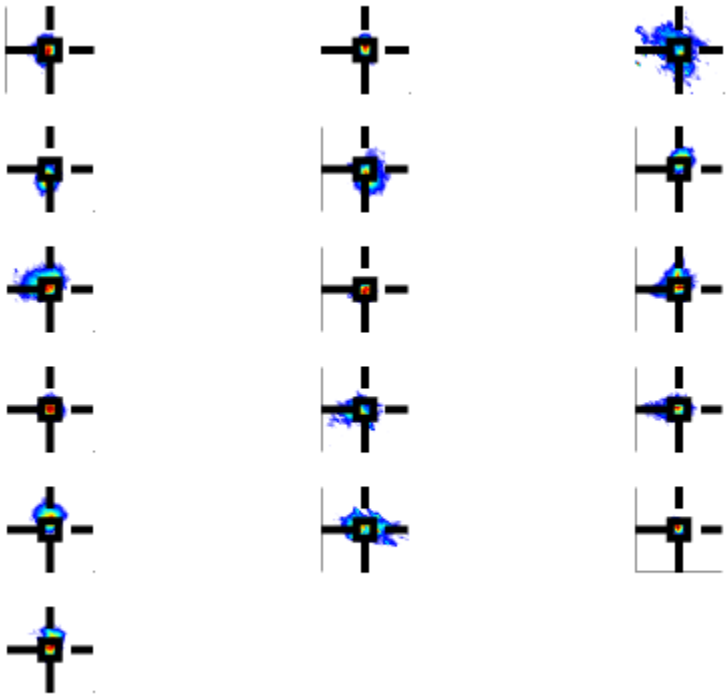
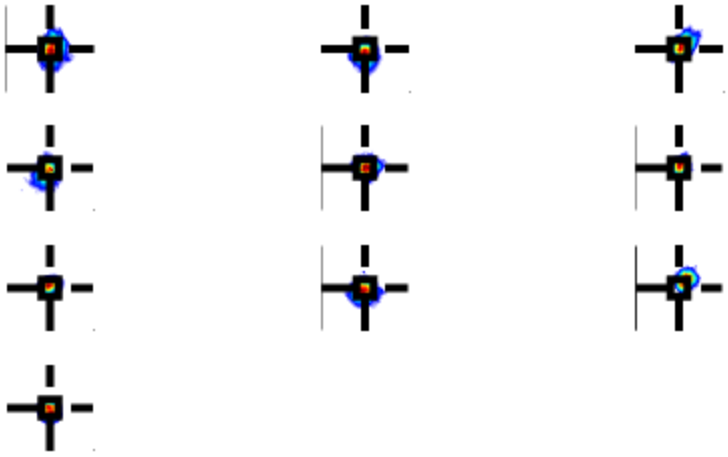
# Table of Contents

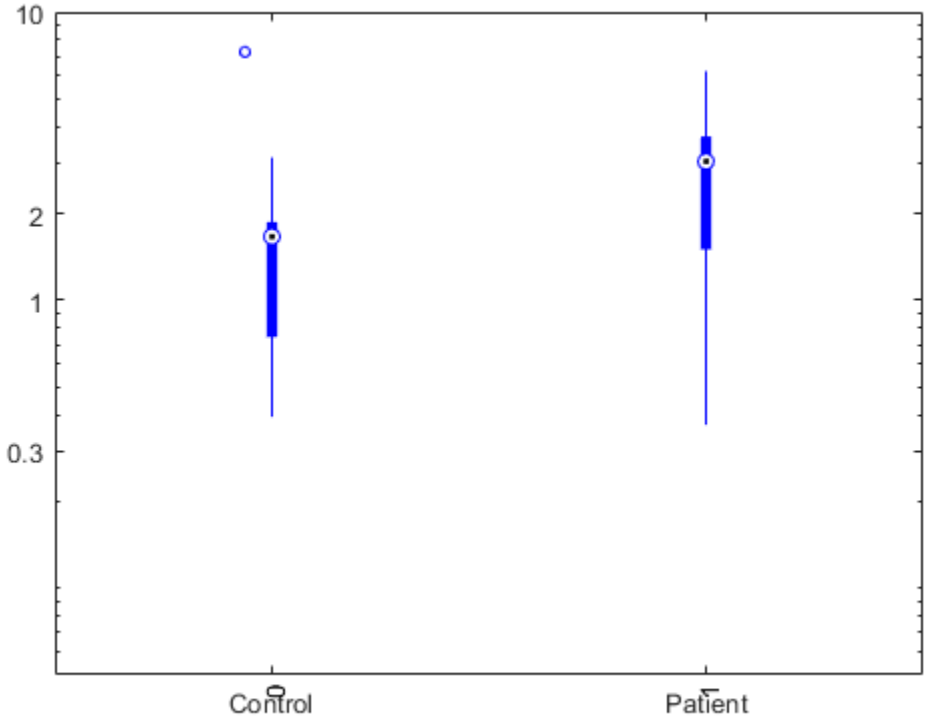
# Script for Analyzing Huxlin Data and Creating Manuscript Figures

## Figure 2A - Heatmaps for Fixation

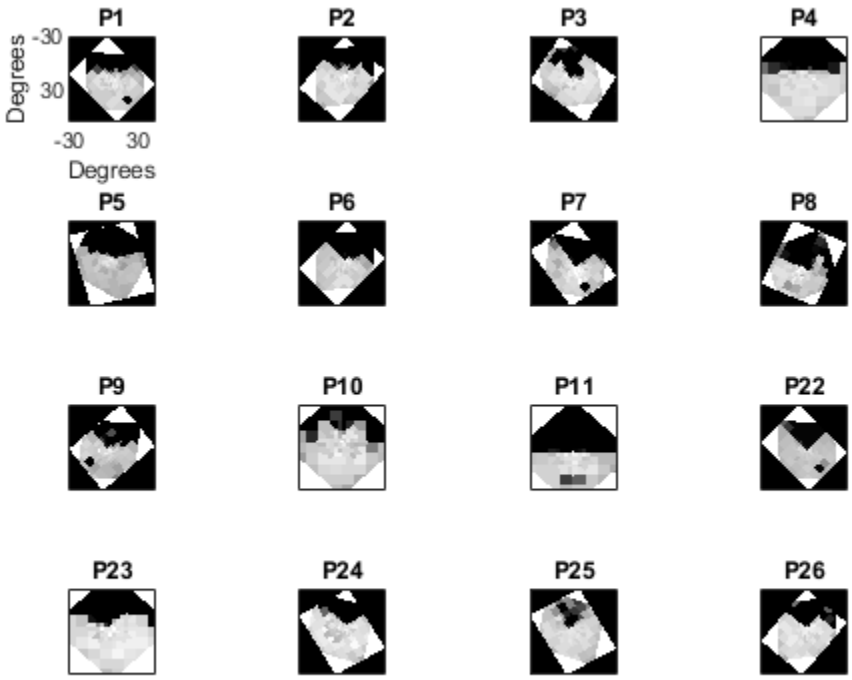


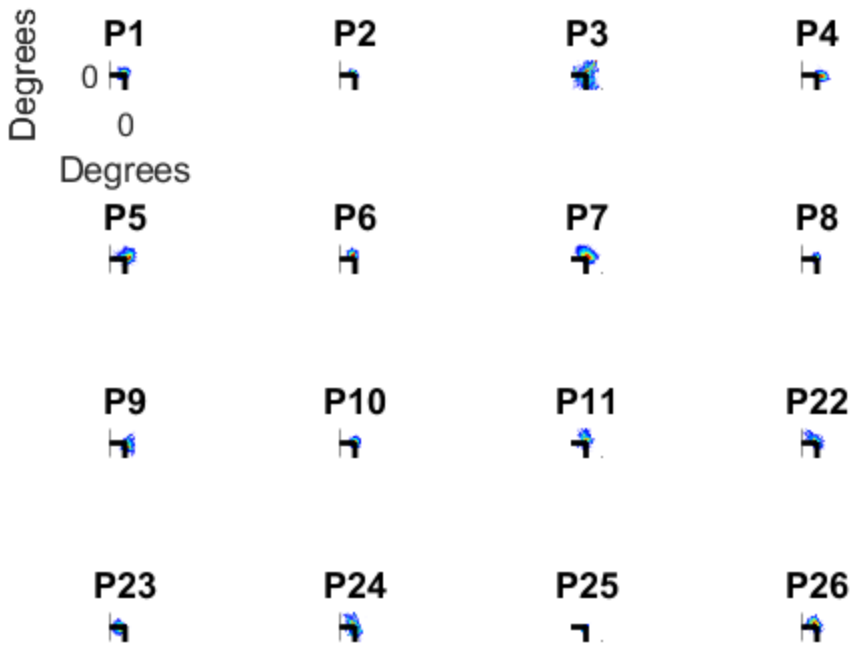


# Figure 2B - BCEA for Fixation



# Figure 3


P1
P2
P3
P4
Degrees
-30
30
-30
30
Degrees
P5
P6
P7
P8
P9
P10
P11
P22
P23
P24
P25
P26




# Figure 4A

```
ans =

  Rectangle with properties:

    FaceColor: 'none'
    EdgeColor: [0.5882 0.5882 0.5882]
    LineWidth: 0.5000
    LineStyle: '-'
    Curvature: [1 1]
     Position: [-11.9991 -4.4693 16.7511 15.8116]

  Use GET to show all properties


ans =

  Rectangle with properties:

    FaceColor: 'none'
    EdgeColor: [0.5882 0.5882 0.5882]
    LineWidth: 0.5000
    LineStyle: '-'
```

```
    Curvature: [1 1]
     Position: [-8.0077 -2.5284 12.2130 10.6765]

  Use GET to show all properties


ans =

  Rectangle with properties:

    FaceColor: 'none'
    EdgeColor: [0.5882 0.5882 0.5882]
    LineWidth: 0.5000
    LineStyle: '-'
    Curvature: [1 1]
     Position: [-13.8124 -19.4919 31.0093 44.6052]

  Use GET to show all properties


ans =

  Rectangle with properties:

    FaceColor: 'none'
    EdgeColor: [0.5882 0.5882 0.5882]
    LineWidth: 0.5000
    LineStyle: '-'
    Curvature: [1 1]
     Position: [0.3383 -9.0095 17.7085 17.4580]

  Use GET to show all properties


ans =

  Rectangle with properties:

    FaceColor: 'none'
    EdgeColor: [0.5882 0.5882 0.5882]
    LineWidth: 0.5000
    LineStyle: '-'
    Curvature: [1 1]
     Position: [-14.0766 -4.9391 28.7798 23.0246]

  Use GET to show all properties


ans =

  Rectangle with properties:

    FaceColor: 'none'
    EdgeColor: [0.5882 0.5882 0.5882]
```

```
    LineWidth: 0.5000
    LineStyle: '-'
    Curvature: [1 1]
     Position: [-10.3890 -0.1302 13.7907 15.8895]

  Use GET to show all properties


ans =

  Rectangle with properties:

    FaceColor: 'none'
    EdgeColor: [0.5882 0.5882 0.5882]
    LineWidth: 0.5000
    LineStyle: '-'
    Curvature: [1 1]
     Position: [-11.6769 -3.0869 25.7564 25.1731]

  Use GET to show all properties


ans =

  Rectangle with properties:

    FaceColor: 'none'
    EdgeColor: [0.5882 0.5882 0.5882]
    LineWidth: 0.5000
    LineStyle: '-'
    Curvature: [1 1]
     Position: [-8.3308 -4.9668 13.4924 18.6893]

  Use GET to show all properties


ans =

  Rectangle with properties:

    FaceColor: 'none'
    EdgeColor: [0.5882 0.5882 0.5882]
    LineWidth: 0.5000
    LineStyle: '-'
    Curvature: [1 1]
     Position: [-3.0559 -14.5882 20.6828 26.2365]

  Use GET to show all properties


ans =

  Rectangle with properties:
```

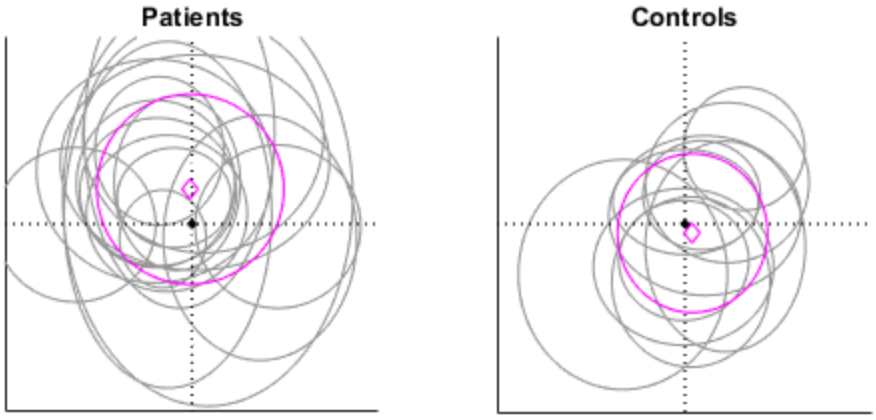
```
    FaceColor: 'none'
    EdgeColor: [0.5882 0.5882 0.5882]
    LineWidth: 0.5000
    LineStyle: '-'
    Curvature: [1 1]
     Position: [-11.2947 -7.2311 17.2024 16.7305]

  Use GET to show all properties


ans =

  Rectangle with properties:

    FaceColor: 'none'
    EdgeColor: [0.5882 0.5882 0.5882]
    LineWidth: 0.5000
    LineStyle: '-'
    Curvature: [1 1]
     Position: [-11.5414 -9.0079 20.3818 37.3653]

  Use GET to show all properties


ans =

  Rectangle with properties:

    FaceColor: 'none'
    EdgeColor: [0.5882 0.5882 0.5882]
    LineWidth: 0.5000
    LineStyle: '-'
    Curvature: [1 1]
     Position: [-16.6267 -6.2919 25.2259 23.9108]

  Use GET to show all properties


ans =

  Rectangle with properties:

    FaceColor: 'none'
    EdgeColor: [0.5882 0.5882 0.5882]
    LineWidth: 0.5000
    LineStyle: '-'
    Curvature: [1 1]
     Position: [-21.0446 -8.3410 17.1680 16.5267]

  Use GET to show all properties


ans =
```

```
  Rectangle with properties:

    FaceColor: 'none'
    EdgeColor: [0.5882 0.5882 0.5882]
    LineWidth: 0.5000
    LineStyle: '-'
    Curvature: [1 1]
     Position: [-13.6855 -17.5531 22.2122 37.0768]

  Use GET to show all properties


ans =

  Rectangle with properties:

    FaceColor: 'none'
    EdgeColor: [0.5882 0.5882 0.5882]
    LineWidth: 0.5000
    LineStyle: '-'
    Curvature: [1 1]
     Position: [-7.7487 -6.8303 9.2711 10.4690]

  Use GET to show all properties


ans =

  Rectangle with properties:

    FaceColor: 'none'
    EdgeColor: [0.5882 0.5882 0.5882]
    LineWidth: 0.5000
    LineStyle: '-'
    Curvature: [1 1]
     Position: [-12.3638 -4.6557 16.9455 17.8930]

  Use GET to show all properties


ans =

  Rectangle with properties:

    FaceColor: 'none'
    EdgeColor: [1 0 1]
    LineWidth: 0.5000
    LineStyle: '-'
    Curvature: [1 1]
     Position: [-10.1771 -6.4447 20.0010 20.3287]

  Use GET to show all properties
```

