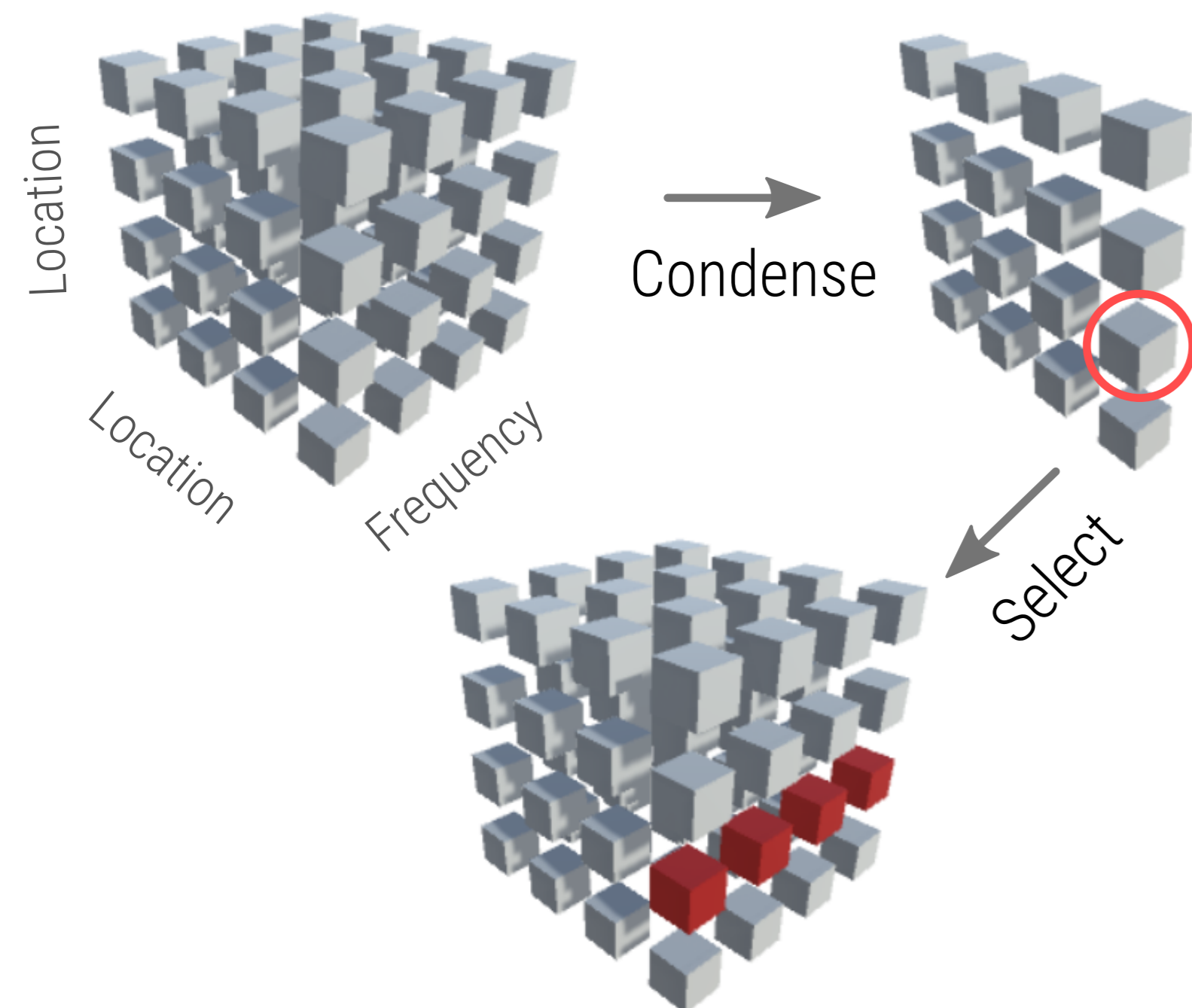
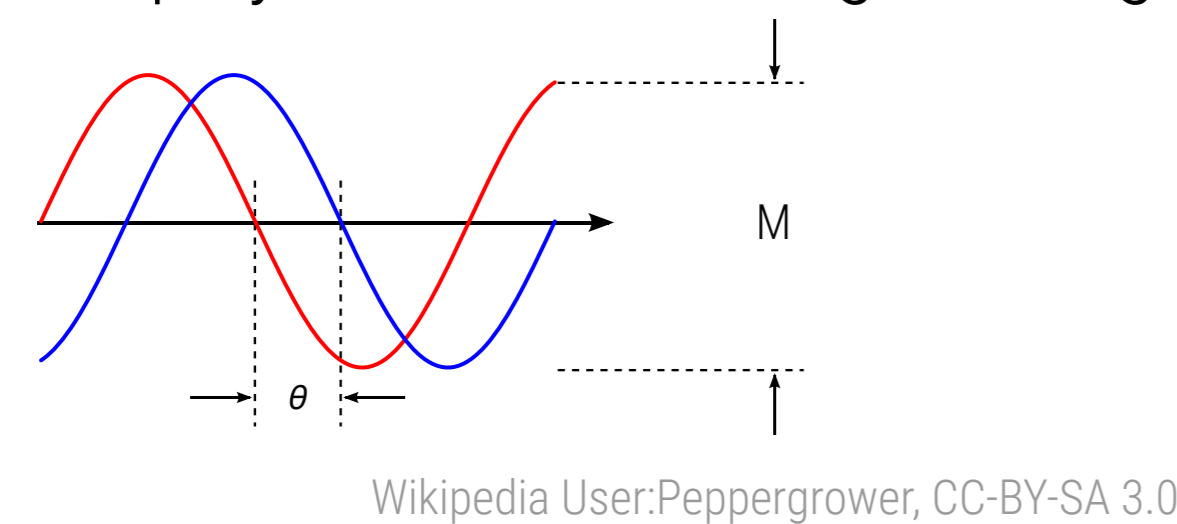


