Visualize the EEG output from the PREP processing pipeline.

Table of Contents

Calling directly: prepPipelineReport

This helper reporting script expects that EEG will be in the base workspace with an EEG.etc.noiseDetection structure containing the report. It also expects the following variables in the base workspace:

- summaryReportName name of the summary report
- summaryFolder folder where summary report goes
- sessionFolder folder where specific report goes
- sessionReportName name of individual report

- relativeReportLocation report location relative to summary

The reporting function appends a summary to the summary report.

Usually the prepPipelineReport script is called through the function:

```
publishPrepPipelineReport
```

Write data status and report header

```
RSVP Study, session 1, task main, recording 1[289 channels, 1079296 frames
Error status: good
Versions:
 Detrend:v0.48 GlobalTrend:v0.48 LineNoise:v0.48 Resampling:v0.48 Referenc
Sampling rate: 256Hz
Events: 26977, Original events: 26977
Unique event types: 9
Bad channels interpolated for reference: []
```

Line noise removal step

```
Version v0.48
Sampling frequency Fs: 256 Hz
Line noise frequencies:
  [ 60 120 ]
Maximum iterations: 10
Significant frequency p-value: 0.01
+/- frequency BW for significant peaks (fScanBandWidth): 2
Taper bandwidth: 2 Hz
Taper window size (seconds): 4
Taper step size (seconds): 1
Sigmoidal smoothing factor (tau): 100
Spectral pad factor: 0
Analysis frequency interval(fPassBand): [ 0, 128 ] Hz
Taper template: [ 1, 4, 1 ]
Line noise channels (256 channels):
  [ 1 2 3 4 5 6 7 8 9 10
  11 12 13 14 15 16 17 18 19 20
  21 22 23 24 25 26 27 28 29 30
  31 32 33 34 35 36 37 38 39 40
  41 42 43 44 45 46 47 48 49 50
  51 52 53 54 55 56 57 58 59 60
  61 62 63 64 65 66 67 68 69 70
  71 72 73 74 75 76 77 78 79 80
  81 82 83 84 85 86 87 88 89 90
  91 92 93 94 95 96 97 98 99 100
  101 102 103 104 105 106 107 108 109 110
  111 112 113 114 115 116 117 118 119 120
  121 122 123 124 125 126 127 128 129 130
  131 132 133 134 135 136 137 138 139 140
  141 142 143 144 145 146 147 148 149 150
  151 152 153 154 155 156 157 158 159 160
```

```
  161 162 163 164 165 166 167 168 169 170
  171 172 173 174 175 176 177 178 179 180
  181 182 183 184 185 186 187 188 189 190
  191 192 193 194 195 196 197 198 199 200
  201 202 203 204 205 206 207 208 209 210
  211 212 213 214 215 216 217 218 219 220
  221 222 223 224 225 226 227 228 229 230
  231 232 233 234 235 236 237 238 239 240
  241 242 243 244 245 246 247 248 249 250
  251 252 253 254 255 256 ]
```

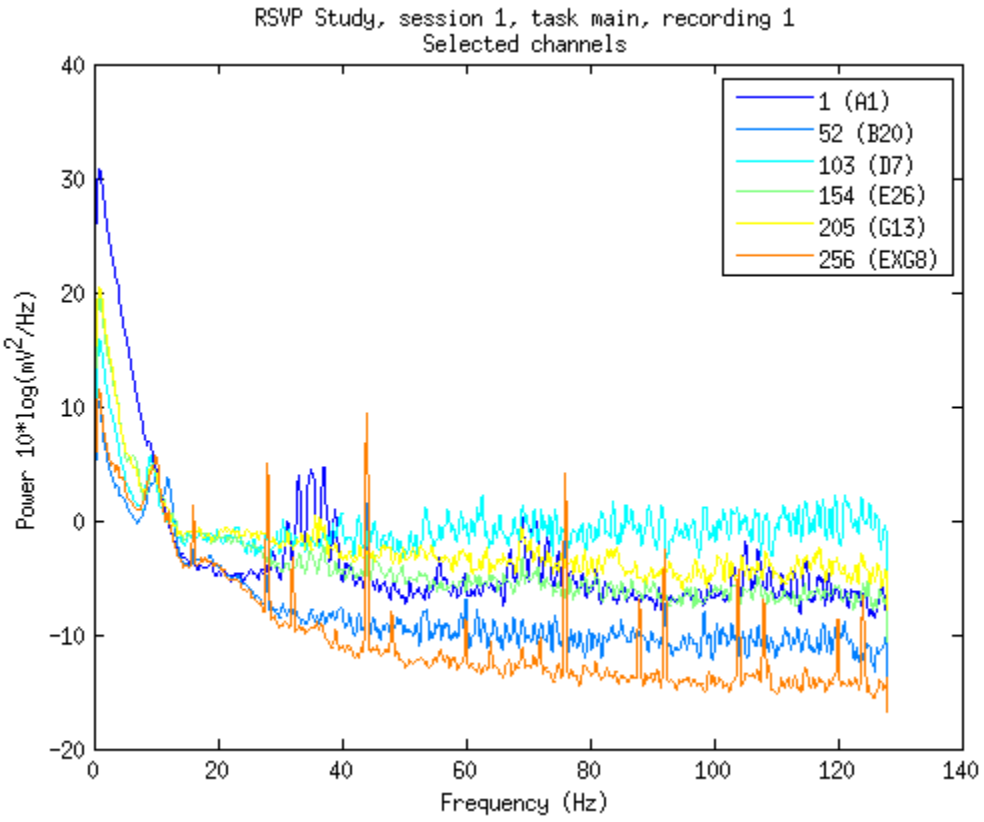
Initial detrend for reference calculation

```
Detrend version v0.48
Detrend cutoff: 1 Hz
Detrend type: high pass
Detrend step size: 2.000000e-02
Detrend command:
EEG1 = pop_eegfiltnew(EEG1, [], 1, 846, true, [], 0);
Detrended channels (256 channels):
  [ 1 2 3 4 5 6 7 8 9 10
  11 12 13 14 15 16 17 18 19 20
  21 22 23 24 25 26 27 28 29 30
  31 32 33 34 35 36 37 38 39 40
  41 42 43 44 45 46 47 48 49 50
  51 52 53 54 55 56 57 58 59 60
  61 62 63 64 65 66 67 68 69 70
  71 72 73 74 75 76 77 78 79 80
  81 82 83 84 85 86 87 88 89 90
  91 92 93 94 95 96 97 98 99 100
  101 102 103 104 105 106 107 108 109 110
  111 112 113 114 115 116 117 118 119 120
  121 122 123 124 125 126 127 128 129 130
  131 132 133 134 135 136 137 138 139 140
  141 142 143 144 145 146 147 148 149 150
  151 152 153 154 155 156 157 158 159 160
  161 162 163 164 165 166 167 168 169 170
  171 172 173 174 175 176 177 178 179 180
  181 182 183 184 185 186 187 188 189 190
  191 192 193 194 195 196 197 198 199 200
  201 202 203 204 205 206 207 208 209 210
  211 212 213 214 215 216 217 218 219 220
  221 222 223 224 225 226 227 228 229 230
  231 232 233 234 235 236 237 238 239 240
  241 242 243 244 245 246 247 248 249 250
  251 252 253 254 255 256 ]
```