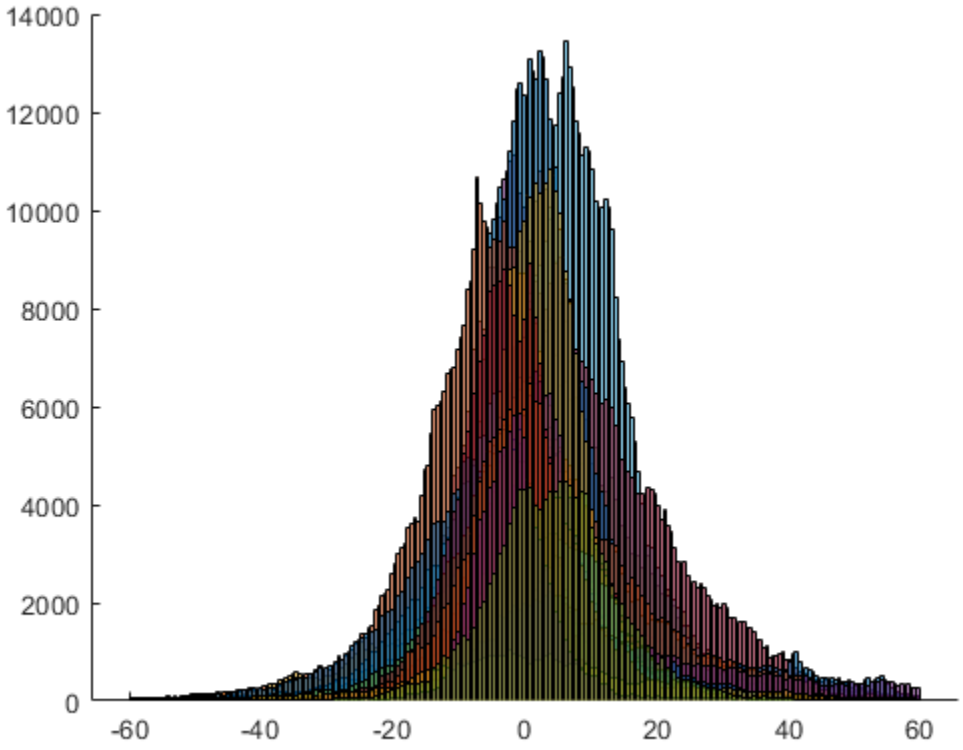
```
ans =

  Rectangle with properties:

    FaceColor: 'none'
    EdgeColor: [0.5882 0.5882 0.5882]
    LineWidth: 0.5000
    LineStyle: '-'
    Curvature: [1 1]
     Position: [-4.2188 -13.6030 17.0152 22.4033]

  Use GET to show all properties


ans =

  Rectangle with properties:

    FaceColor: 'none'
    EdgeColor: [0.5882 0.5882 0.5882]
    LineWidth: 0.5000
    LineStyle: '-'
    Curvature: [1 1]
     Position: [-7.7808 -15.2273 16.8382 18.1125]

  Use GET to show all properties


ans =

  Rectangle with properties:

    FaceColor: 'none'
    EdgeColor: [0.5882 0.5882 0.5882]
    LineWidth: 0.5000
    LineStyle: '-'
    Curvature: [1 1]
     Position: [-4.2224 -4.1266 17.4210 17.0424]

  Use GET to show all properties


ans =

  Rectangle with properties:

    FaceColor: 'none'
    EdgeColor: [0.5882 0.5882 0.5882]
    LineWidth: 0.5000
    LineStyle: '-'
    Curvature: [1 1]
     Position: [-17.7272 -17.6148 22.2374 24.4702]

  Use GET to show all properties
```

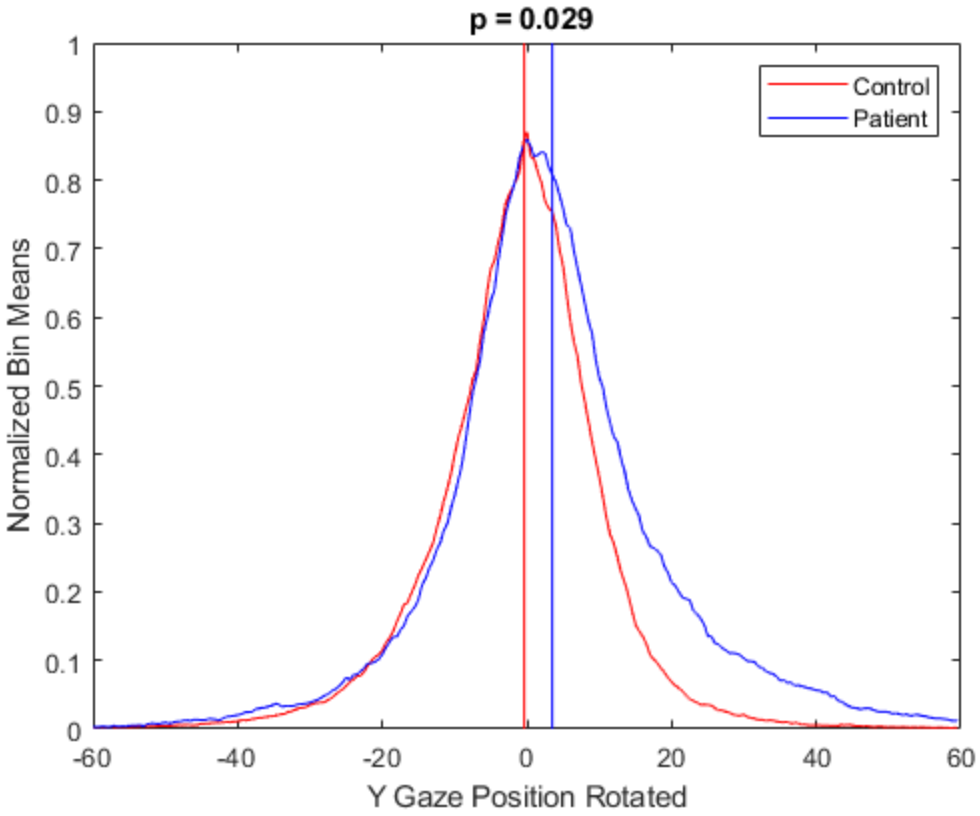
```
ans =

  Rectangle with properties:

    FaceColor: 'none'
    EdgeColor: [0.5882 0.5882 0.5882]
    LineWidth: 0.5000
    LineStyle: '-'
    Curvature: [1 1]
     Position: [-8.1120 -7.5961 20.4346 16.9900]

  Use GET to show all properties


ans =

  Rectangle with properties:

    FaceColor: 'none'
    EdgeColor: [0.5882 0.5882 0.5882]
    LineWidth: 0.5000
    LineStyle: '-'
    Curvature: [1 1]
     Position: [-4.4667 -2.7506 12.4923 11.6054]

  Use GET to show all properties


ans =

  Rectangle with properties:

    FaceColor: 'none'
    EdgeColor: [0.5882 0.5882 0.5882]
    LineWidth: 0.5000
    LineStyle: '-'
    Curvature: [1 1]
     Position: [-7.6817 -3.2650 15.4707 11.1715]

  Use GET to show all properties


ans =

  Rectangle with properties:

    FaceColor: 'none'
    EdgeColor: [0.5882 0.5882 0.5882]
    LineWidth: 0.5000
    LineStyle: '-'
    Curvature: [1 1]
     Position: [-9.7494 -12.8930 19.1756 16.6673]
```

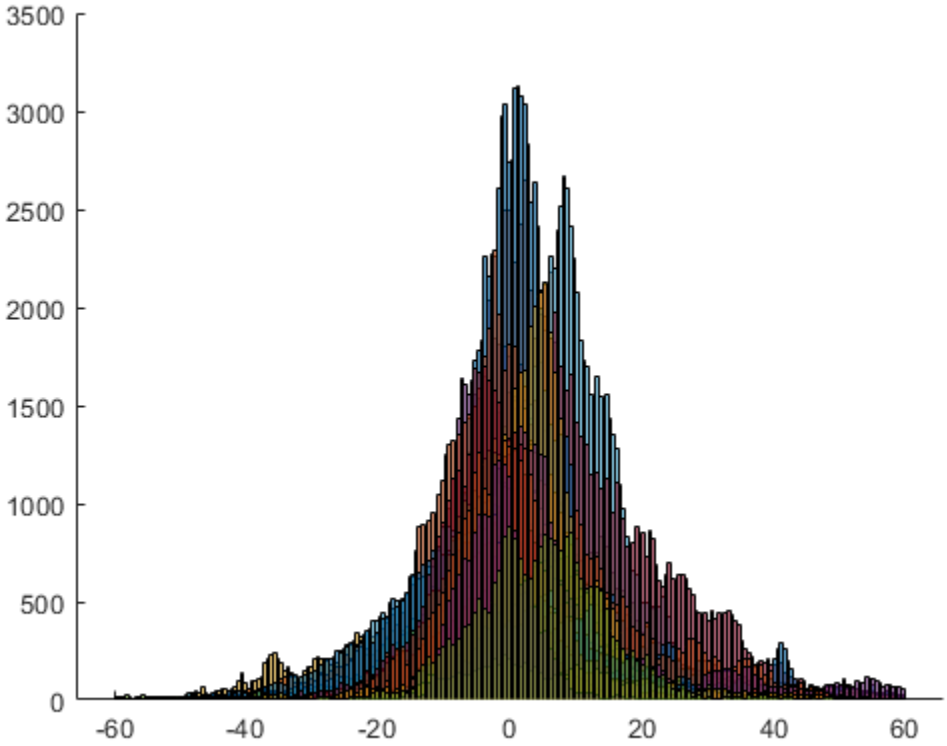
```
  Use GET to show all properties


ans =

  Rectangle with properties:

    FaceColor: 'none'
    EdgeColor: [0.5882 0.5882 0.5882]
    LineWidth: 0.5000
    LineStyle: '-'
    Curvature: [1 1]
     Position: [-0.1701 1.4628 12.9037 13.0897]

  Use GET to show all properties


ans =

  Rectangle with properties:

    FaceColor: 'none'
    EdgeColor: [0.5882 0.5882 0.5882]
    LineWidth: 0.5000
    LineStyle: '-'
    Curvature: [1 1]
     Position: [-7.0473 -10.2708 13.8419 12.7575]

  Use GET to show all properties


ans =

  Rectangle with properties:

    FaceColor: 'none'
    EdgeColor: [1 0 1]
    LineWidth: 0.5000
    LineStyle: '-'
    Curvature: [1 1]
     Position: [-7.1795 -9.4212 15.9650 16.8956]

  Use GET to show all properties
```

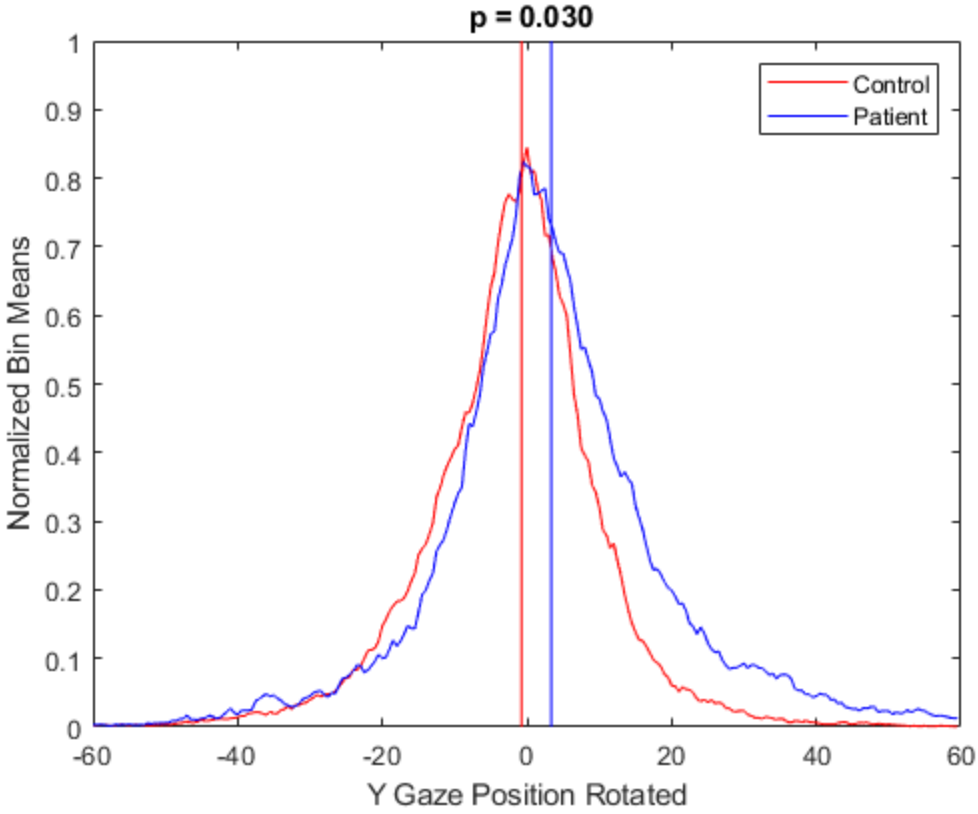

Patients
Controls

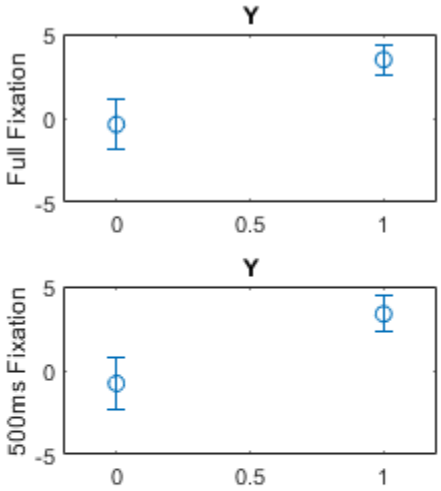
# Figure3B and C




p = 0.029
Control
Patient
Normalized Bin Means
Y Gaze Position Rotated
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
-60
-40
-20
0
20
40
60

