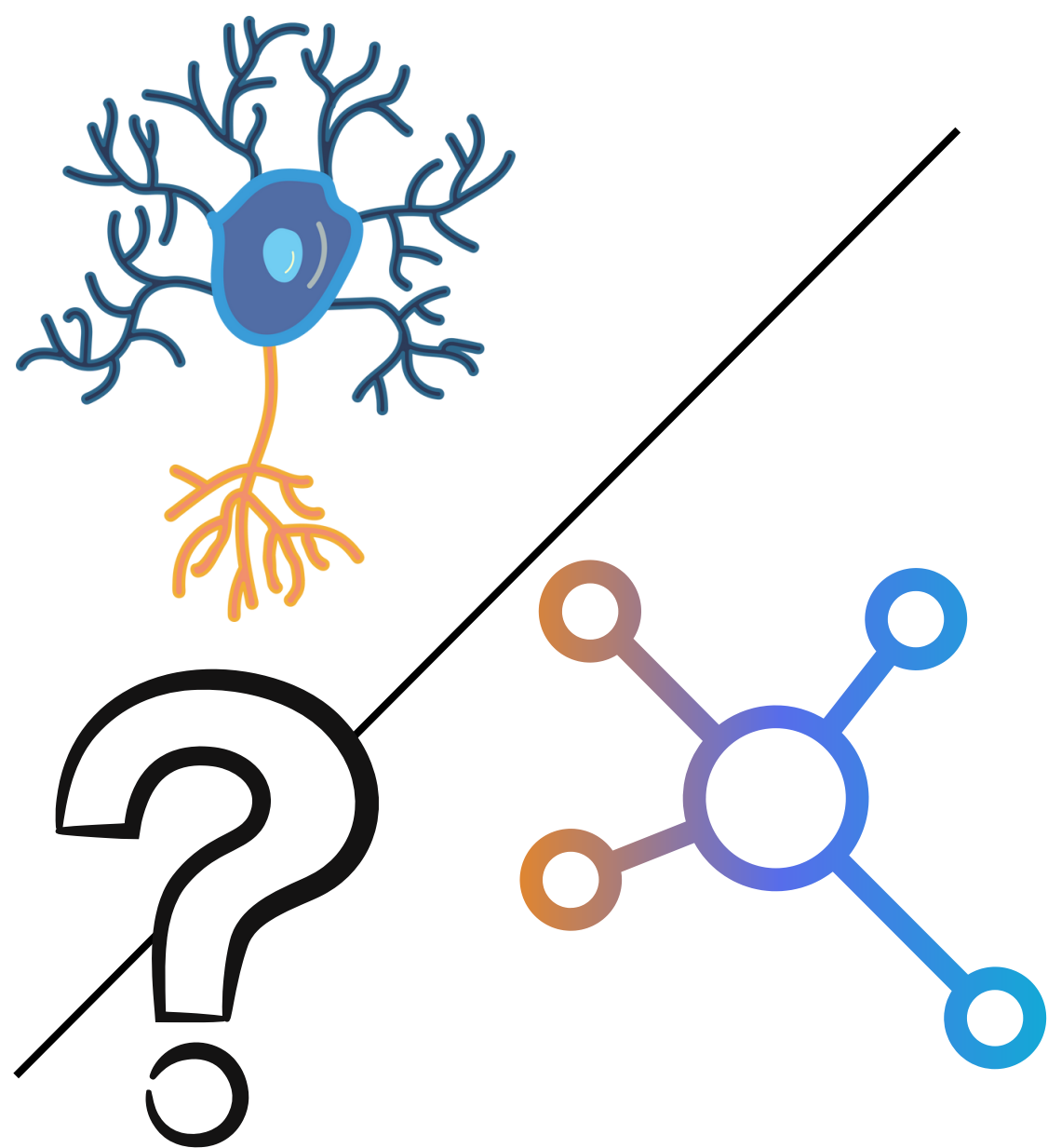
- TPO: 106
- TE3: 104
- A23b: 100
- A8b: 100
- PG: 90