Spectrum after line noise and detrend

```
pop_eegfiltnew() - performing 847 point highpass filtering.
```

```
pop_eegfiltnew() - transition band width: 1 Hz

pop_eegfiltnew() - passband edge(s): 1 Hz
pop_eegfiltnew() - cutoff frequency(ies) (-6 dB): 0.5 Hz
pop_eegfiltnew() - filtering the data
firfilt(): |====================| 100%, ETE 00:00
```



Report referencing step

```
Referencing version v0.48
Reference type robust
Interpolation order post-reference

Reference channels (248 channels):
  [ 1 2 3 4 5 6 7 8 9 10
  11 12 13 14 15 16 17 18 19 20
  21 22 23 24 25 26 27 28 29 30
  31 32 33 34 35 36 37 38 39 40
  41 42 43 44 45 46 47 48 49 50
  51 52 53 54 55 56 57 58 59 60
  61 62 63 64 65 66 67 68 69 70
  71 72 73 74 75 76 77 78 79 80
  81 82 83 84 85 86 87 88 89 90
  91 92 93 94 95 96 97 98 99 100
  101 102 103 104 105 106 107 108 109 110
  111 112 113 114 115 116 117 118 119 120
```

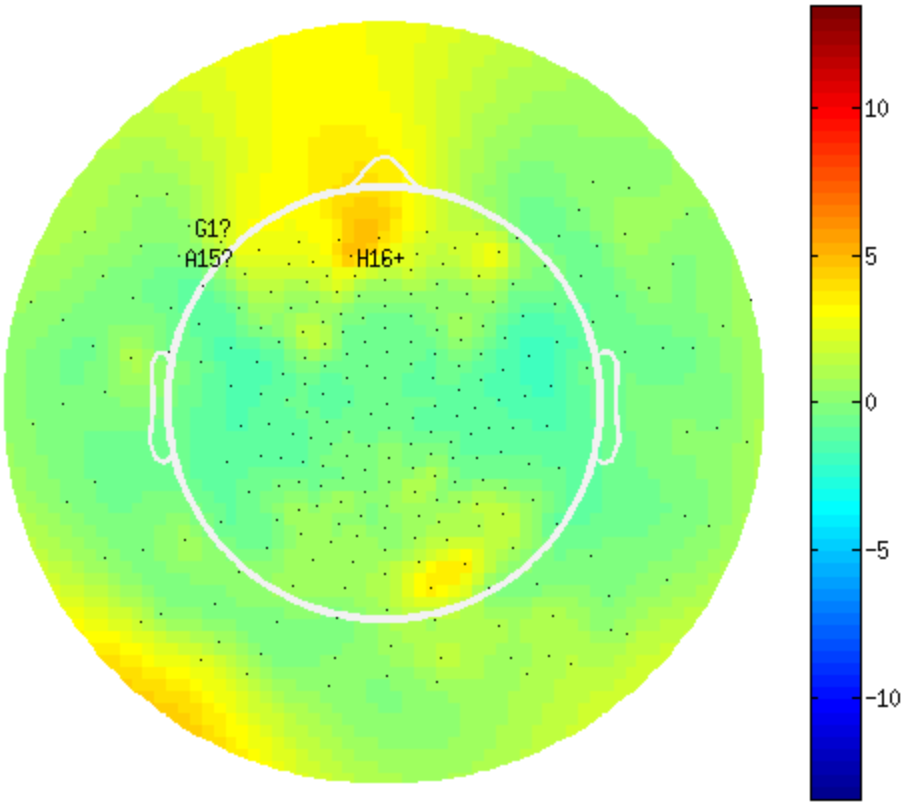
```
  121 122 123 124 125 126 127 128 129 130
  131 132 133 134 135 136 137 138 139 140
  141 142 143 144 145 146 147 148 149 150
  151 152 153 154 155 156 157 158 159 160
  161 162 163 164 165 166 167 168 169 170
  171 172 173 174 175 176 177 178 179 180
  181 182 183 184 185 186 187 188 189 190
  191 192 193 194 195 196 197 198 199 200
  201 202 203 204 205 206 207 208 209 210
  211 212 213 214 215 216 217 218 219 220
  221 222 223 224 225 226 227 228 229 230
  231 232 233 234 235 236 237 238 239 240
  241 242 243 244 245 246 247 248 ]

Evaluation channels (248 channels):
  [ 1 2 3 4 5 6 7 8 9 10
  11 12 13 14 15 16 17 18 19 20
  21 22 23 24 25 26 27 28 29 30
  31 32 33 34 35 36 37 38 39 40
  41 42 43 44 45 46 47 48 49 50
  51 52 53 54 55 56 57 58 59 60
  61 62 63 64 65 66 67 68 69 70
  71 72 73 74 75 76 77 78 79 80
  81 82 83 84 85 86 87 88 89 90
  91 92 93 94 95 96 97 98 99 100
  101 102 103 104 105 106 107 108 109 110
  111 112 113 114 115 116 117 118 119 120
  121 122 123 124 125 126 127 128 129 130
  131 132 133 134 135 136 137 138 139 140
  141 142 143 144 145 146 147 148 149 150
  151 152 153 154 155 156 157 158 159 160
  161 162 163 164 165 166 167 168 169 170
  171 172 173 174 175 176 177 178 179 180
  181 182 183 184 185 186 187 188 189 190
  191 192 193 194 195 196 197 198 199 200
  201 202 203 204 205 206 207 208 209 210
  211 212 213 214 215 216 217 218 219 220
  221 222 223 224 225 226 227 228 229 230
  231 232 233 234 235 236 237 238 239 240
  241 242 243 244 245 246 247 248 ]

RereferencedChannels (256 channels):
  [ 1 2 3 4 5 6 7 8 9 10
  11 12 13 14 15 16 17 18 19 20
  21 22 23 24 25 26 27 28 29 30
  31 32 33 34 35 36 37 38 39 40
  41 42 43 44 45 46 47 48 49 50
  51 52 53 54 55 56 57 58 59 60
  61 62 63 64 65 66 67 68 69 70
  71 72 73 74 75 76 77 78 79 80
  81 82 83 84 85 86 87 88 89 90
  91 92 93 94 95 96 97 98 99 100
  101 102 103 104 105 106 107 108 109 110
  111 112 113 114 115 116 117 118 119 120
```

```
  121 122 123 124 125 126 127 128 129 130
  131 132 133 134 135 136 137 138 139 140
  141 142 143 144 145 146 147 148 149 150
  151 152 153 154 155 156 157 158 159 160
  161 162 163 164 165 166 167 168 169 170
  171 172 173 174 175 176 177 178 179 180
  181 182 183 184 185 186 187 188 189 190
  191 192 193 194 195 196 197 198 199 200
  201 202 203 204 205 206 207 208 209 210
  211 212 213 214 215 216 217 218 219 220
  221 222 223 224 225 226 227 228 229 230
  231 232 233 234 235 236 237 238 239 240
  241 242 243 244 245 246 247 248 249 250
  251 252 253 254 255 256 ]
Noisy channel detection parameters:
  Robust deviation threshold (z score): 5
  High frequency noise threshold (ratio): 5
  Correlation window size (in seconds): 1
  Correlation threshold (with any channel): 0.4
  Bad correlation threshold: 0.01
    (fraction of time with low correlation or dropout)
  Ransac off (if 1 Ransac turned off) : 0
  Ransac sample size : 50
    (number channels to use for interpolated estimate)
  Ransac channel fraction (for ransac sample size): 0.25
  RansacCorrelationThreshold: 0.75
  RansacUnbrokenTime (input parameter): 0.4
  RansacWindowSeconds (in seconds): 5
  RansacPerformed (if 1, Ransac on and enough channels): 1
  Maximum reference iterations: 4
  Actual reference iterations: 2


Bad channels interpolated:
   [ 2(A2) 3(A3) 4(A4) 11(A11) 19(A19) 20(A20) 24(A24) 25(A25) 26(A26) 27(
  30(A30) 31(A31) 32(A32) 48(B16) 58(B26) 85(C21) 100(D4) 101(D5) 104(D8)
  106(D10) 109(D13) 110(D14) 111(D15) 112(D16) 115(D19) 116(D20) 117(D21)
  131(E3) 133(E5) 172(F12) 174(F14) 176(F16) 191(F31) 214(G22) 215(G23) 21
  218(G26) 228(H4) 233(H9) 235(H11) 236(H12) 241(H17) 242(H18) 243(H19) 24
  247(H23) 248(H24) ]
Bad because of NaN:
  [ ]
Bad because data is constant:
  [ ]
Bad because of low SNR:
  [ ]
Bad because of drop outs:
  [ ]
Bad because of poor max correlation:
  [ 3(A3) 4(A4) 11(A11) 19(A19) 20(A20) 24(A24) 25(A25) 26(A26) 27(A27) 30
  31(A31) 32(A32) 48(B16) 58(B26) 85(C21) 100(D4) 101(D5) 104(D8) 105(D9)
  109(D13) 110(D14) 111(D15) 112(D16) 115(D19) 116(D20) 117(D21) 118(D22)
  172(F12) 174(F14) 176(F16) 191(F31) 214(G22) 215(G23) 216(G24) 217(G25)
  233(H9) 235(H11) 236(H12) 241(H17) 245(H21) 247(H23) ]
```

