

Visualization of Tonic Pain Signature (ToPS) connectivity

This script shows how to derive the ToPS and plot it's region-to-region connectivity using a circos plot. All of the data and functions used in this tutorial can be found here: <https://github.com/cocoanlab/tops>.

Loading ToPS weights and the modified brainnetome atlas

```
basedir = '/Users/Patty/Documents/MATLAB/ToPS/tops-master';
addpath(genpath(fullfile(basedir, 'functions')));
myDir = '/Volumes/MyBook/UKB_Files/Spreading/';
load('/Volumes/MyBook/UKB_Files/Spreading/ToPS_weight.mat', 'ToPS_w')
load('/Users/Patty/Documents/MATLAB/ToPS/cluster_Fan_Net_r279.mat')
```

Define tonic pain signature weights and threshold (5% threshold here)

```
threshold = prctile(abs(ToPS_w), 95, 'all'); % Signature thresholded to show top 5% we
ToPS_w2 = ToPS_w ;
ToPS_w2(abs(ToPS_w) < threshold) = ToPS_w(abs(ToPS_w) < threshold) * 0;
ToPS_w2;
```

```
col_pos_deg = [0.9961    0.9412    0.8510
               0.9922    0.8000    0.5412
               0.9882    0.5529    0.3490
               0.8902    0.2902    0.2000
               0.7020     0         0];
```

```
col_neg_deg = [0.9412    0.9765    0.9098
               0.7294    0.8941    0.7373
               0.4824    0.8000    0.7686
               0.2627    0.6353    0.7922
               0.0314    0.4078    0.6745];
```

```
ToPS_w_recon = reformat_r_new(ToPS_w2, 'reconstruct');
```

```
pos_deg = sum(ToPS_w_recon .* double(ToPS_w_recon>0));
neg_deg = -sum(ToPS_w_recon .* double(ToPS_w_recon<0));
norm_pos_deg = (pos_deg - min([pos_deg neg_deg])) ./ (max([pos_deg, neg_deg]) - min([pos_deg, neg_deg]));
norm_neg_deg = (neg_deg - min([pos_deg neg_deg])) ./ (max([pos_deg, neg_deg]) - min([pos_deg, neg_deg]));
```

Plot full ToPS connectivity in circos plot (5% threshold)

```
figure;
set(gcf, 'visible', 'on');
circos_multilayer(ToPS_w_recon, ...
    'group', cluster_Fan_Net.dat(:,3), 'group_color', cluster_Fan_Net.nine_network_col,
    'add_layer', {'layer', norm_pos_deg, 'color', col_pos_deg, 'layer', norm_neg_deg,
    'region_names_size', 7, 'laterality', cluster_Fan_Net.dat(:,7), 'sep_pos_neg');
set(gca, 'xlim', [-1.2 1.2], 'ylim', [-1.2 1.2]);
set(gcf, 'position', [40 40 786 762]);
title('Top 5% of ToPS Connectivity', 'FontSize', 24)
```

Top 5% of ToPS Connectivity