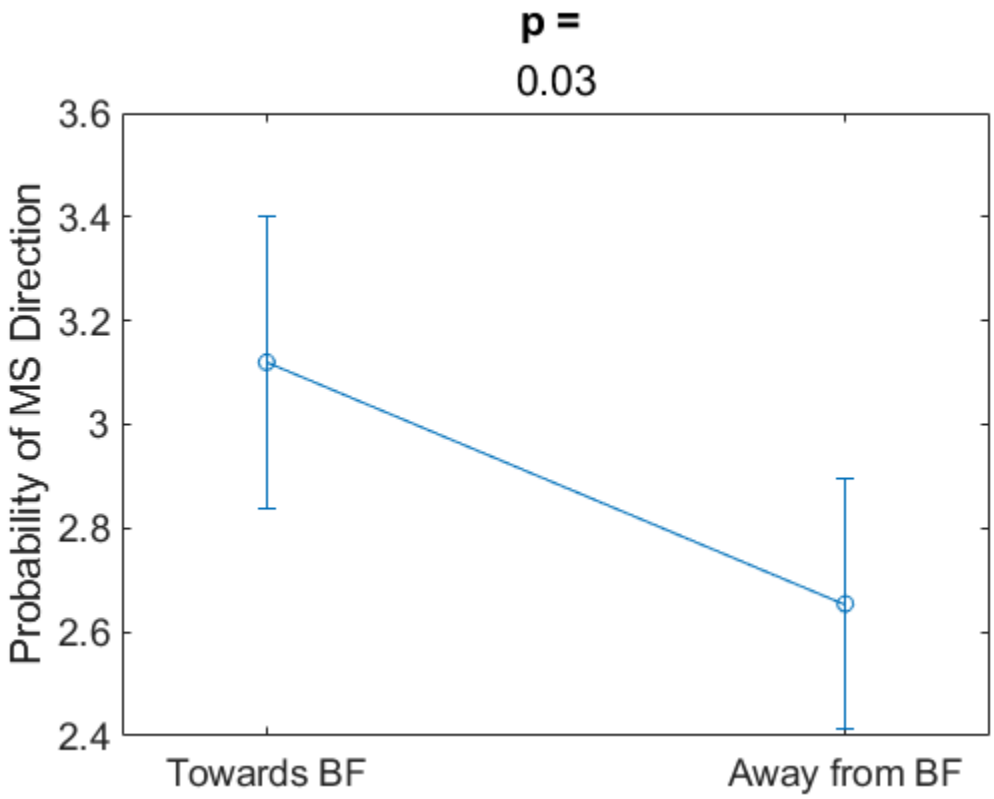

3500
3000
2500
2000
1500
1000
500
0
-60
-40
-20
0
20
40
60

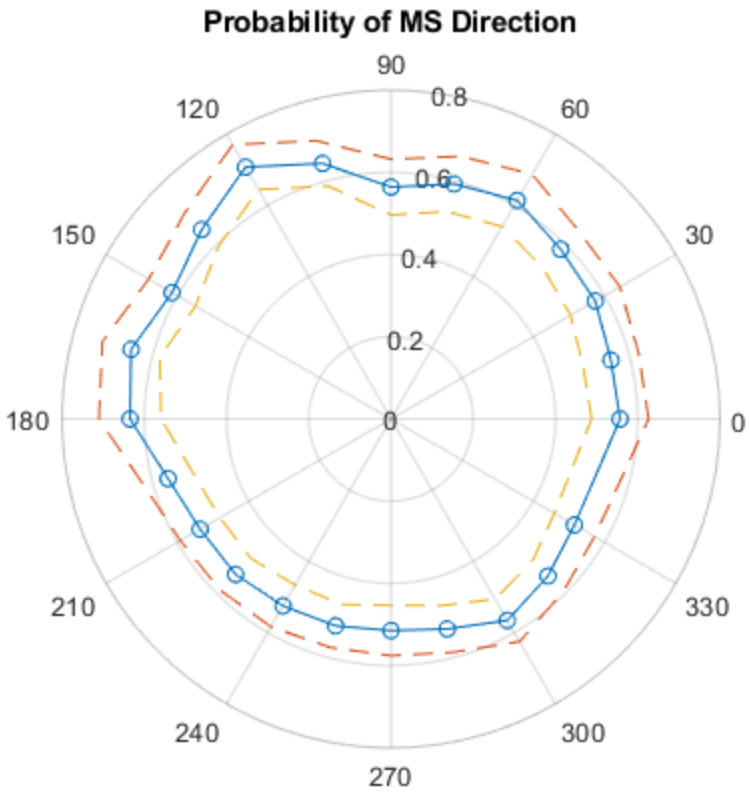

p = 0.030
Control
Patient
Normalized Bin Means
Y Gaze Position Rotated
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
-60
-40
-20
0
20
40
60


Y
Full Fixation
5
0
-5
0
0.5
1
Y
500ms Fixation
5
0
-5
0
0.5
1

# Figure 4 MS Fixation

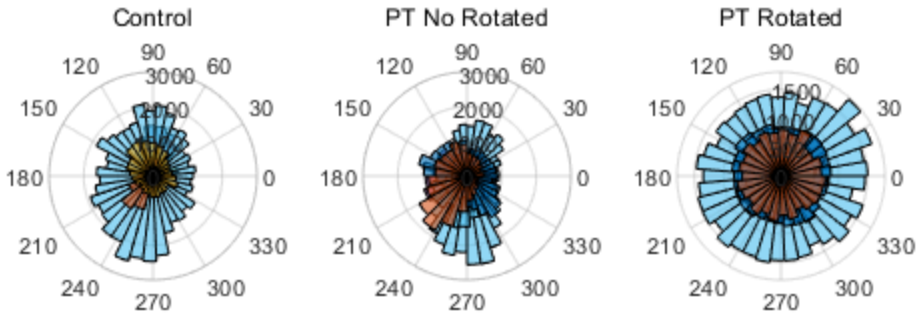
```
numSize =

    16    23


numSize =

    16     1


numSize =

    16    23


numSize =

    16     1
```

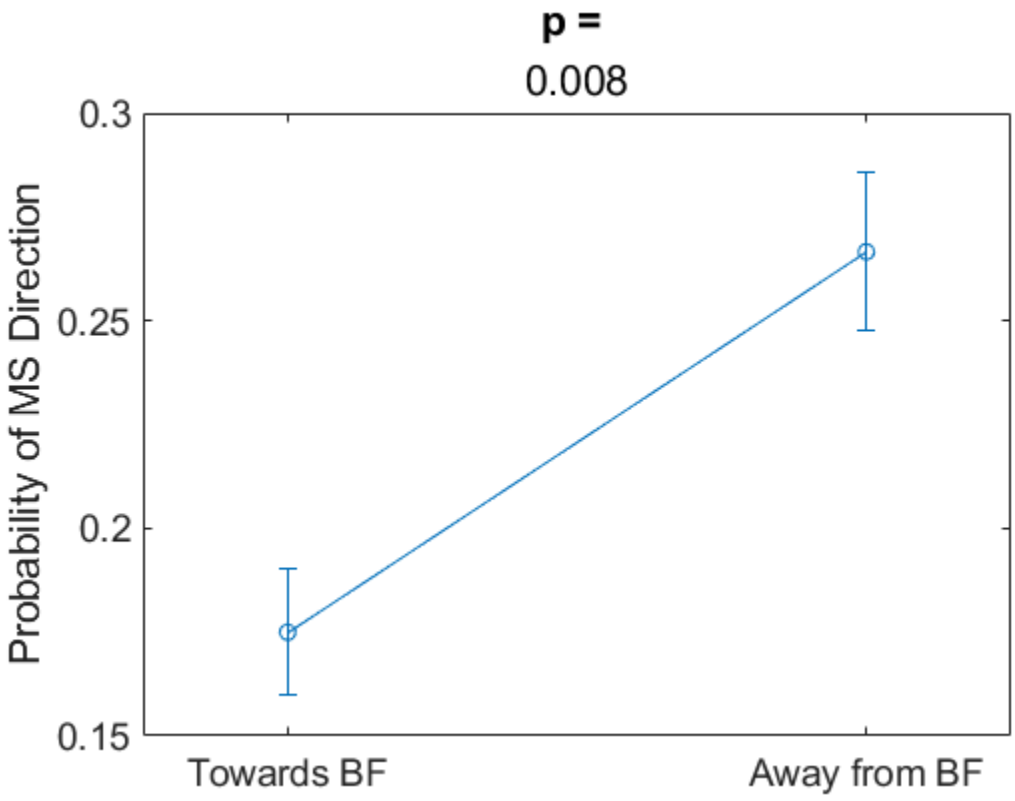


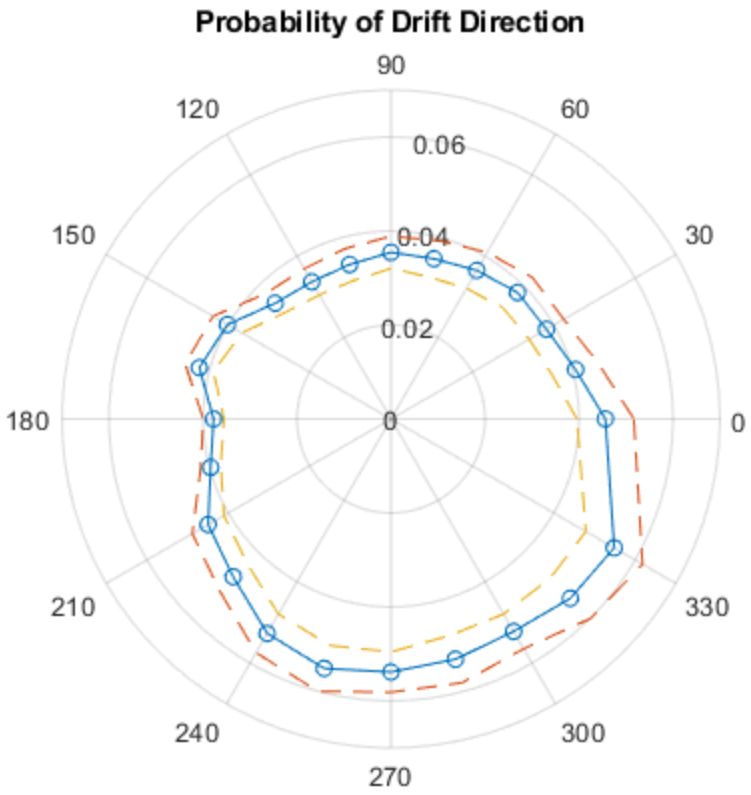



# Figure 4 Drift Fixation

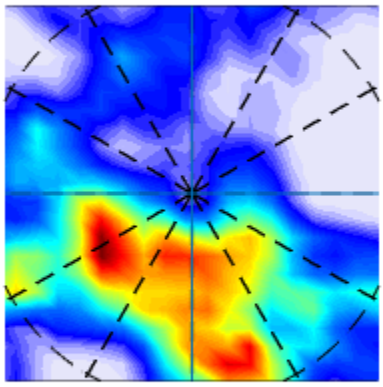
```
numSize =

    16    23


numSize =

    16     1


numSize =

    16    23


numSize =

    16     1
```

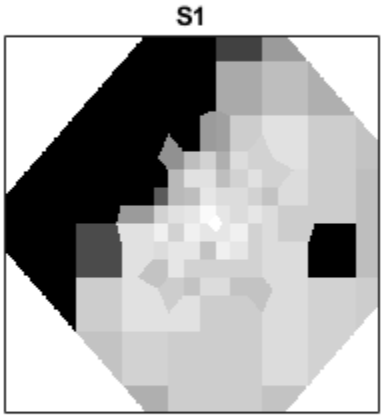

Control
PT No Rotated
PT Rotated
90
120
60
150
30
180
0
210
330
240
300
270
3000
2000
1500

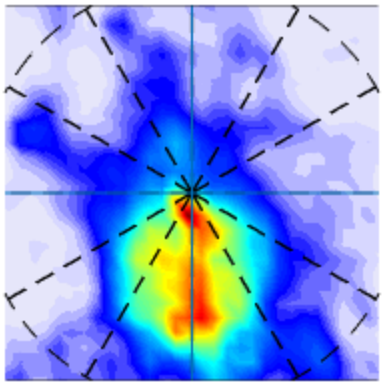

p =
0.008
Probability of MS Direction
0.3
0.25
0.2
0.15
Towards BF
Away from BF

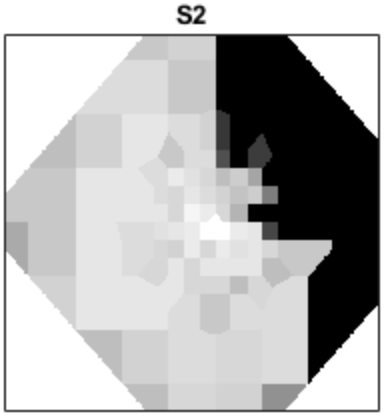

Probability of Drift Direction
90
60
30
0
330
300
270
240
210
180
150
120
0.06
0.04
0.02
0