Problem

Neural connectivity exploration requires a user-friendly method of exploring high-dimensional data with simultaneous displays of multiple matrix slicing.

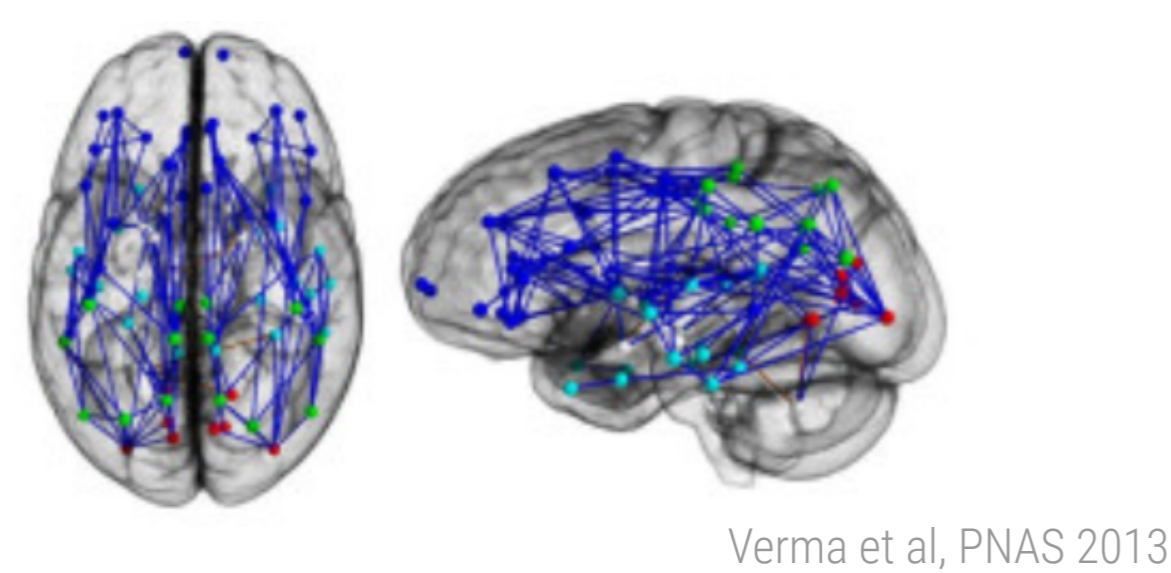


Multiple metrics for pairwise connection make connection displays time-consuming to navigate.



Motivation

"Gold standard" visualization techniques in neuroscience literature highly insufficient for direct interpretation without supplemental data.