**Nr. of Communities: 3**

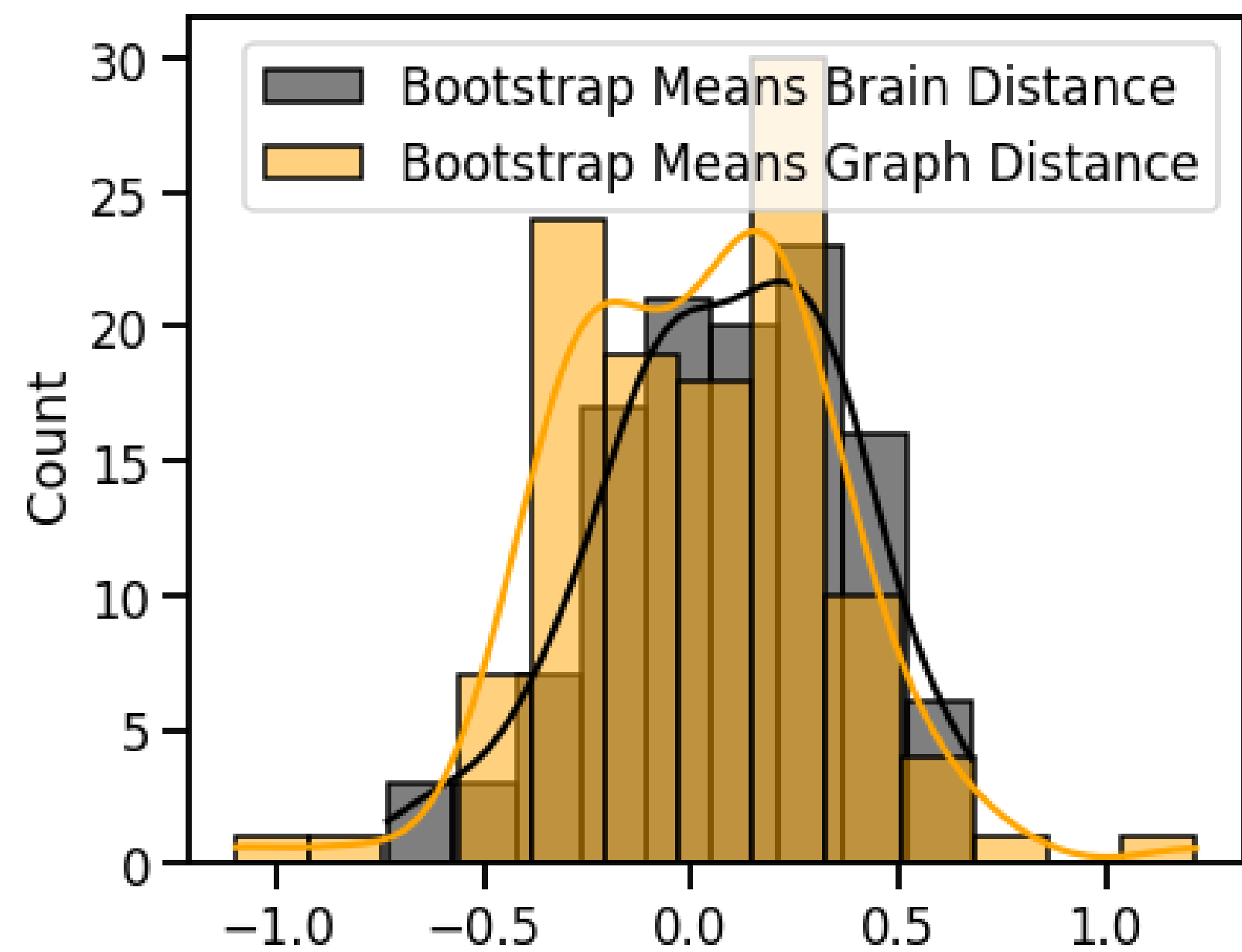