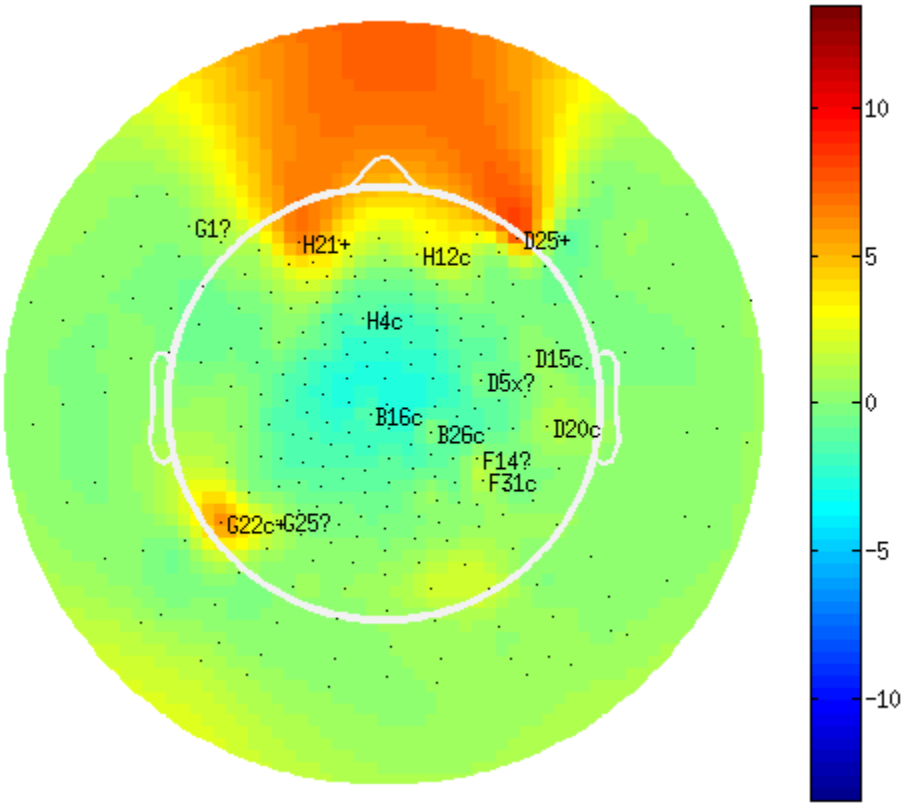
```
Bad because of large deviation:
  [ 2(A2) 121(D25) 214(G22) 241(H17) 242(H18) 243(H19) 244(H20) 245(H21) 2
  ]
Bad because of HF noise:
  [ ]
Bad because of poor Ransac predictability :
  [ ]

Bad channels after interpolation+referencing:
   [ 15(A15) 193(G1) 240(H16) ]
Bad because of NaN:
  [ ]
Bad because data is constant:
  [ ]
Bad because of low SNR:
  [ ]
Bad because of drop outs:
  [ ]
Bad because of poor max correlation:
  [ ]
Bad because of large deviation:
  [ 240(H16) ]
Bad because of HF noise:
  [ ]
Bad because of poor Ransac predictability :
  [ 15(A15) 193(G1) ]

Actual interpolation iterations: 2
```

Robust channel deviation (referenced)

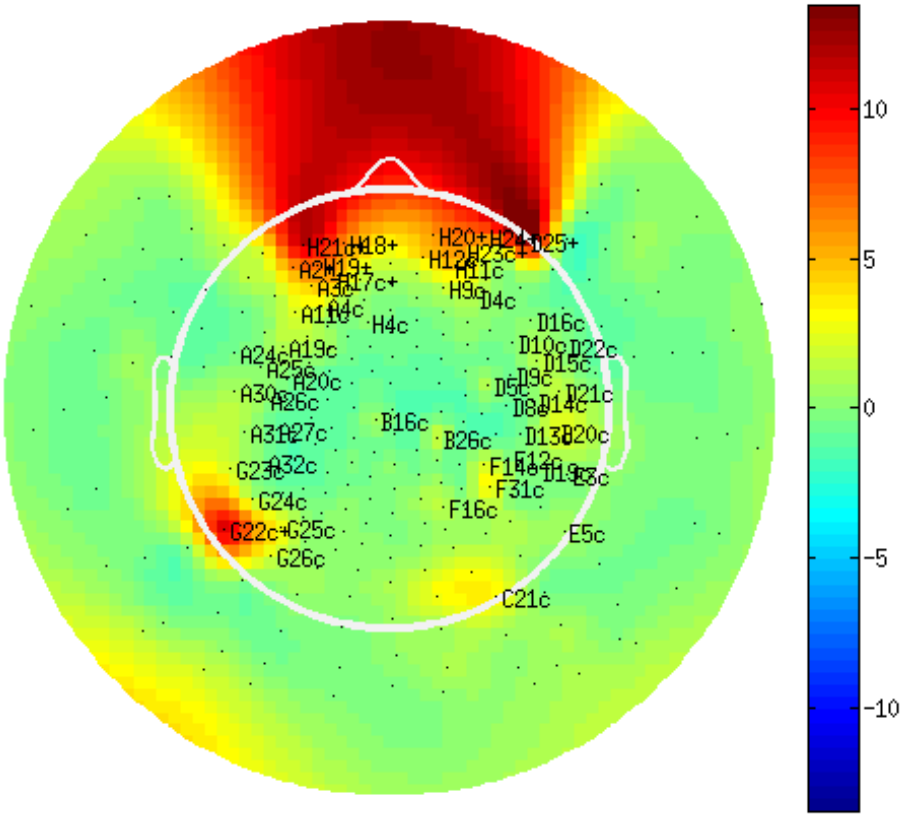
```
Noisy channel legend: NaN: n
NoData: z
LowSNR: s
Corr: c
Amp: +
Noise: x
Ran: ?
```