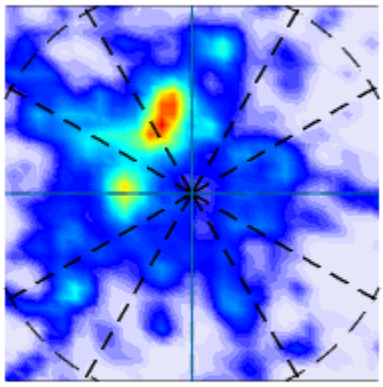
# Velocity Check of Drift

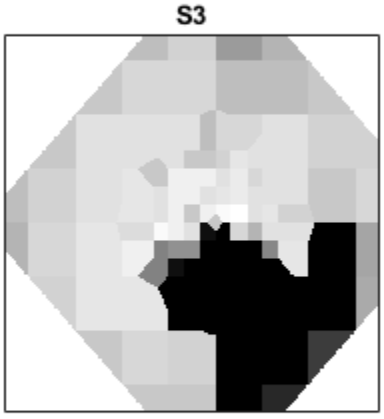


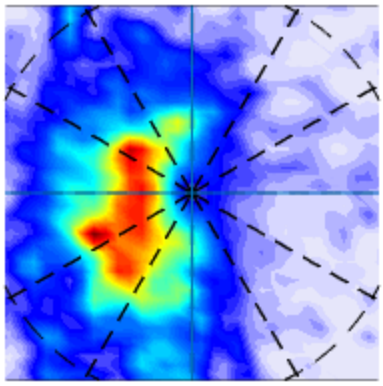


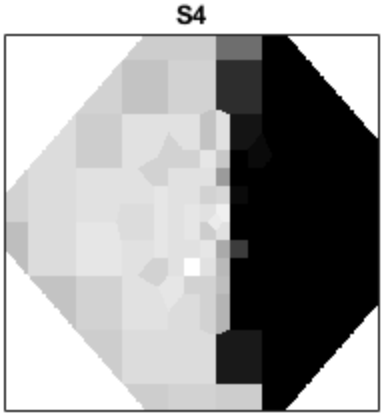


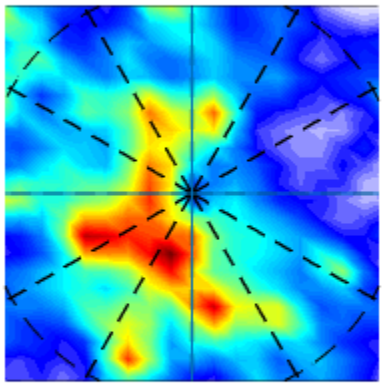

S2

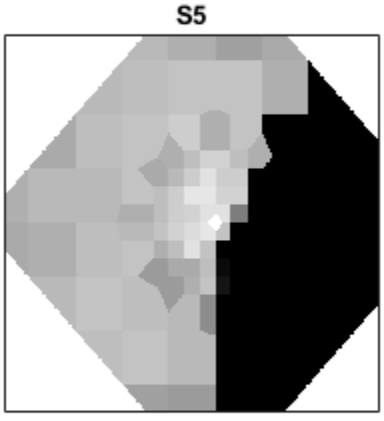


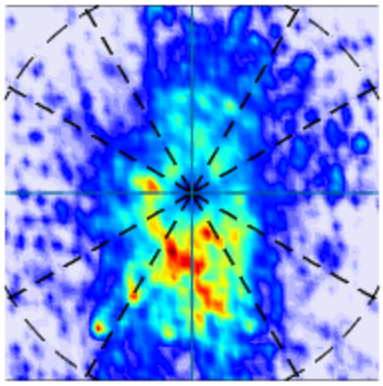

S3

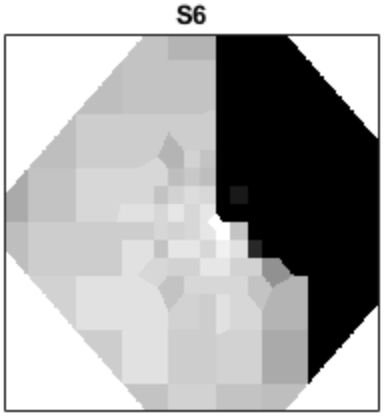


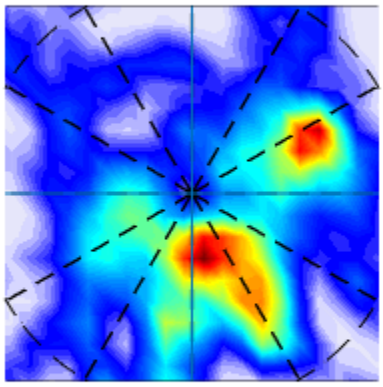

S4

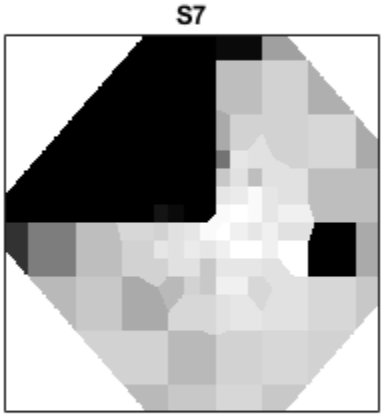


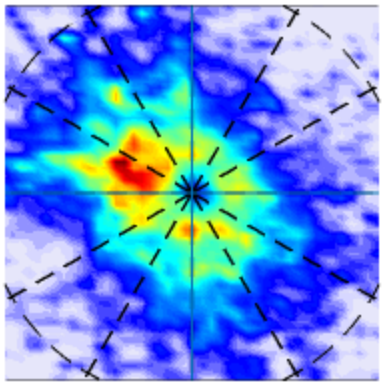

S5

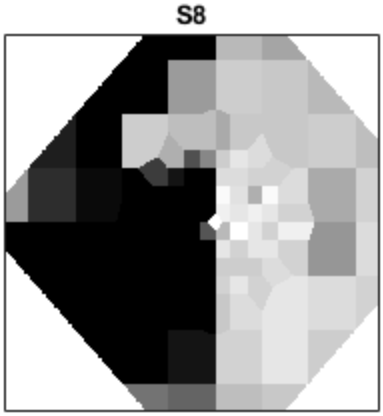


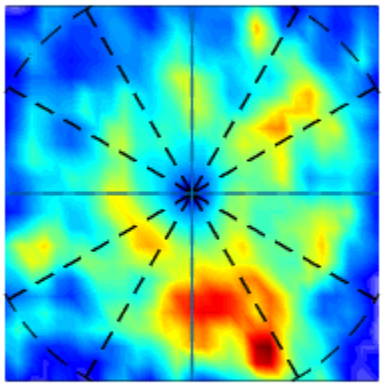

S6

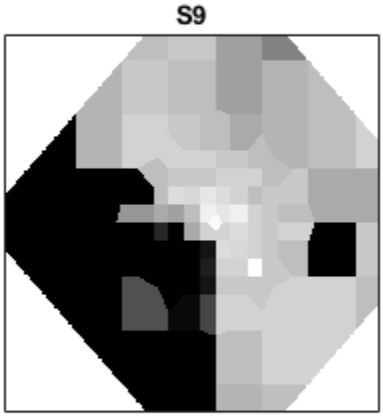



S7




S8

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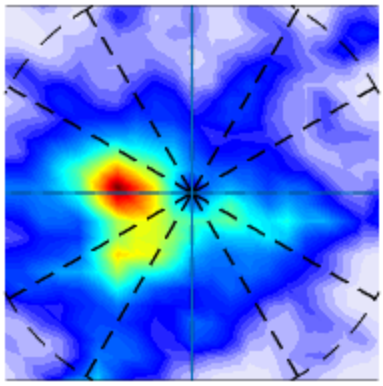

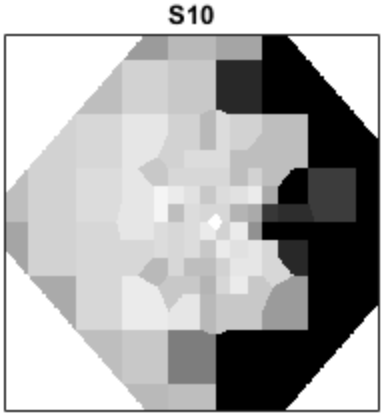
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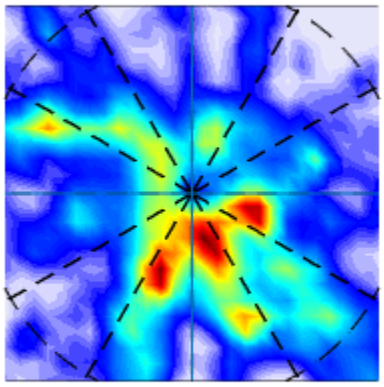

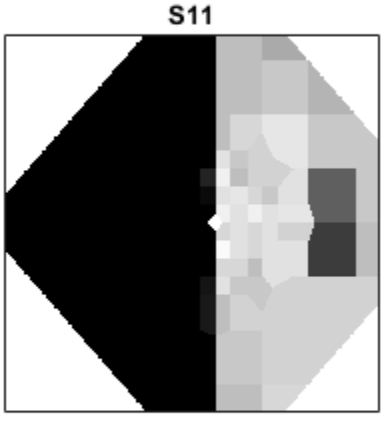
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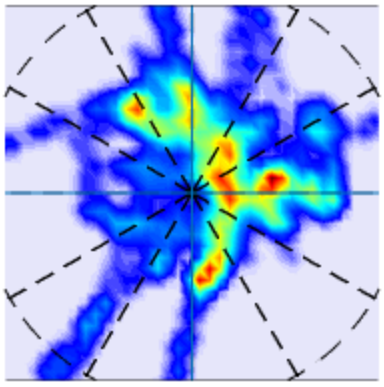

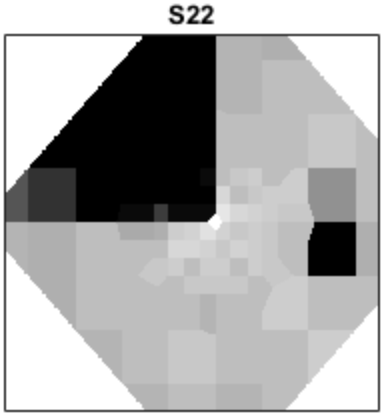
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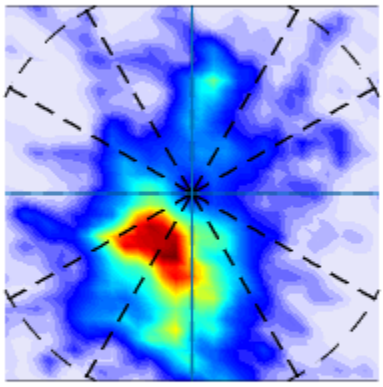

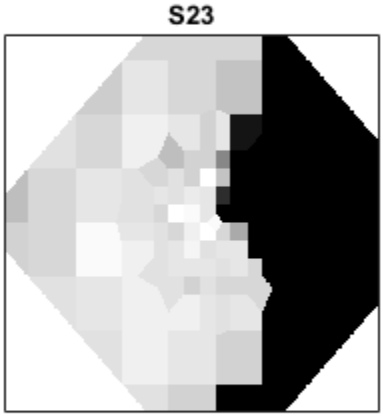
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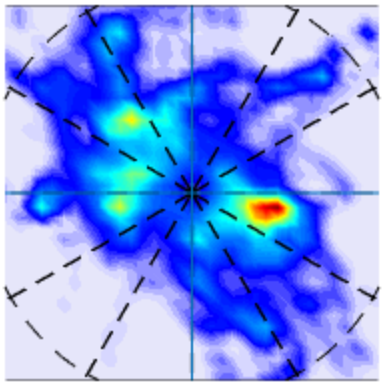

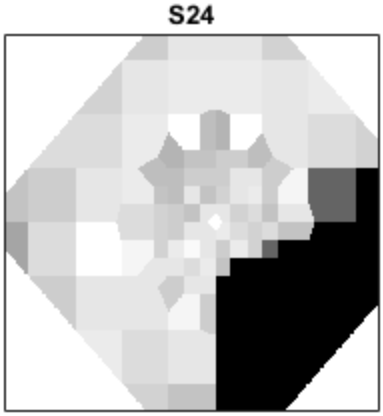
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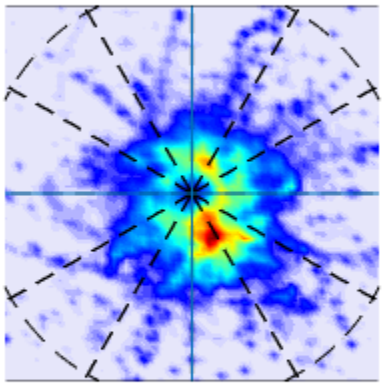

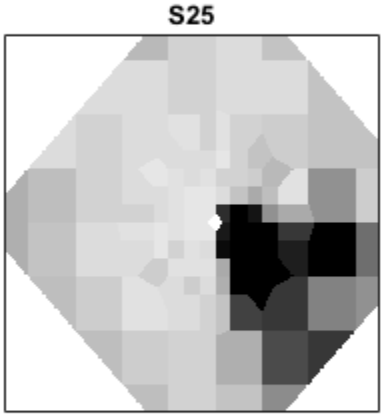
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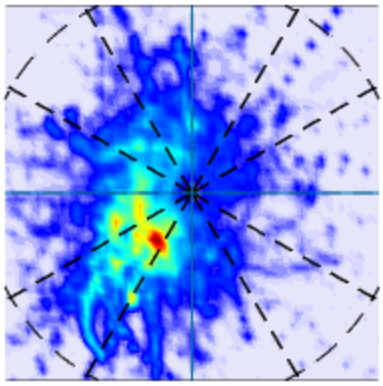

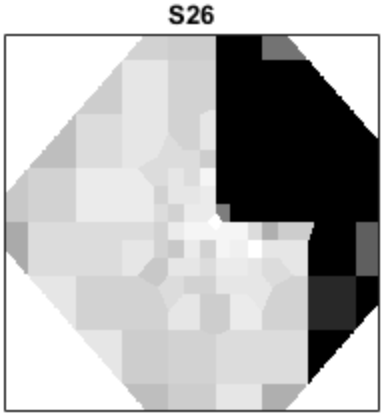
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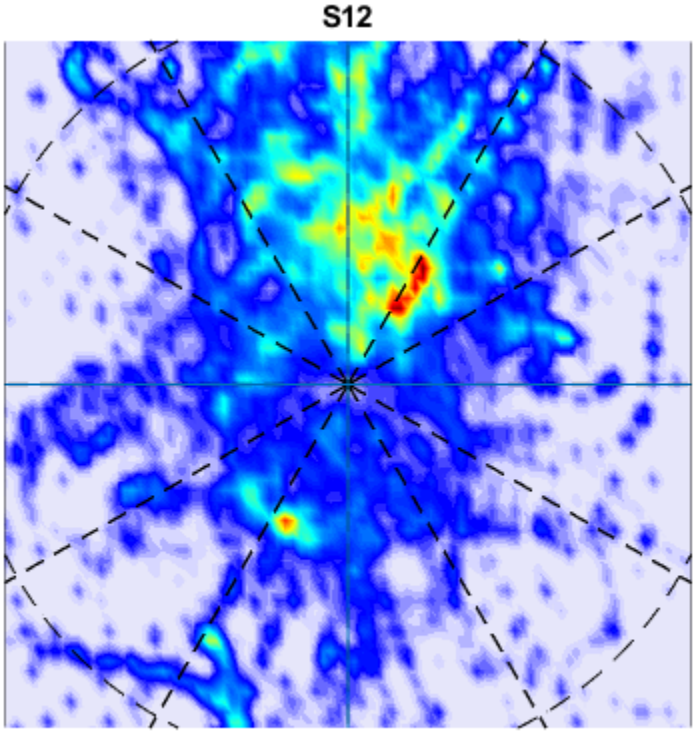
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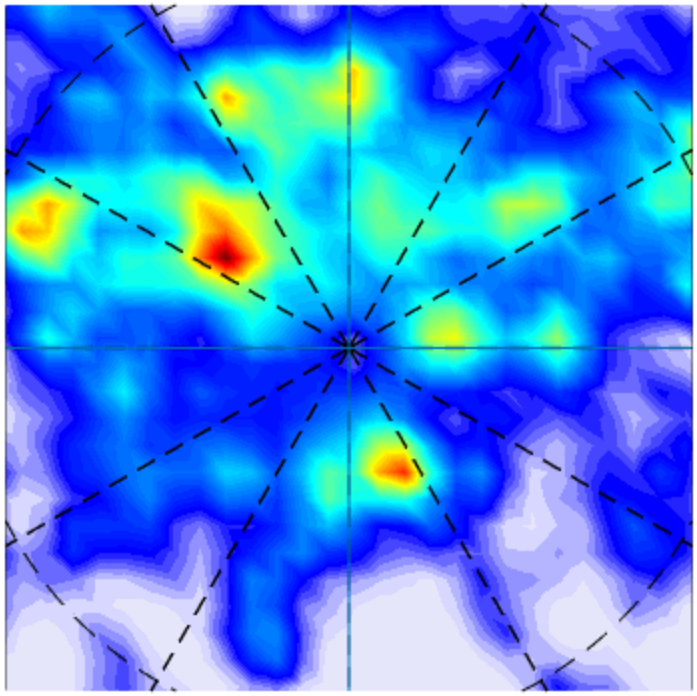