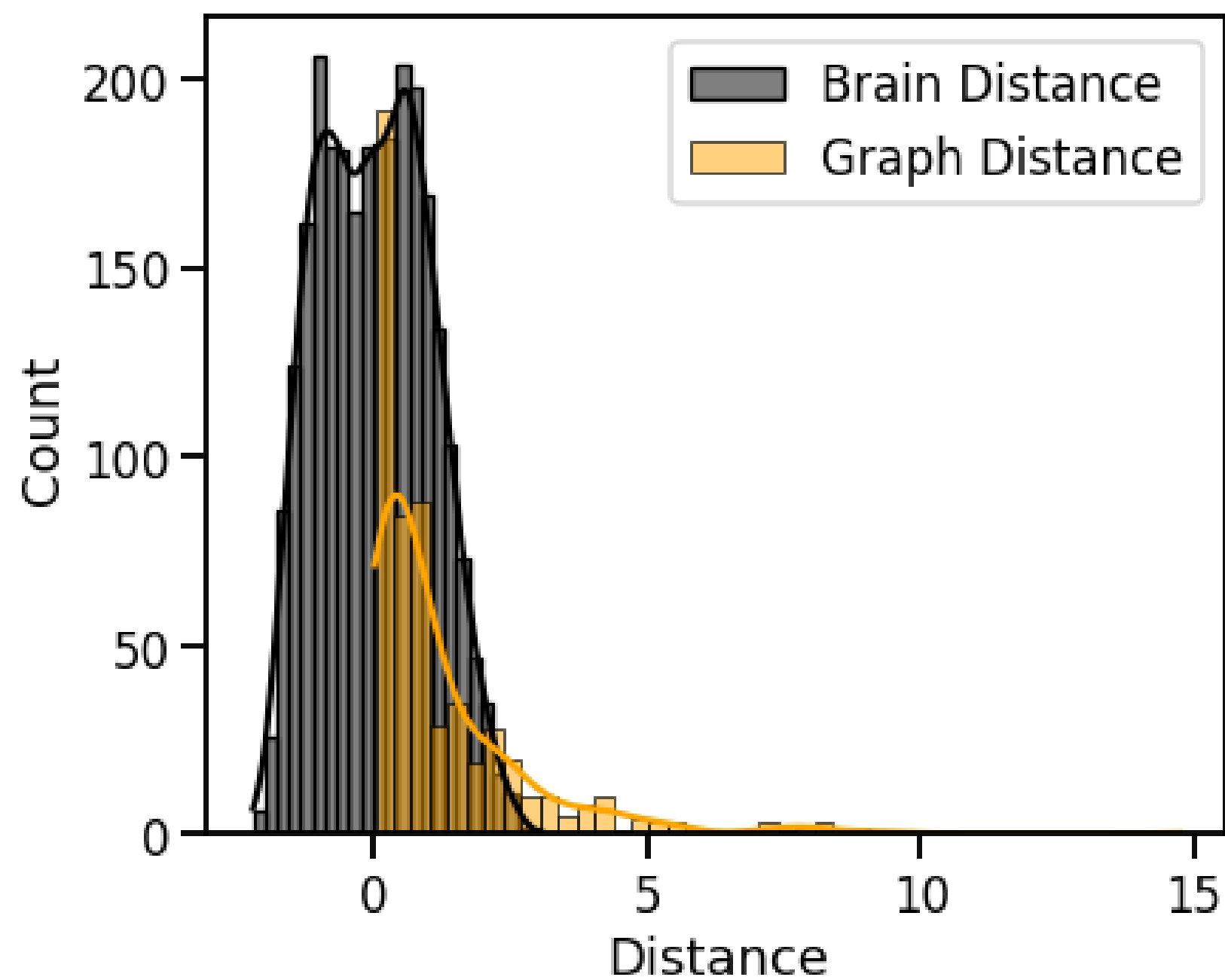
- Comm 1: 33 areas
- Comm 2: 49 areas
- Comm 3: 34 areas