G1?
A15?
H16+
10
5
0
-5
-10

Robust channel deviation (original)

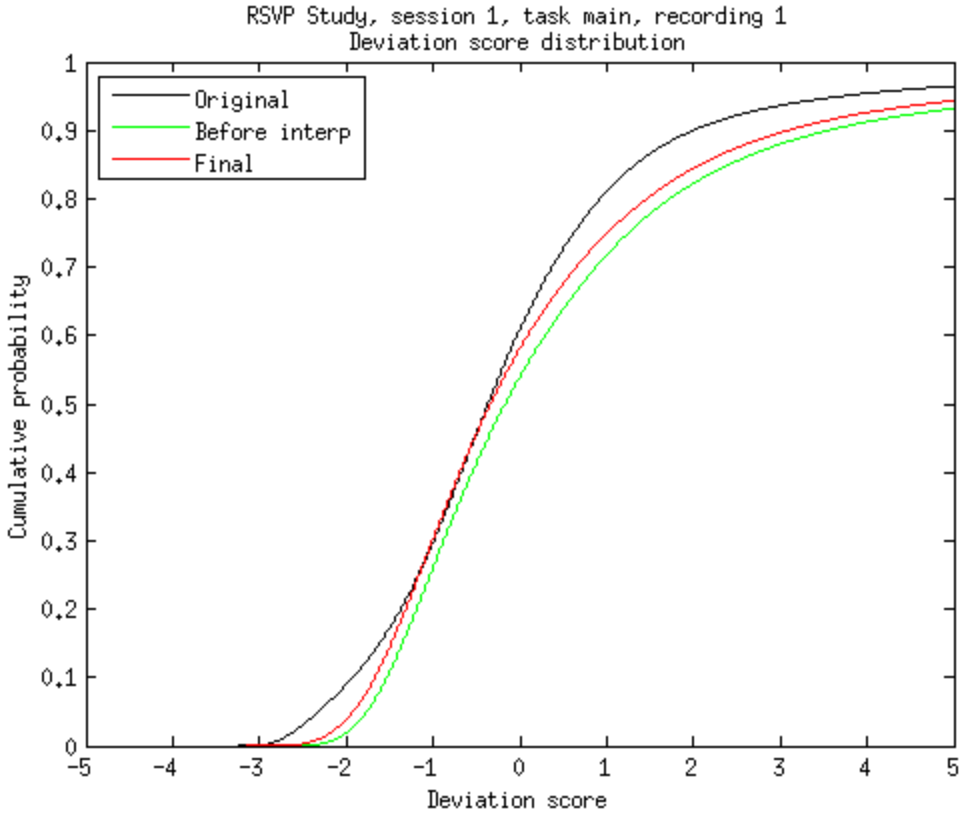


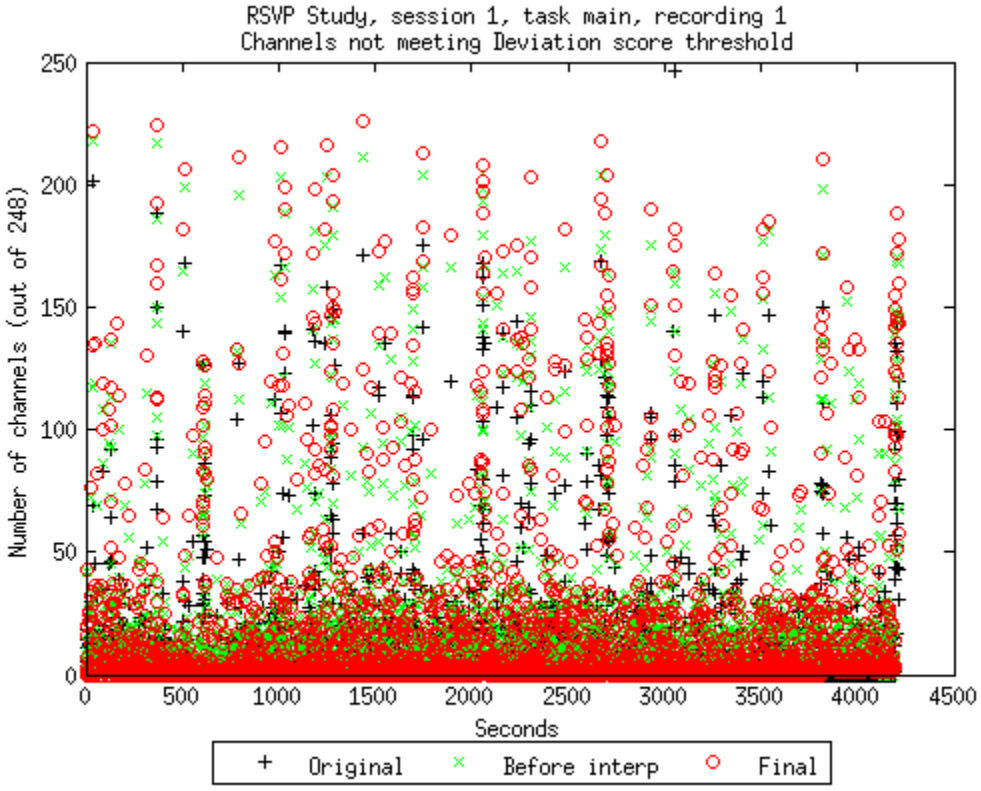
Robust channel deviation (marking interpolated)