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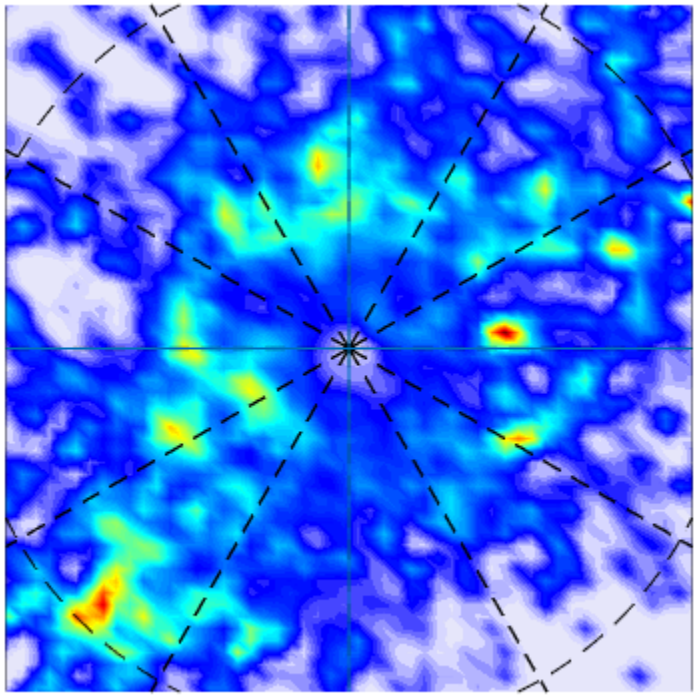

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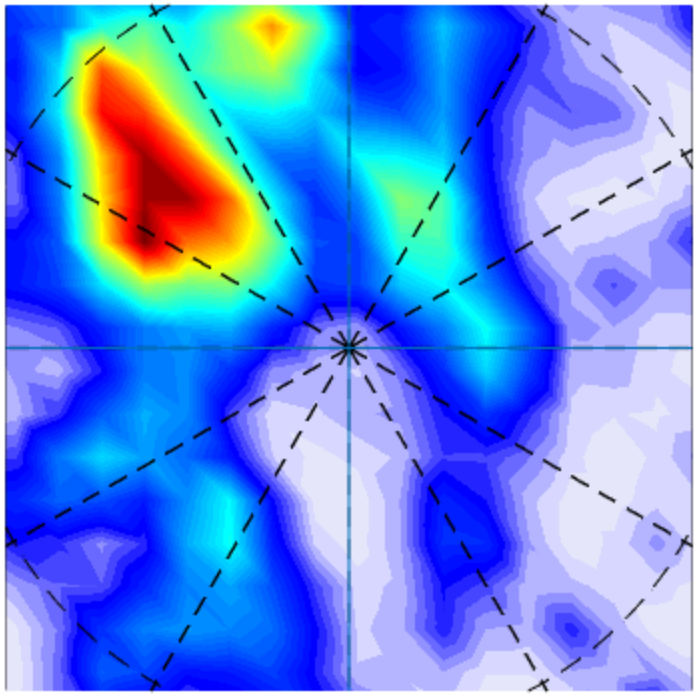

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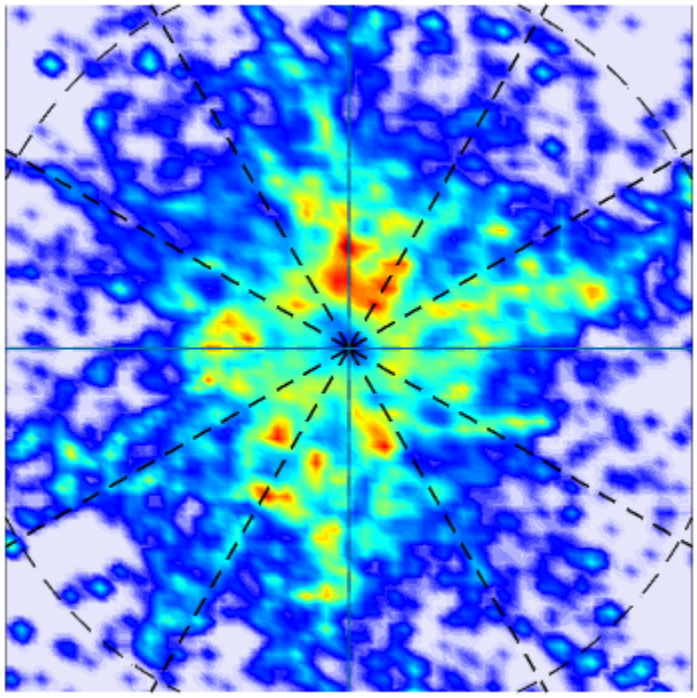

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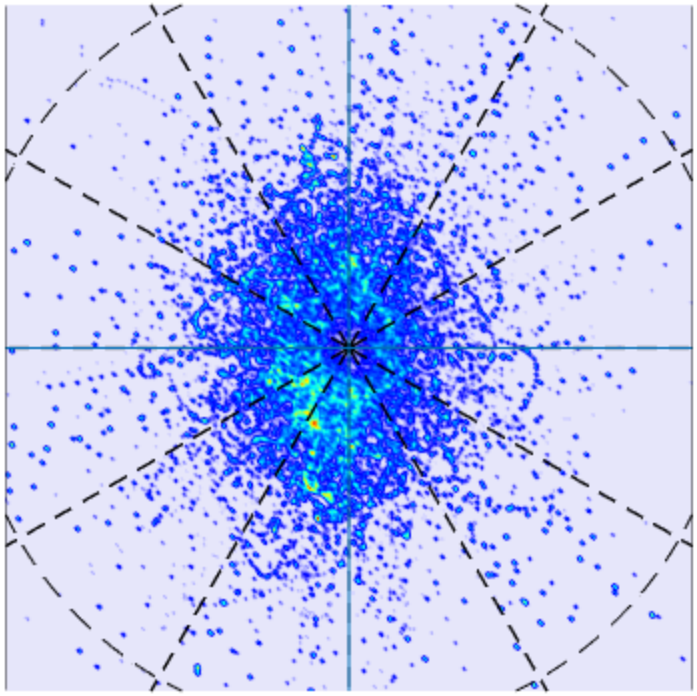

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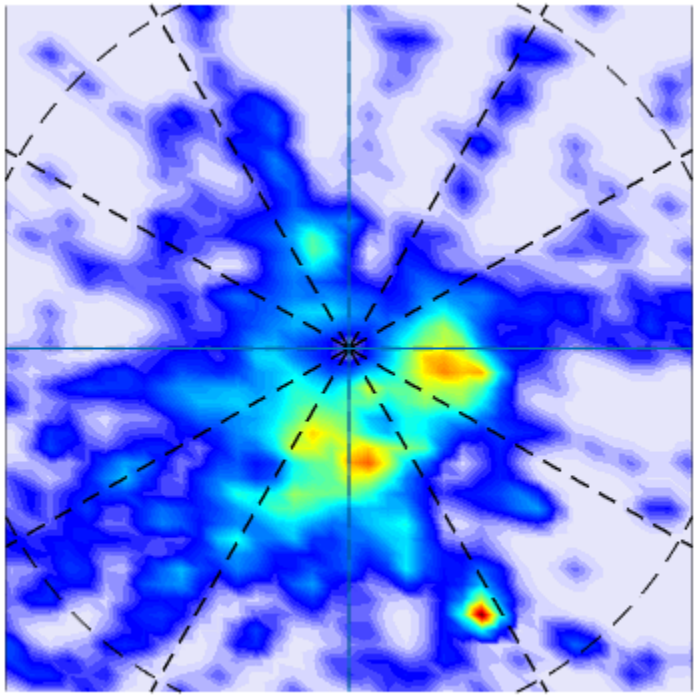

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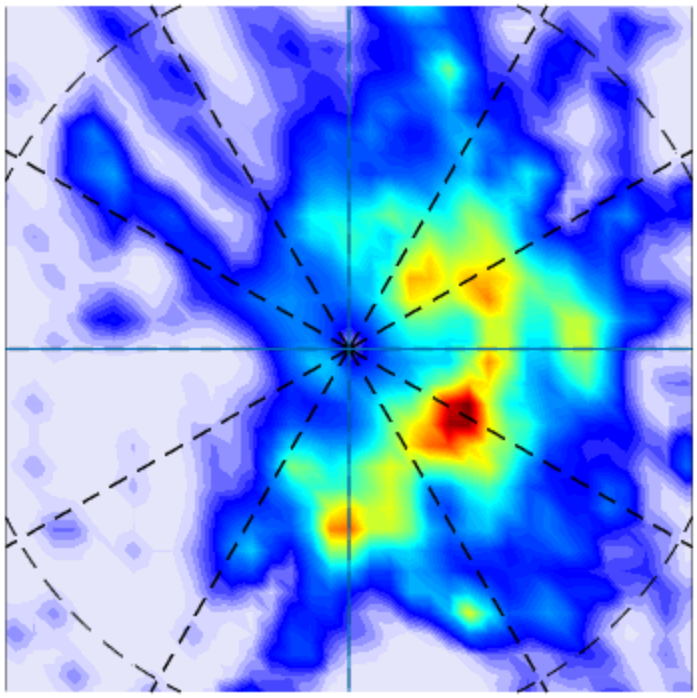

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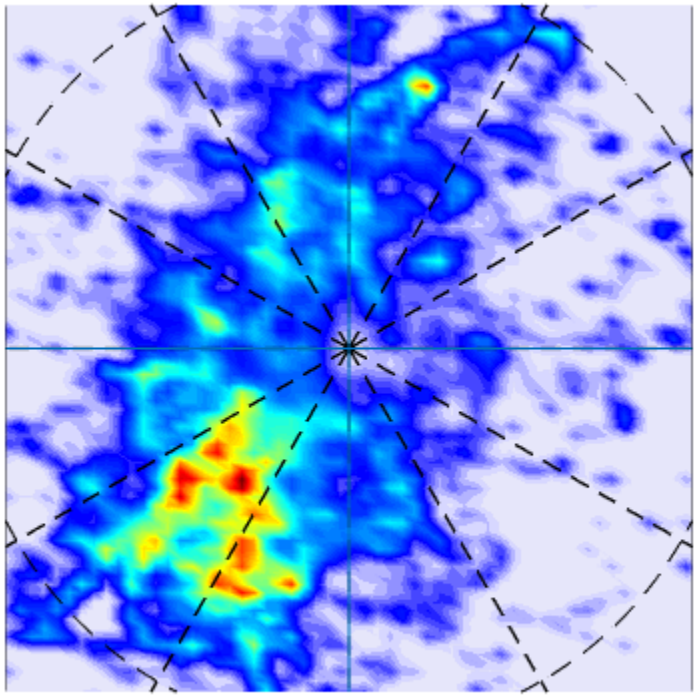
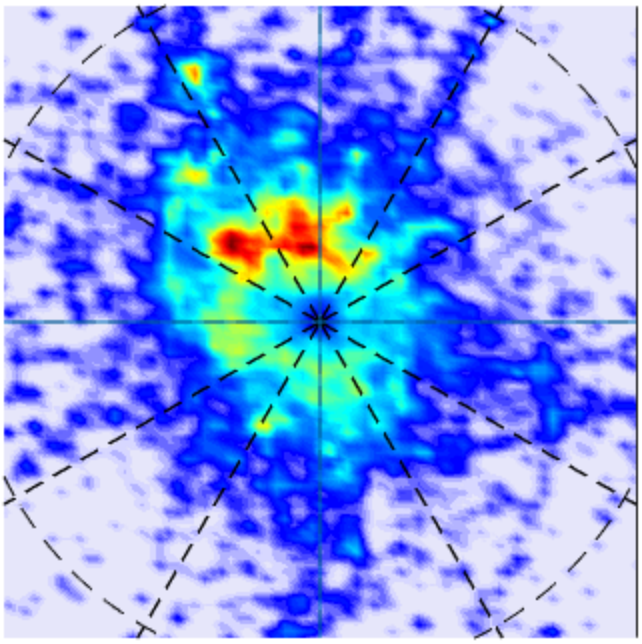
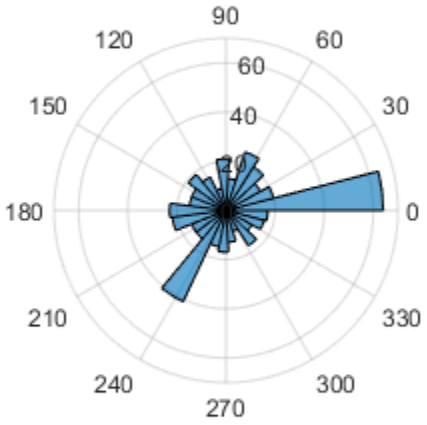