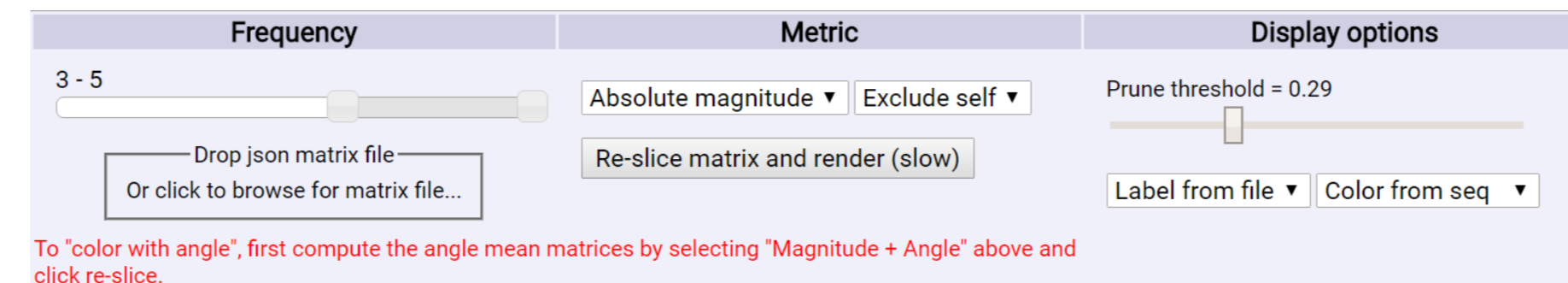


User interactivity with on-demand selection of multivariate attributes and in-browser computation and thresholding is the key for revealing underlying trends.

Results

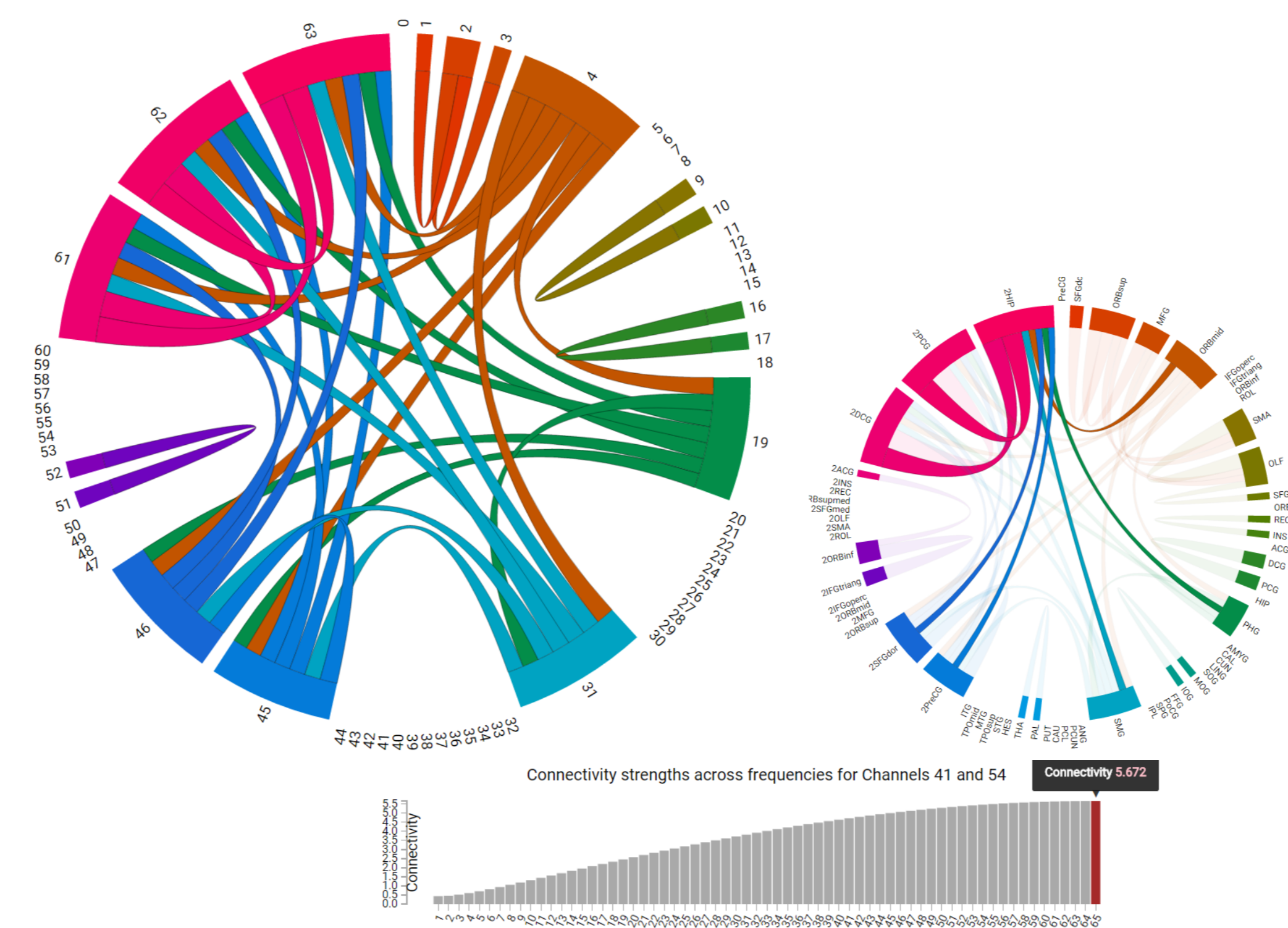
Affinity: a connectivity rapid exploration tool