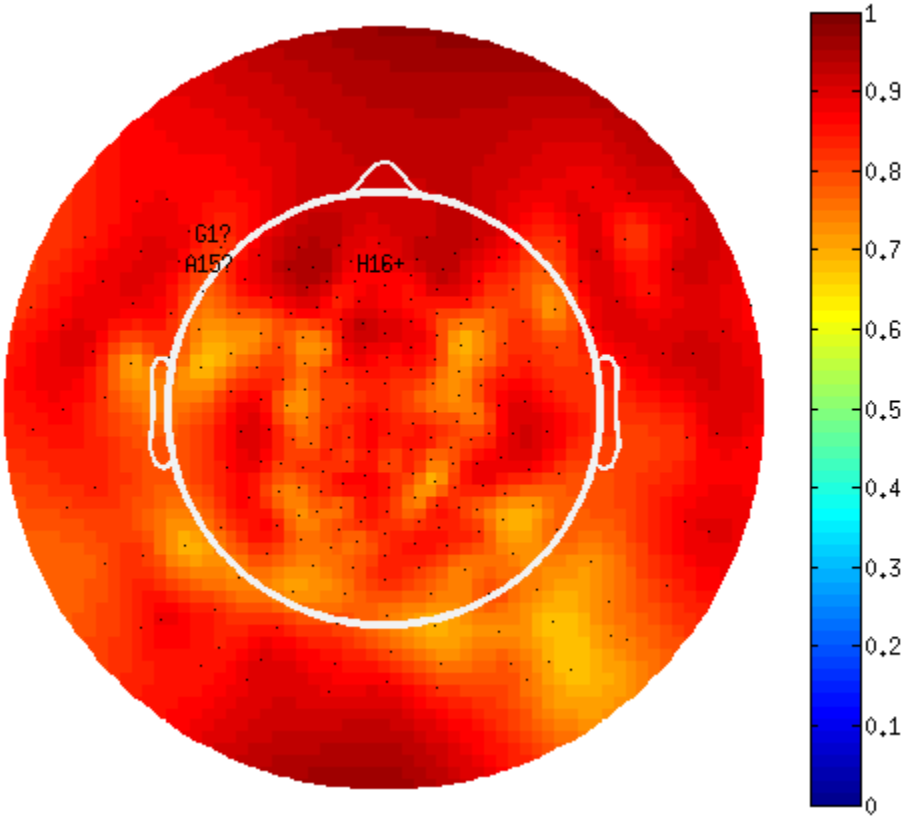
Robust deviation window statistics

```
Deviation window statistics (over 4215 windows):
Large deviation channel fraction:
   [before=0.035161, after=0.056742]
Median channel deviation: [before=12.6255, after=8.1499]
SD channel deviation: [before=3.1587, after=1.8149]
Max raw deviation level [before=3739.9697, after=3718.3795]
Average fraction 0.035161 (8.7198 channels)
   not meeting threshold before in each window
Average fraction 0.056742 (14.0721 channels)
   not meeting threshold after in each window
Windows with > 1/4 deviation channels:
  [before=137, after=291]
Windows with > 1/2 deviation channels:
  [before=39, after=135]
Median window deviations: [before=11.4609, after=7.532]
SD window deviations: [before=4.1242, after=2.6406]
Channels with dropouts: None
```

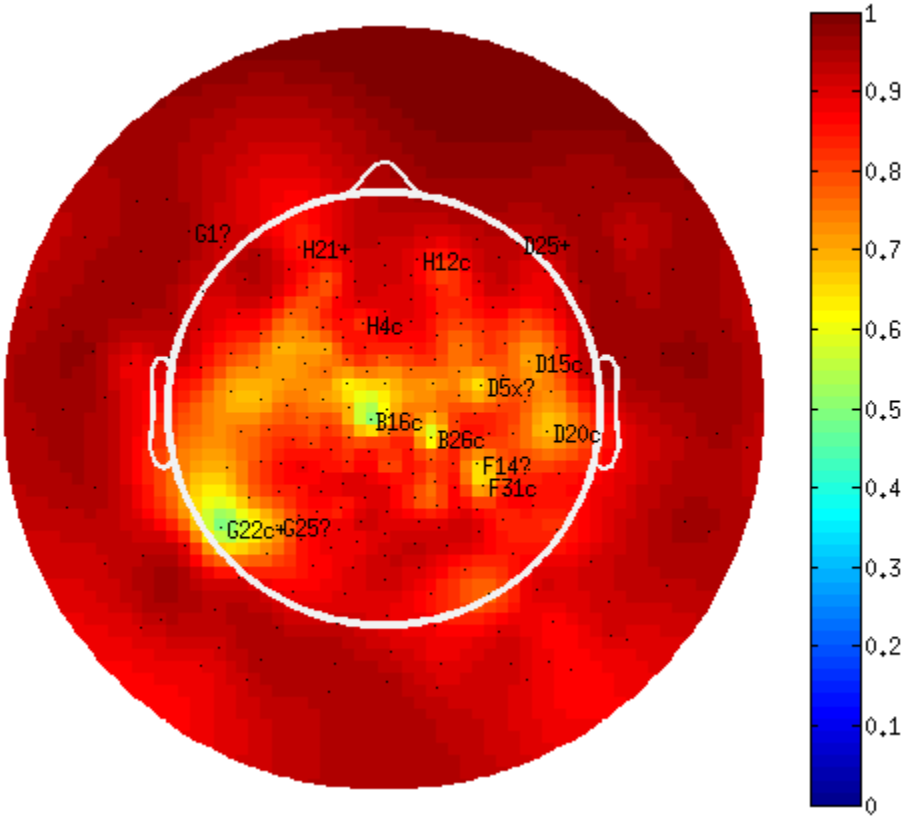

RSVP Study, session 1, task main, recording 1
Deviation score distribution
Original
Before interp
Final
Cumulative probability
Deviation score


RSVP Study, session 1, task main, recording 1
Channels not meeting Deviation score threshold
Number of channels (out of 248)
Seconds
Original
Before interp
Final

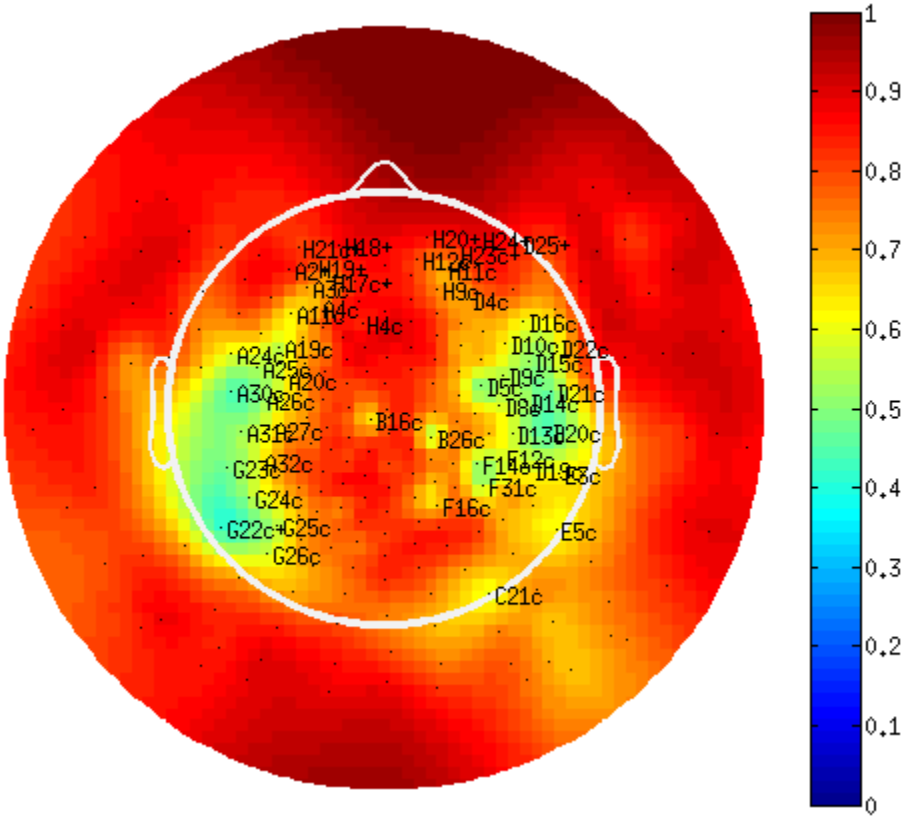
Median max abs correlation (referenced)