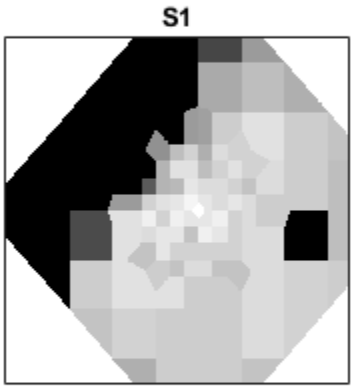
Ocular Drift Velocity

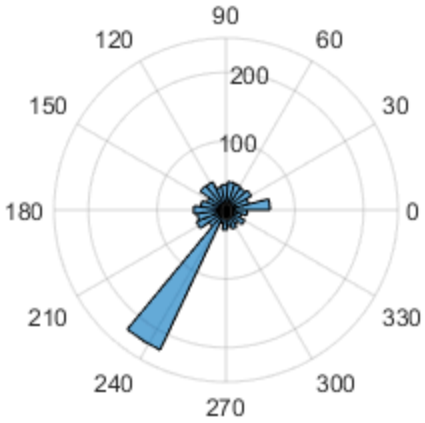
**S21**



# %% Velocity Check of MS

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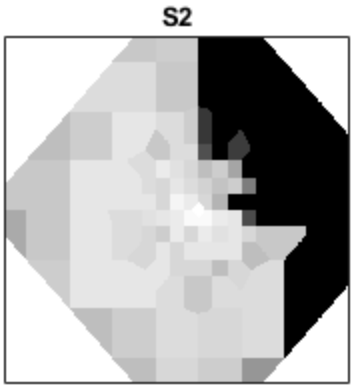
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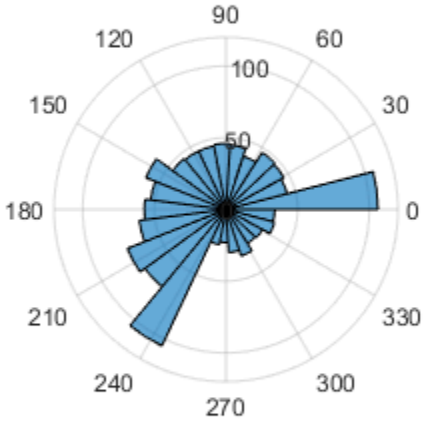
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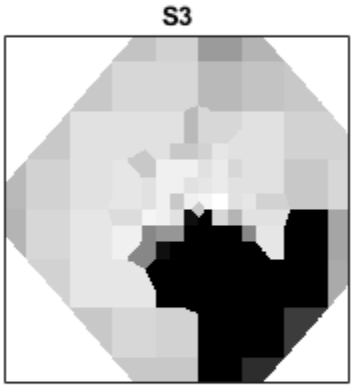
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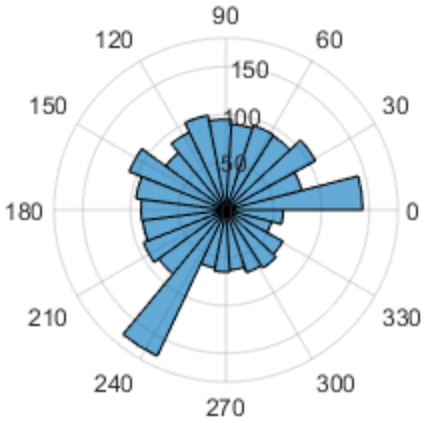
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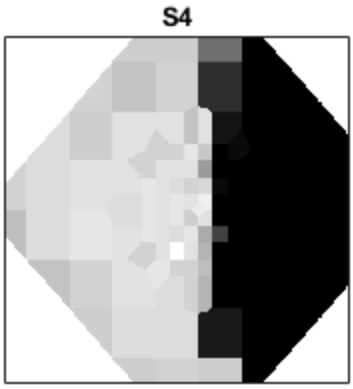
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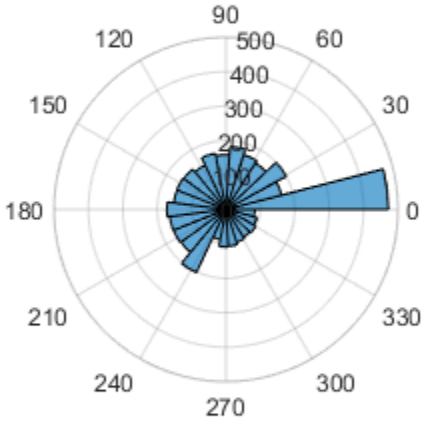
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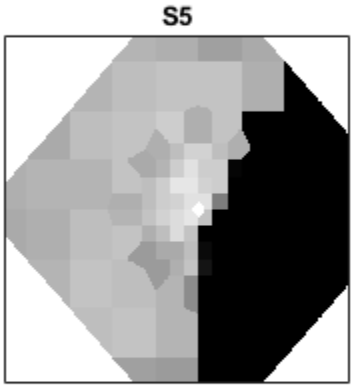
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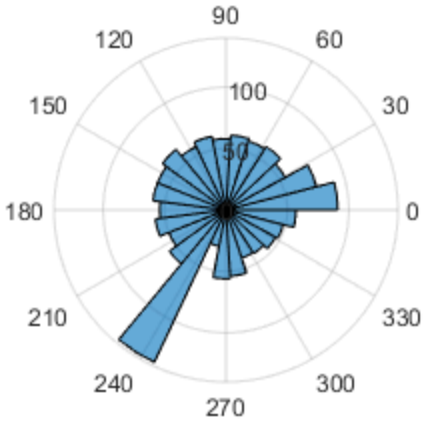
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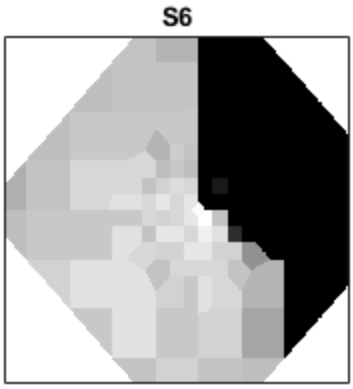
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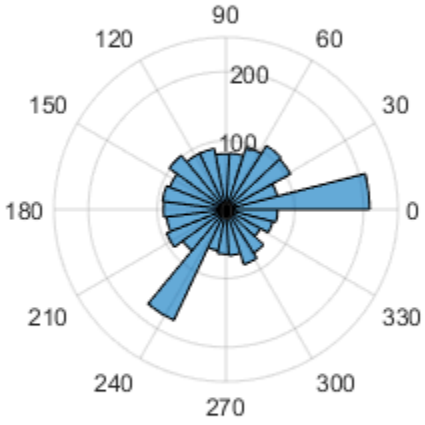
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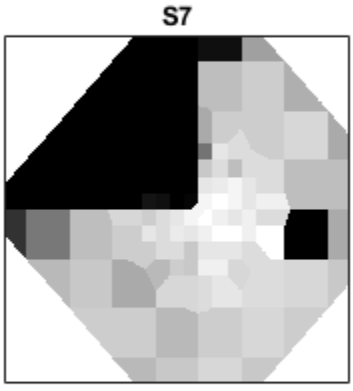
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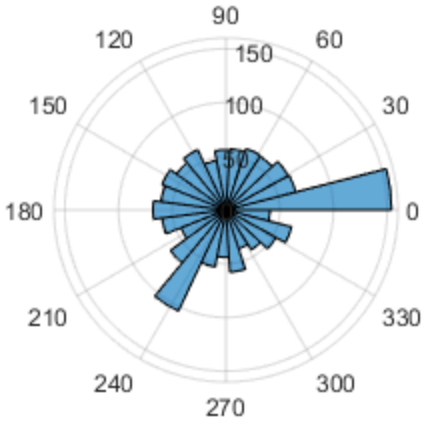
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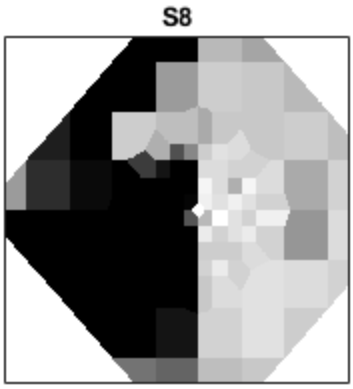
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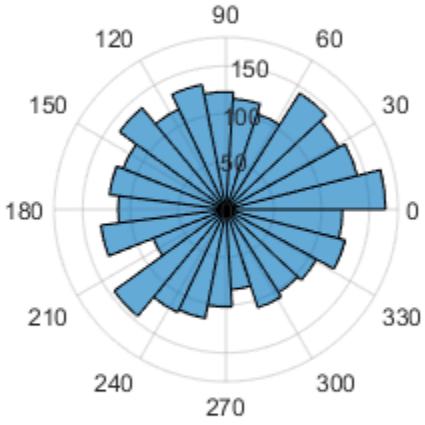
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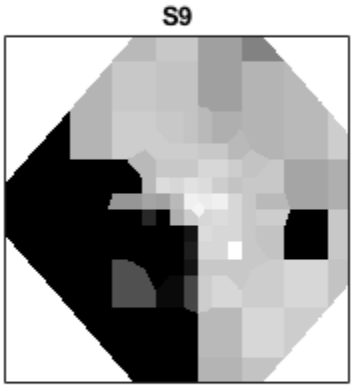
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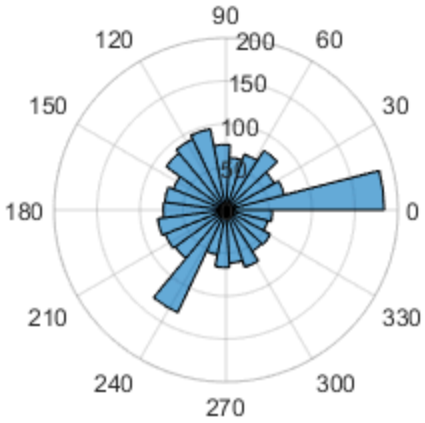
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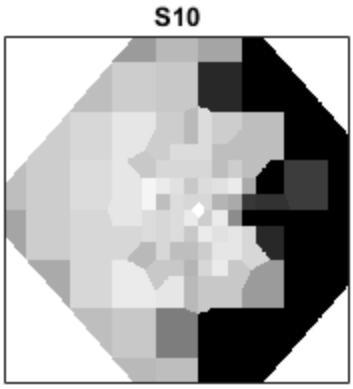
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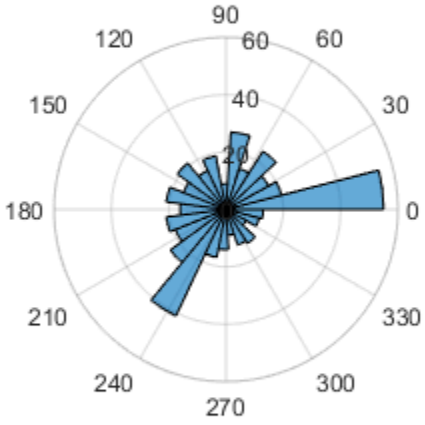
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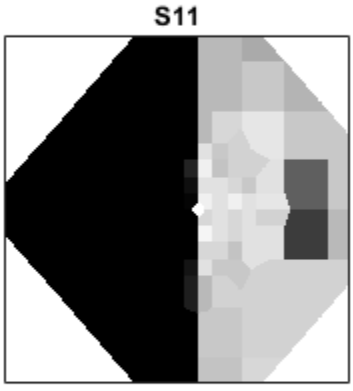
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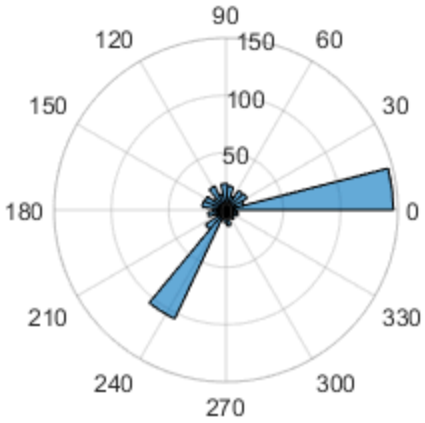
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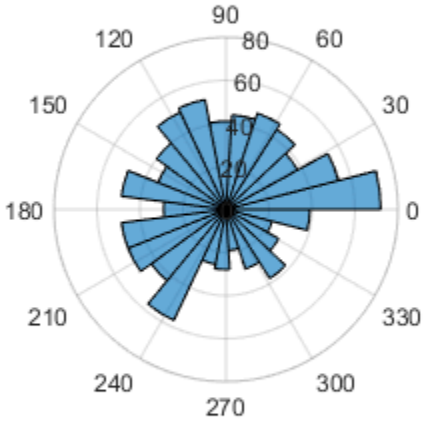
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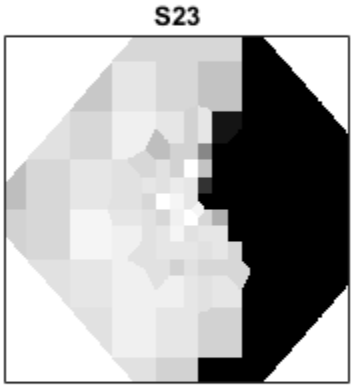
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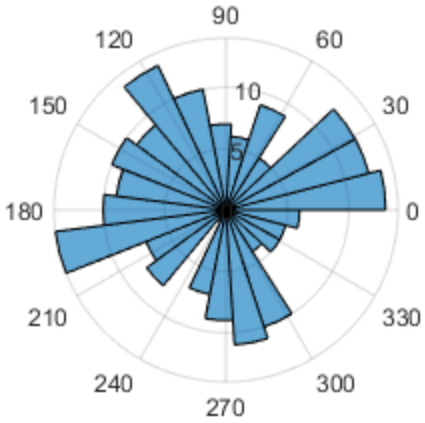
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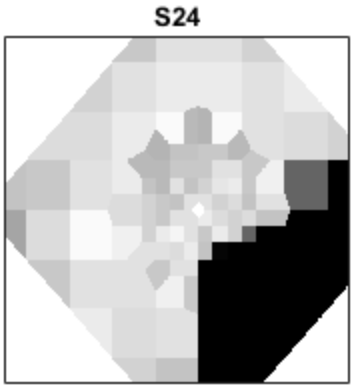
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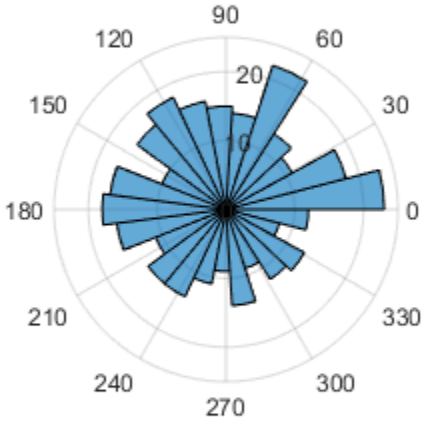
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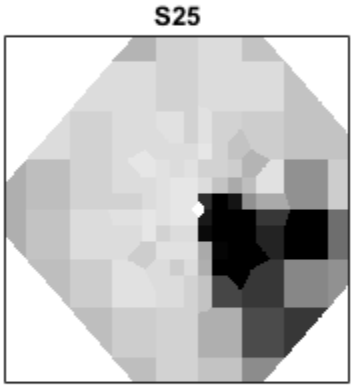
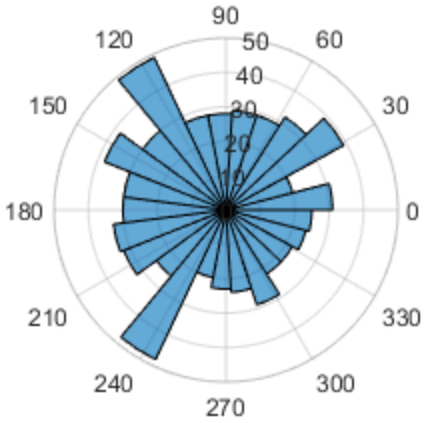
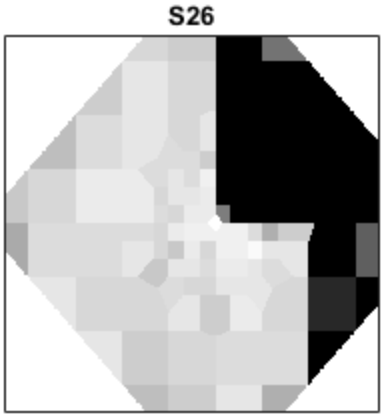
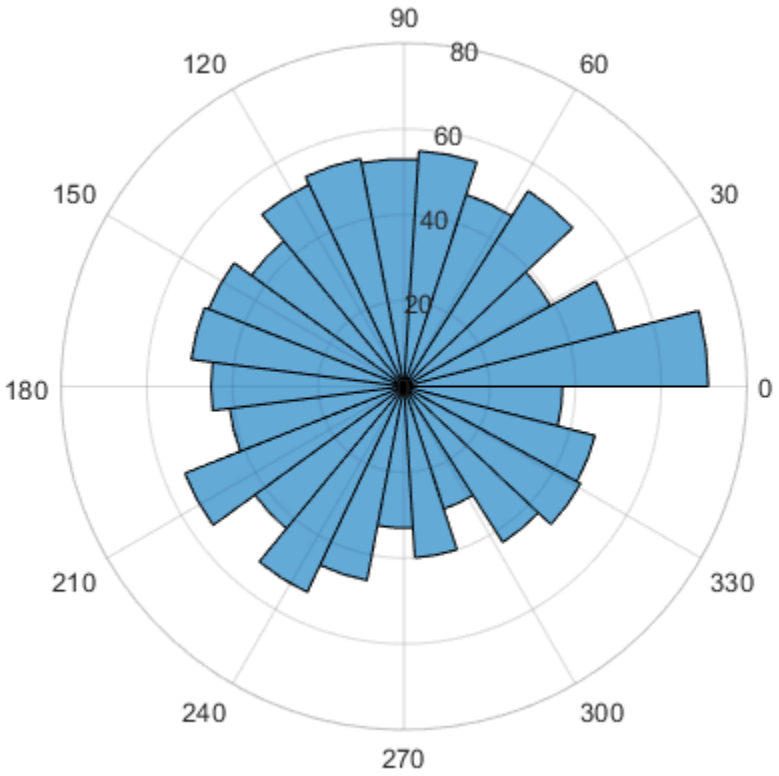
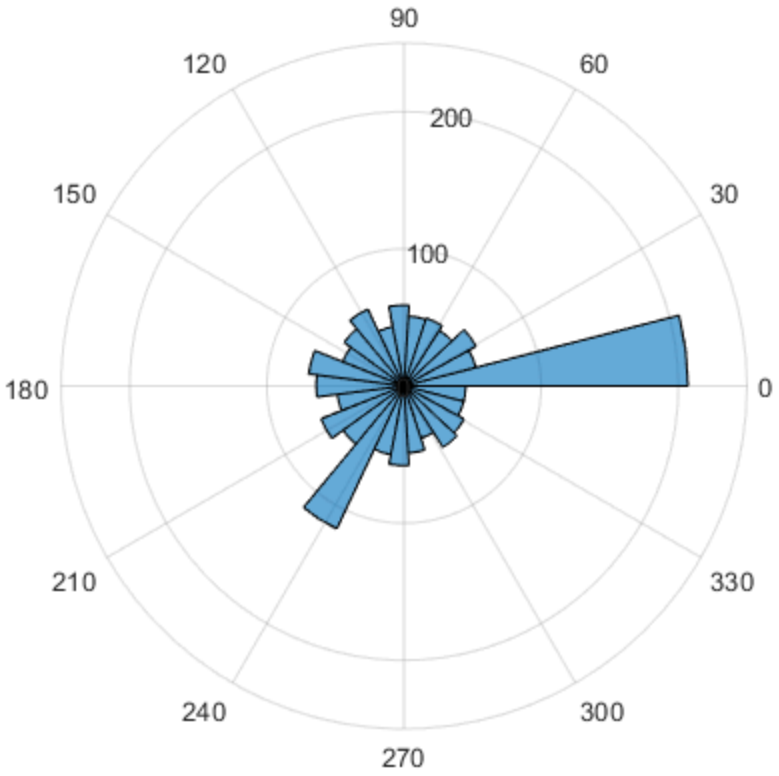