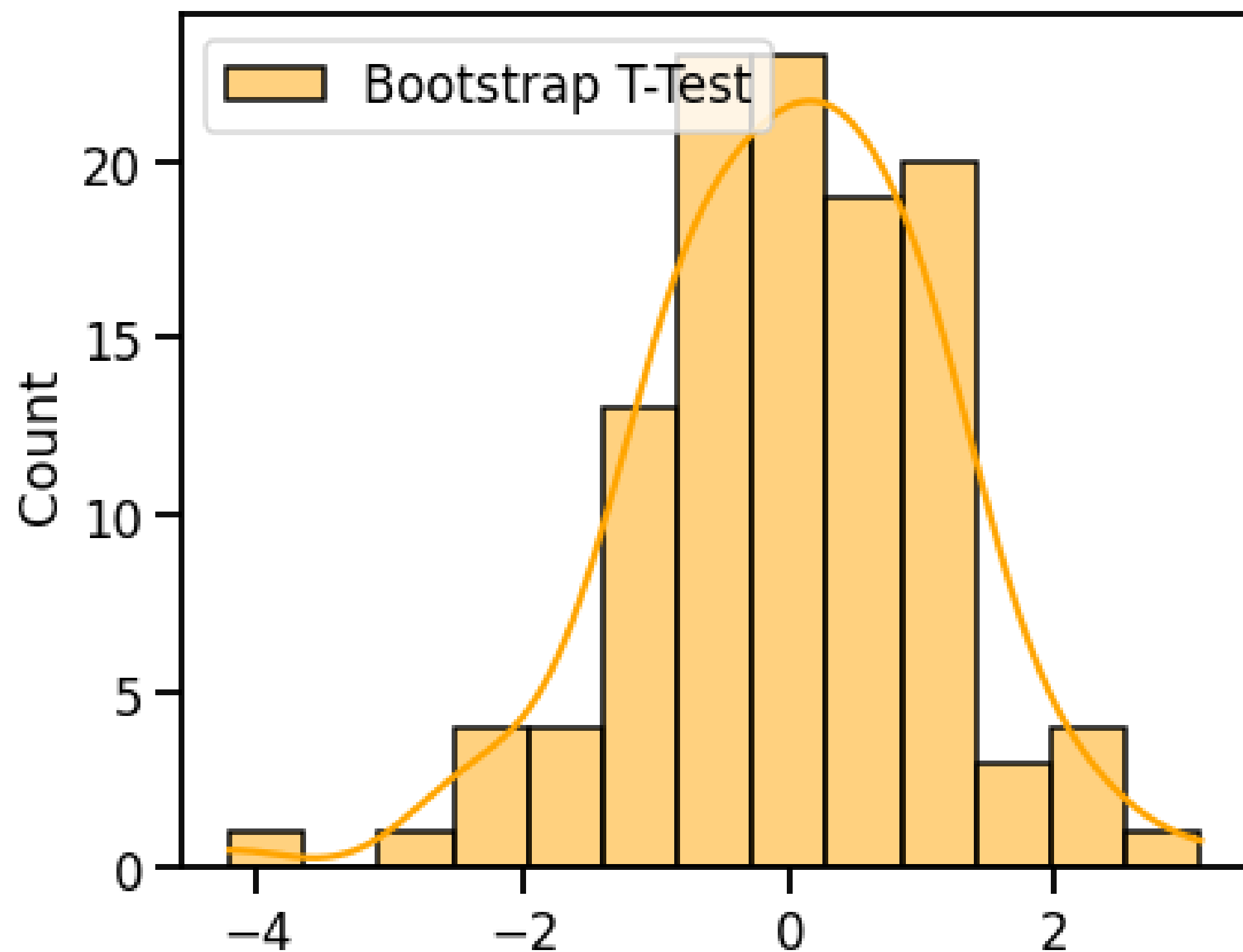












**T-test  
statistic = -23  
p\_value = 0**

Strength Connection



Area 1	Area 2	Connection (log(FLNe))	In the same Community	Shortest Path = 1
TPO	TE3	-1.3	Yes	Yes
A23b	PG	-1.62	No	Yes
TE3	PG	-1.66	No	Yes
A23b	A8b	-1.96	No	Yes
TPO	PG	-2.81	No	Yes
A8b	PG	-3.16	No	Yes
TPO	A8b	-3.26	Yes	Yes
TE3	A23b	-4.36	No	Yes
TPO	A23b	-	No	Yes
TE3	A8b	-	Yes	Yes

\*

Avg path lenght: 1.6



# Further leads



**01**

Examining positions  
and functions of  
communities

**02**

Research on area  
functions

**03**

Correlation analysis  
with statistical tests

**04**

Other species?

**That's all, folks!**

(for now)

**Thank you!**

# Resources

1. Majka, P., Bai, S., Bakola, S., Bednarek, S., Chan, J. M., Jermakow, N., ... & Rosa, M. G. (2020). Open access resource for cellular-resolution analyses of corticocortical connectivity in the marmoset monkey. *Nature communications*, 11(1), 1-14.
2. Majka P., Chaplin T.A., Yu, H.-H., Tolpygo A., Mitra P.P., Wójcik D.K., & Rosa M.G.P. (2016). Towards a comprehensive atlas of cortical connections in a primate brain: Mapping tracer injection studies of the common marmoset into a reference digital template. *Journal of Comparative Neurology*, 524(11), 2161–2181. <http://doi.org/10.1002/cne.24023>