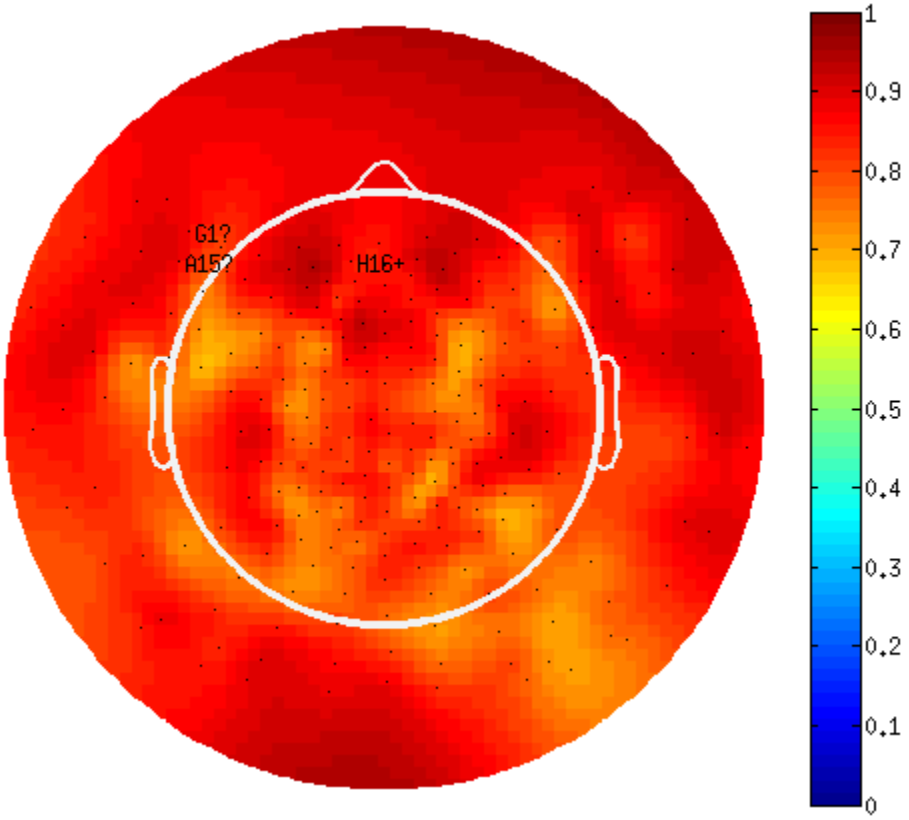
Median max abs correlation (original)



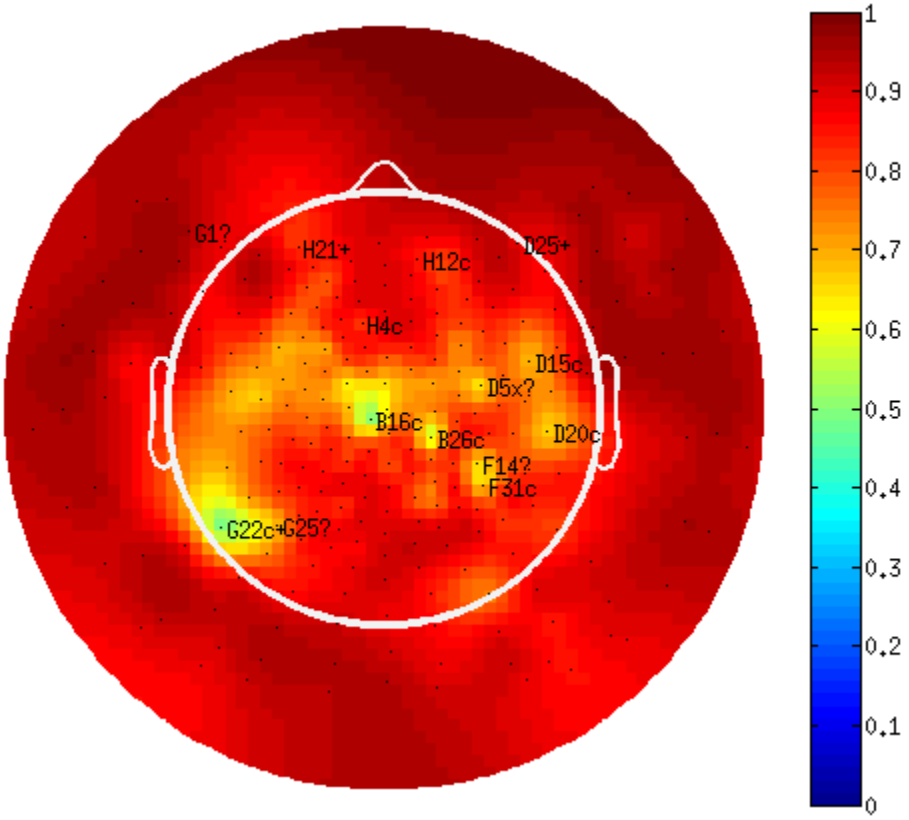
Median max abs correlation (marking interpolated)



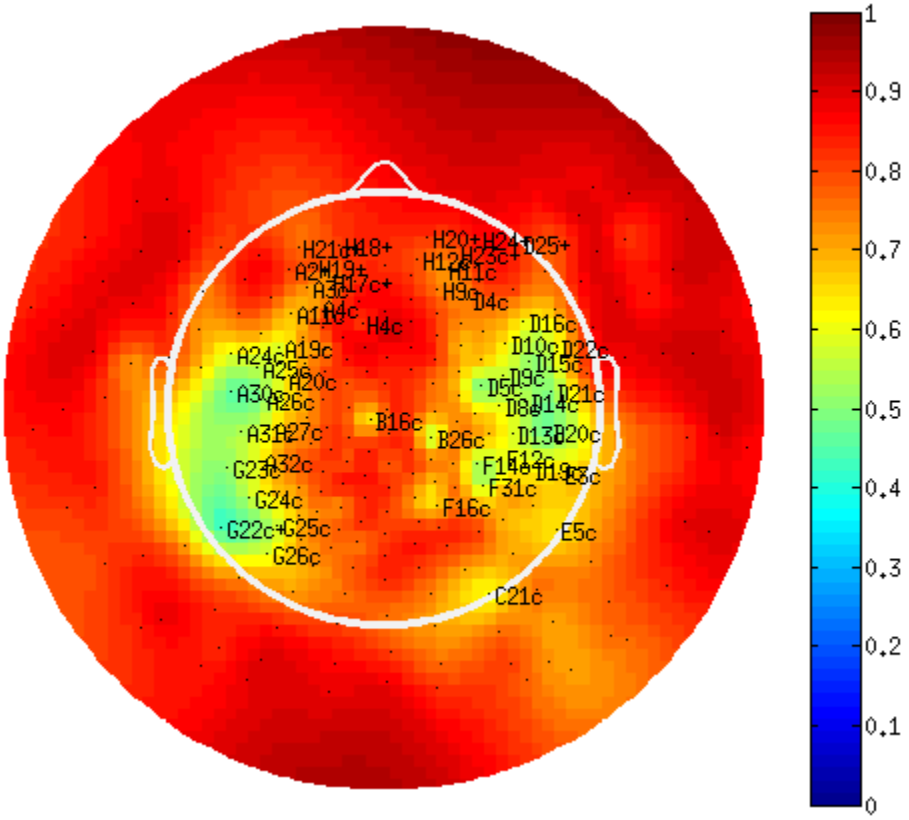
Mean max abs correlation (referenced)