S25

## Microsaccade Direction and BF

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200
150
30
100
180
0
210
330
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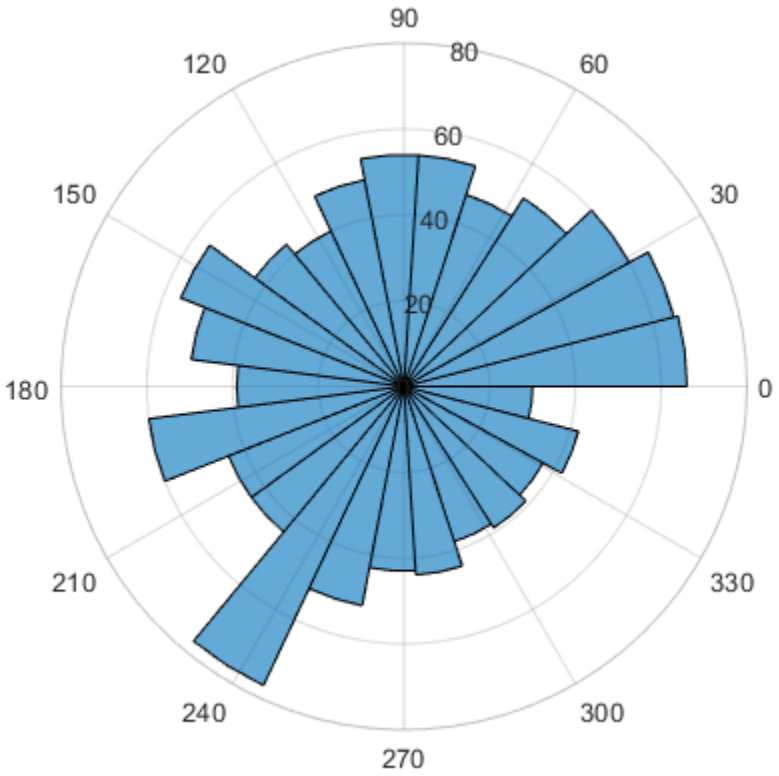
300
270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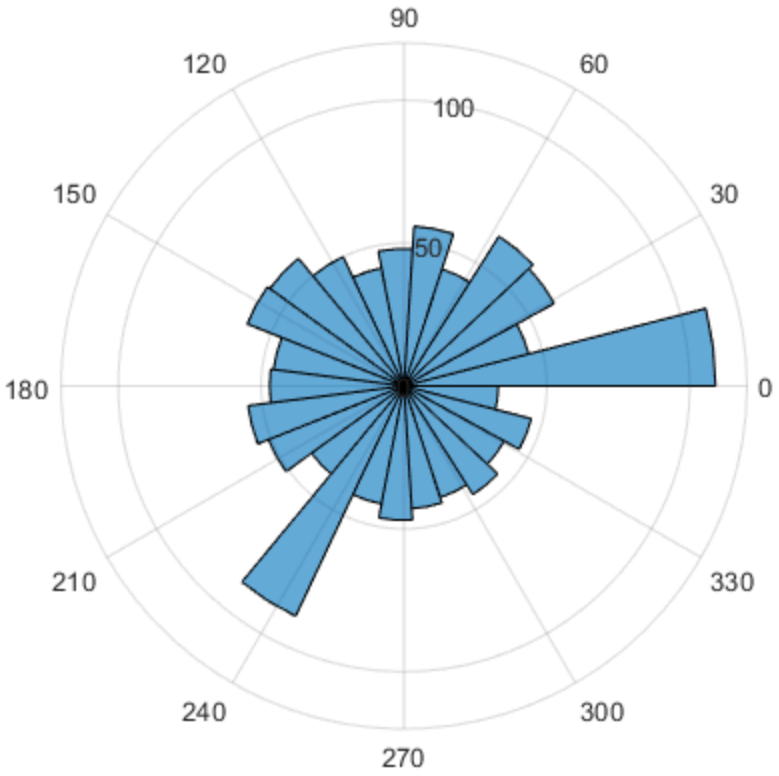
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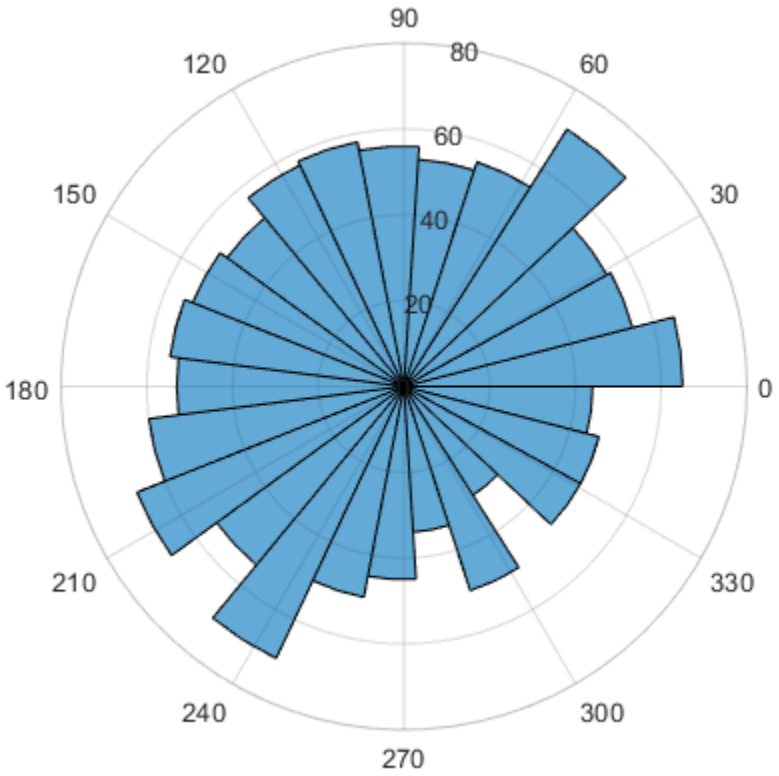
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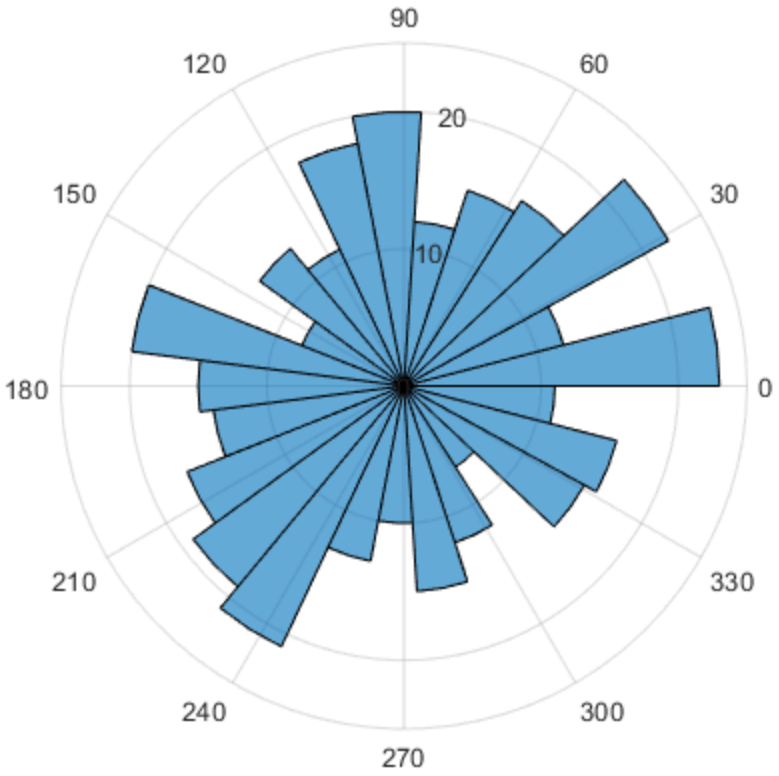
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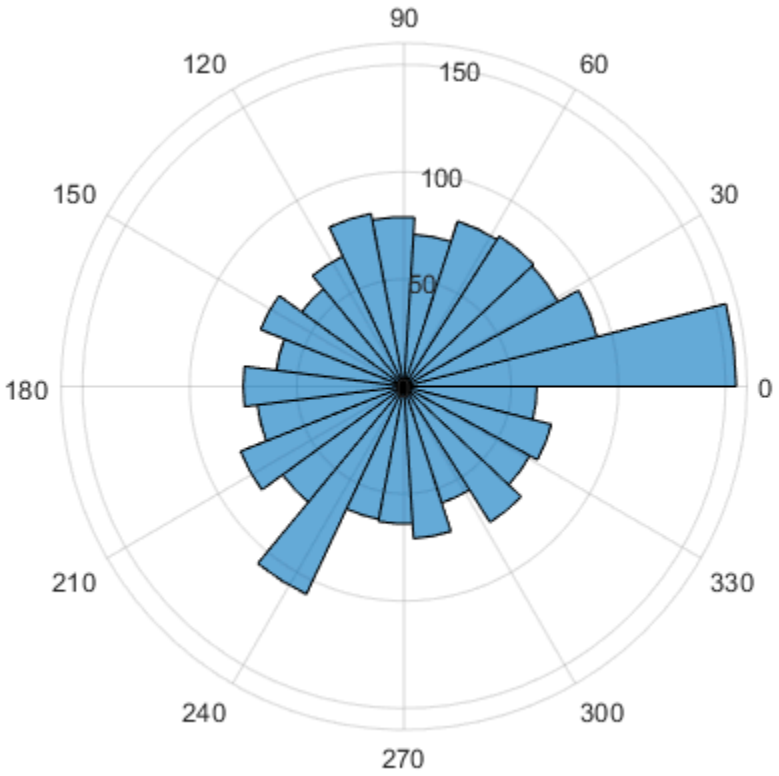
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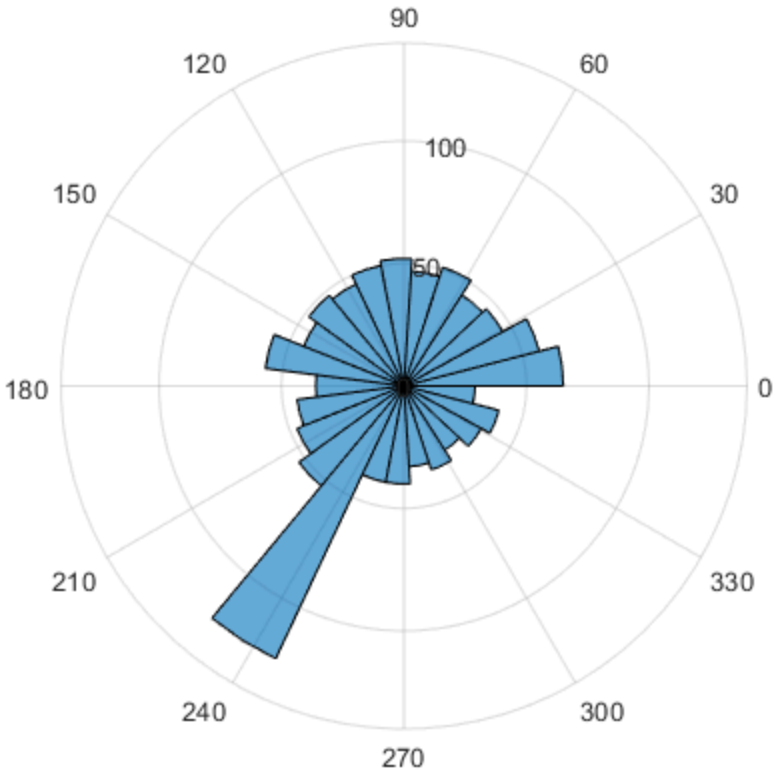
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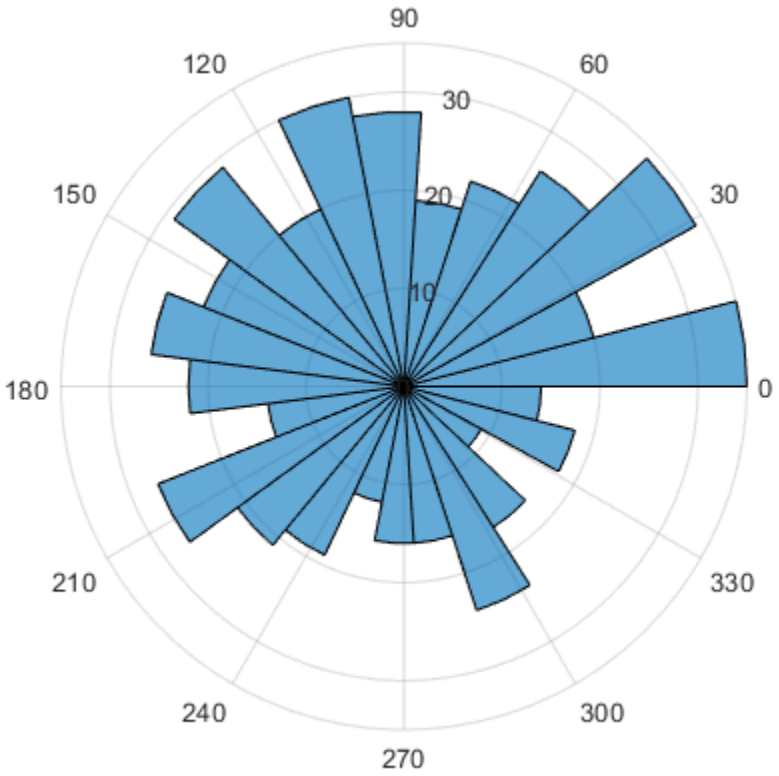
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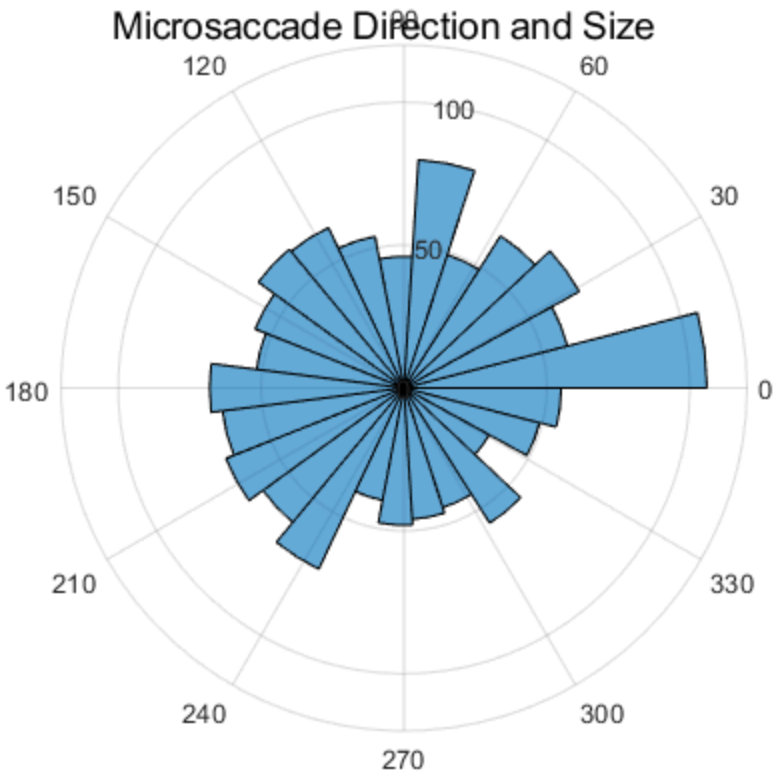
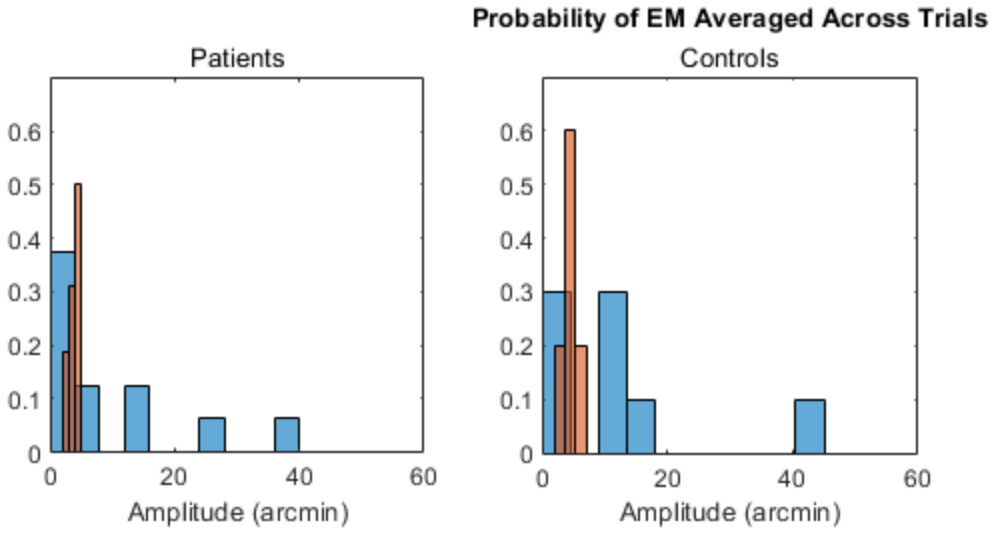
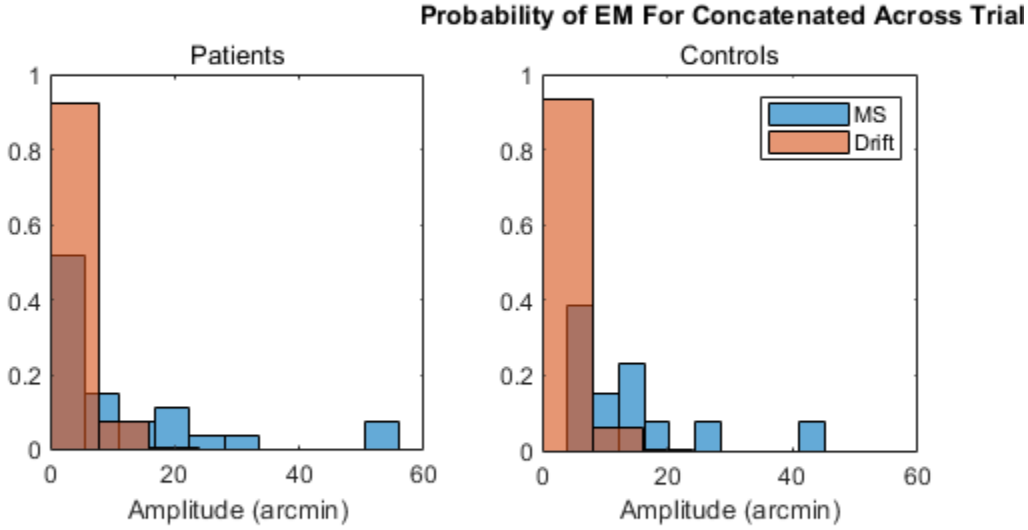