Spectral frequency range Chord plot metric Instant pruning slider



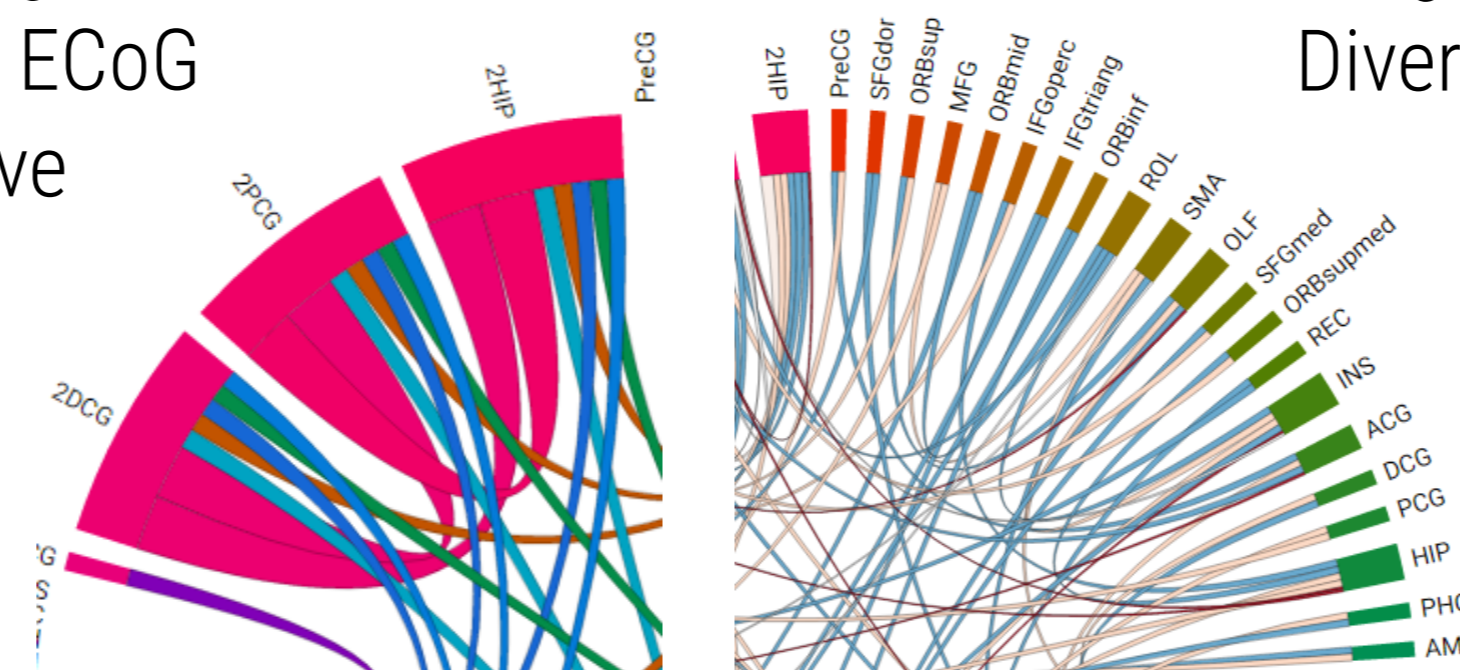
Drag & drop file loading

Colormap

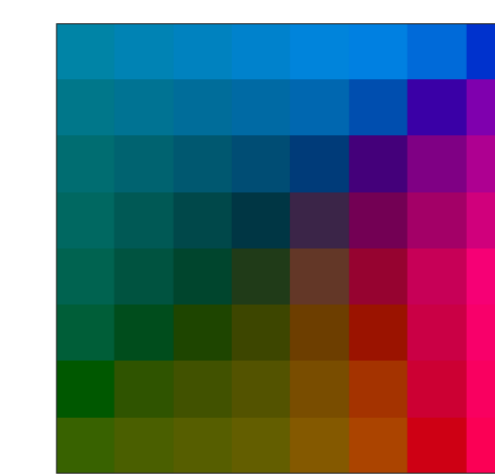


Connectivity magnitude for EEG · sEEG · ECoG
Spatial qualitative coloring shows inter- and intra-connectivity

Phase angle for EEG · MEG
Divergent color scale shows $-\pi$... $+\pi$ phase angles



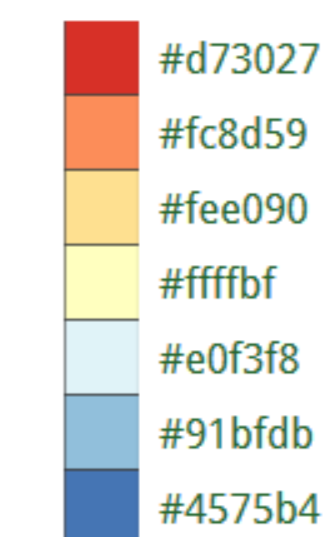
Approach



Equal luminance colormaps for nominal encoding of position



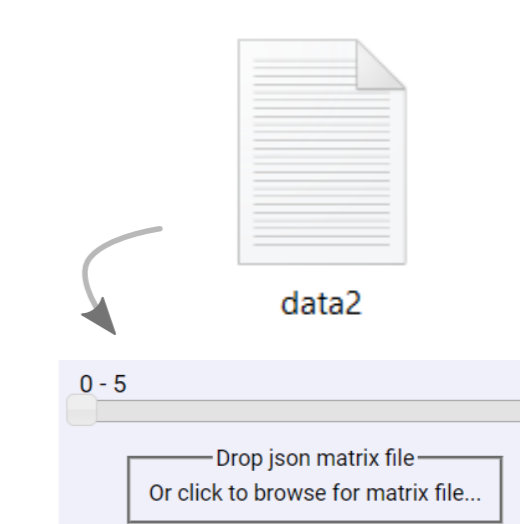
Feature not bug: take advantage of human visual quirk of perceptual color grouping



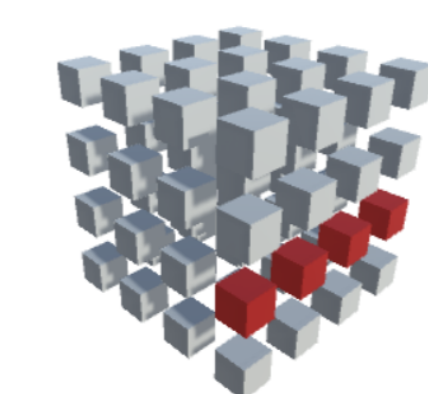
ColorBrewer diverging color scales for encoding quantitative data such as average phase angle



Responsive chord pruning slider for rapid examination of most salient features without occlusion



Drag-n-drop file loading and in-browser matrix slice selection with math.js and custom array .map() methods



Rapid slice selection across unplotted dimension on clicking chord

Future Work

Rapid switching between chord diagram and anatomical brain in WebGL
Python numpy processing in-browser for larger matrices (>1 million elements) in flask
Additional dimension: temporal variability plotting

References

bost.ocks.org: d3.layout.chord
d3 bar charts
FileDrop.js: iframe+HTML5 example
AmeliaBR: chord disambiguation key
<https://jsfiddle.net/KjrGF/12/>
Verma et al. PNAS 2013: Literature example of connectivity
ColorBrewer divergent scale: colorbrewer2.org
Pascal Getreuer: MATLAB L*a*b and L*c*h coordinate transformations