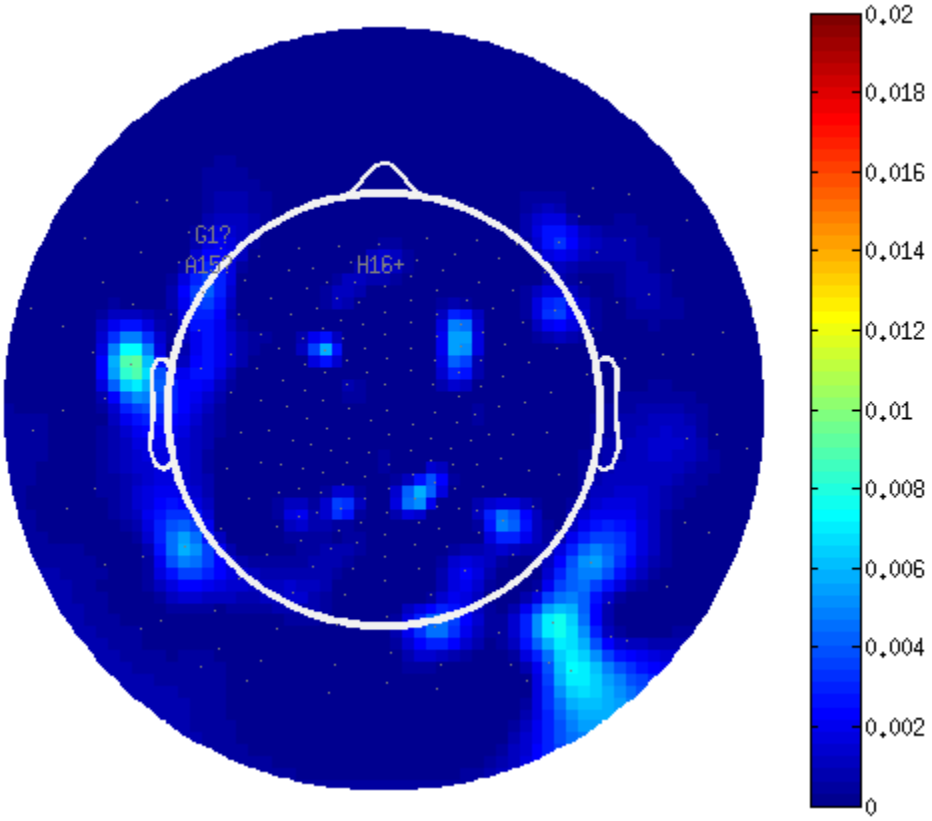
Mean max abs correlation (original)



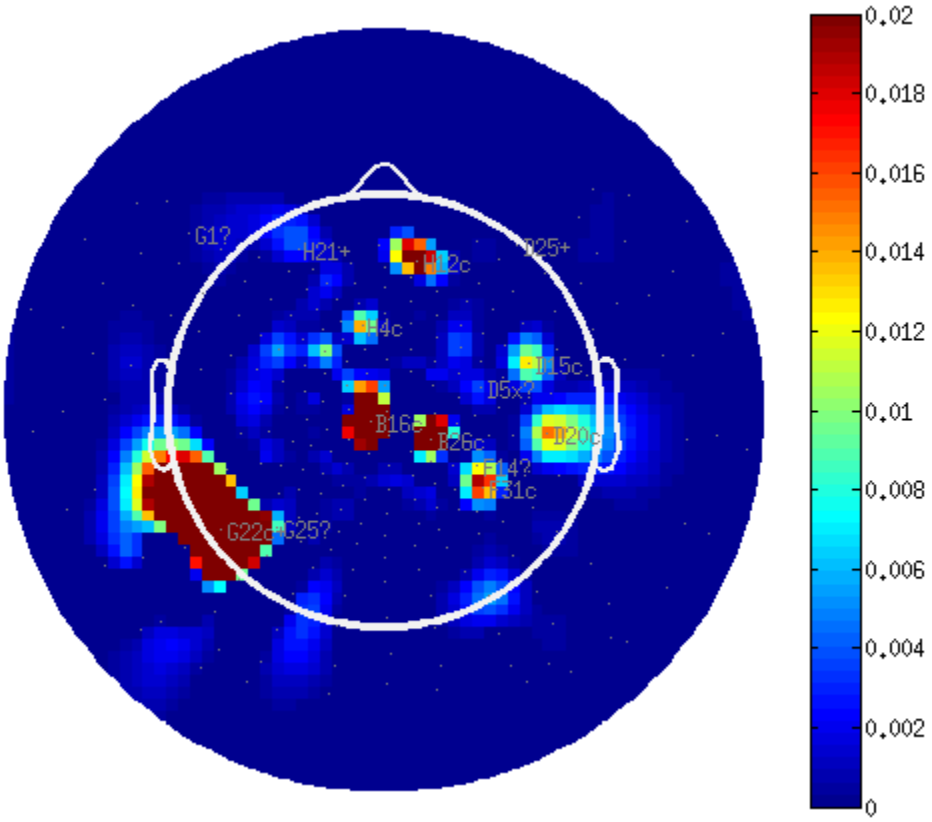
Mean max abs correlation (marking interpolated)