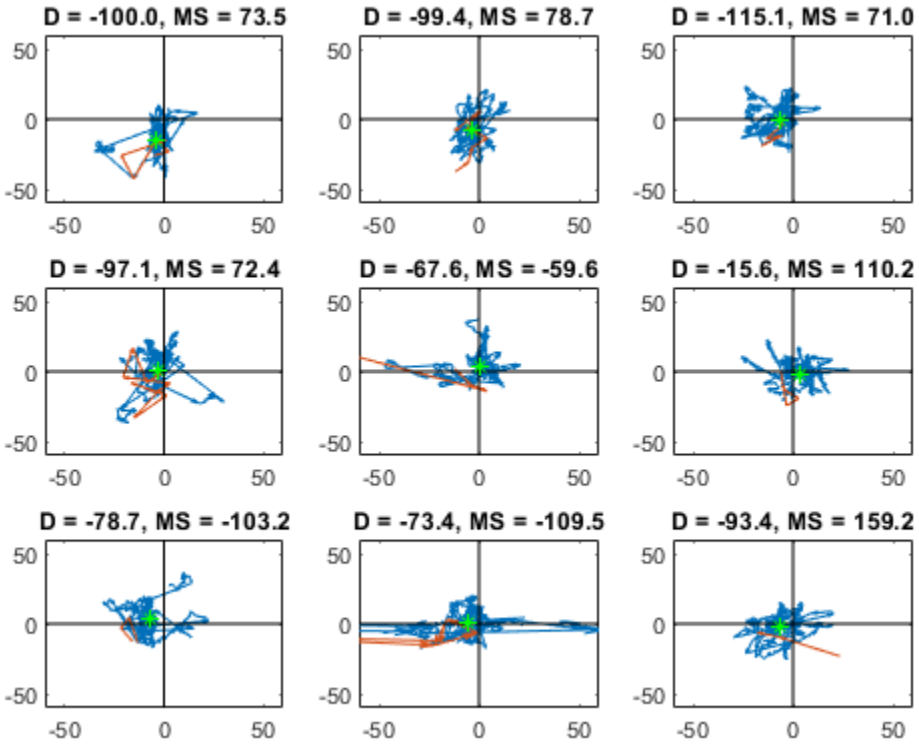

# Check for MS and Drift Compensation in Fixation

Average for each subject

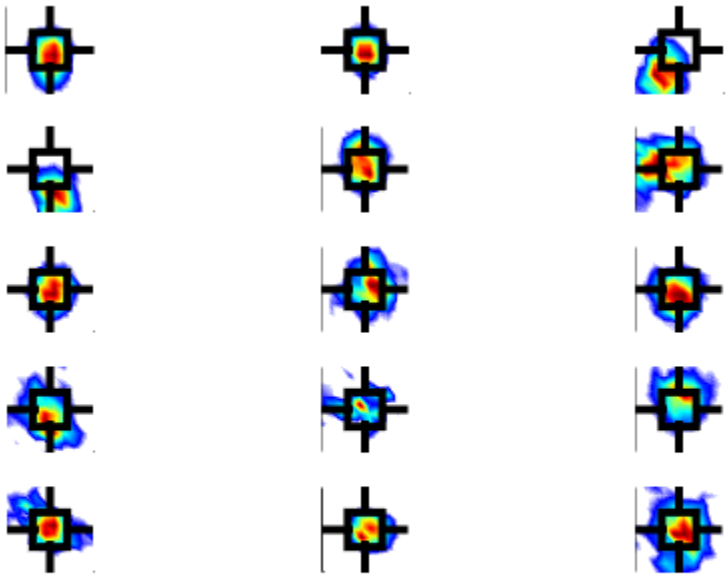

Probability of EM Averaged Across Trials
Patients
Controls
0.6
0.5
0.4
0.3
0.2
0.1
0
0
20
40
60
Amplitude (arcmin)

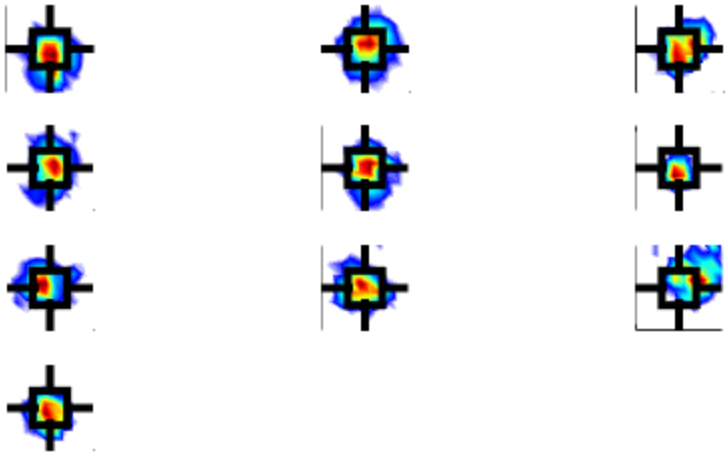

Probability of EM For Concatenated Across Trial
Patients
Controls
MS
Drift
1
0.8
0.6
0.4
0.2
0
0
20
40
60
Amplitude (arcmin)

# Do MS and Drift Compensation for Individual Trials

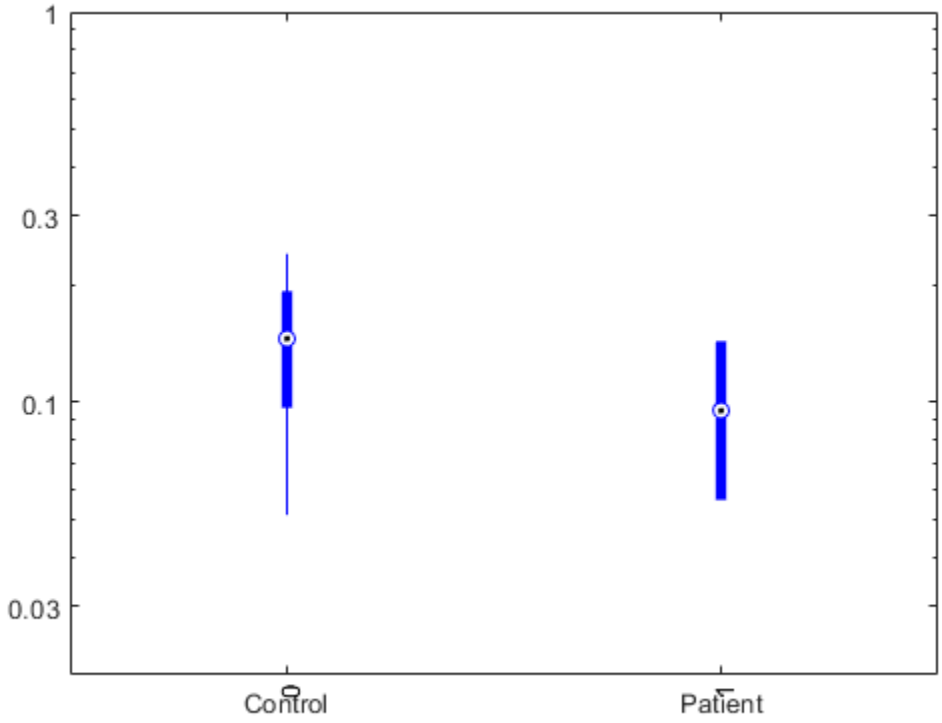


# Figure 5A

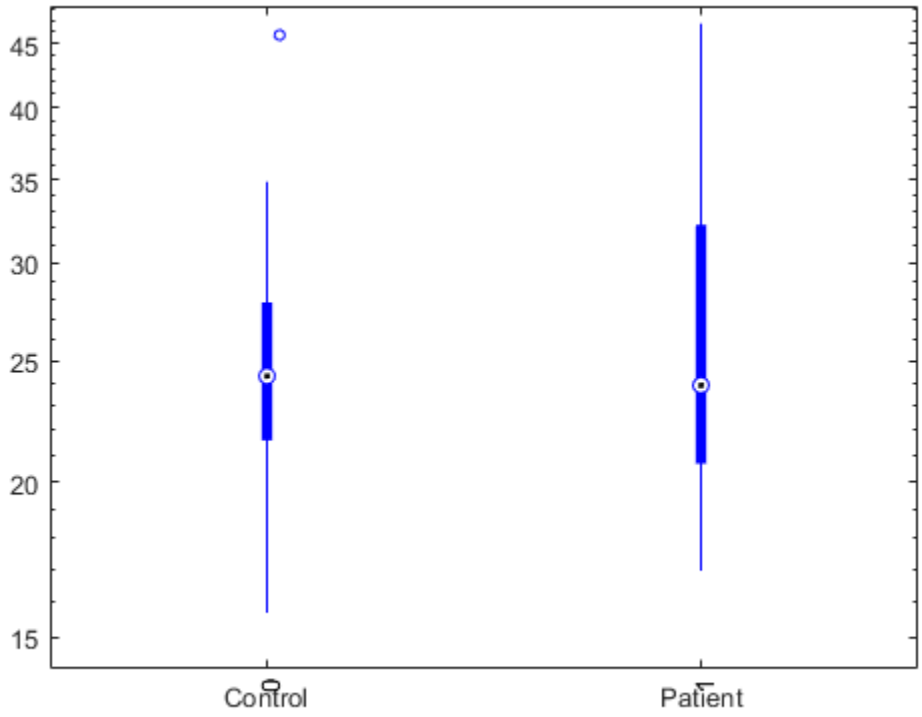




# Figure 5B - BCEA for Task



# Figure 5B - Acuity for Task




# Figure 6A&B

# functions

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