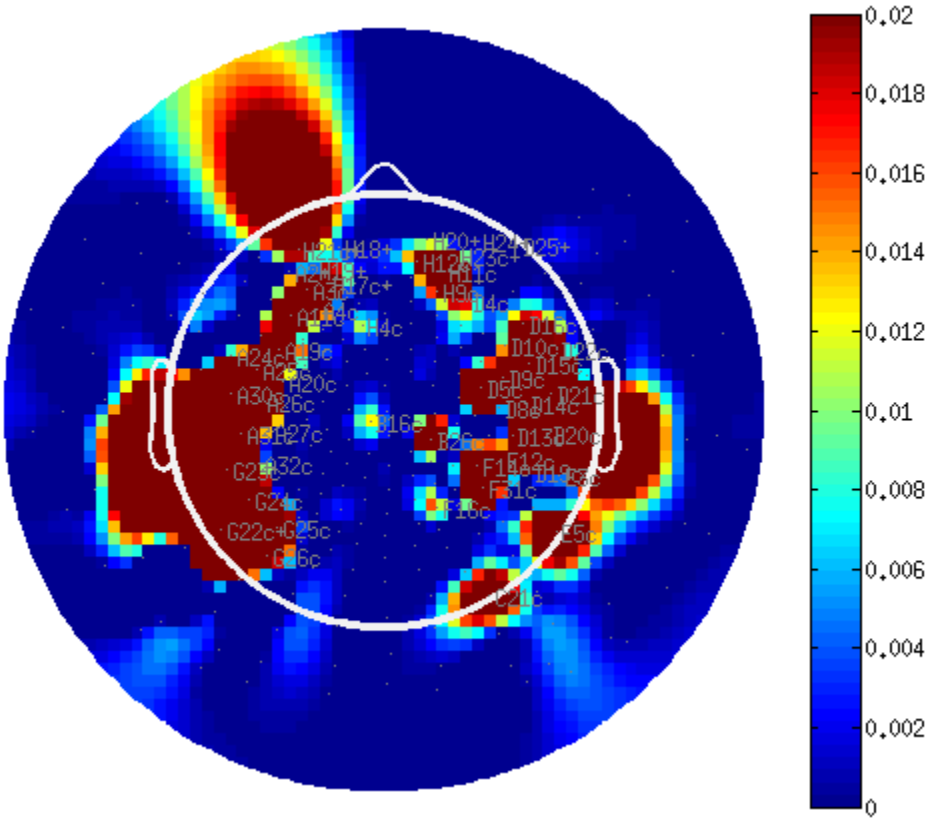
Bad min max correlation fraction (referenced)



Bad min max correlation fraction(original)

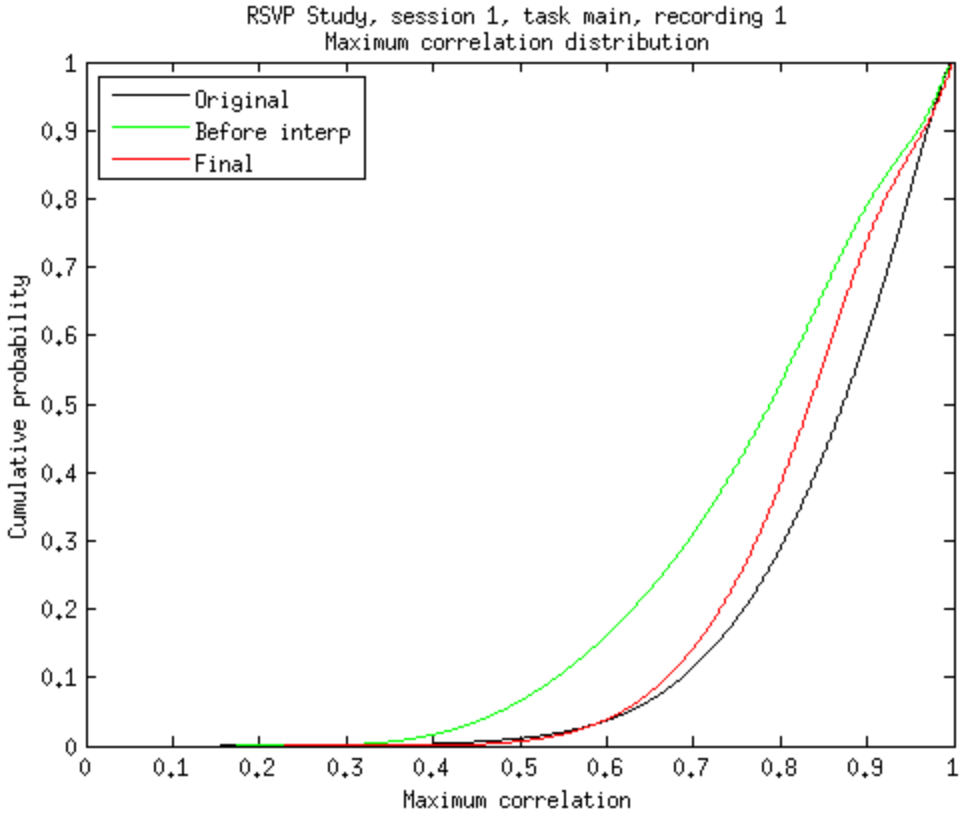


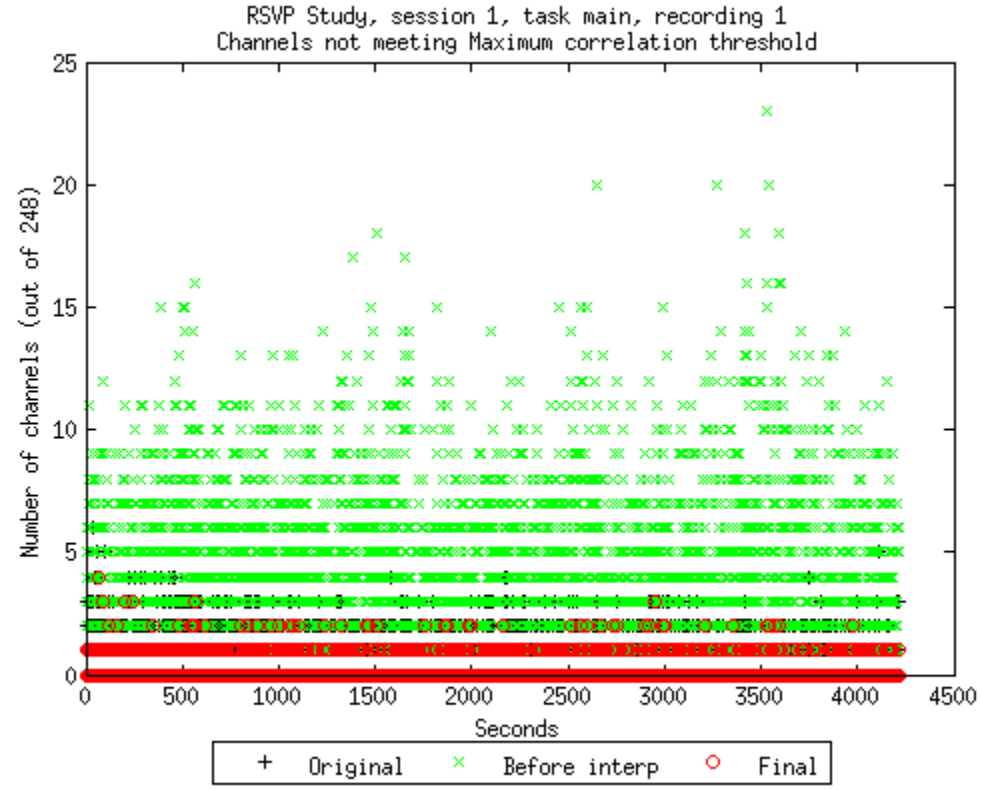
Bad min max correlation fraction (marking interpolated)



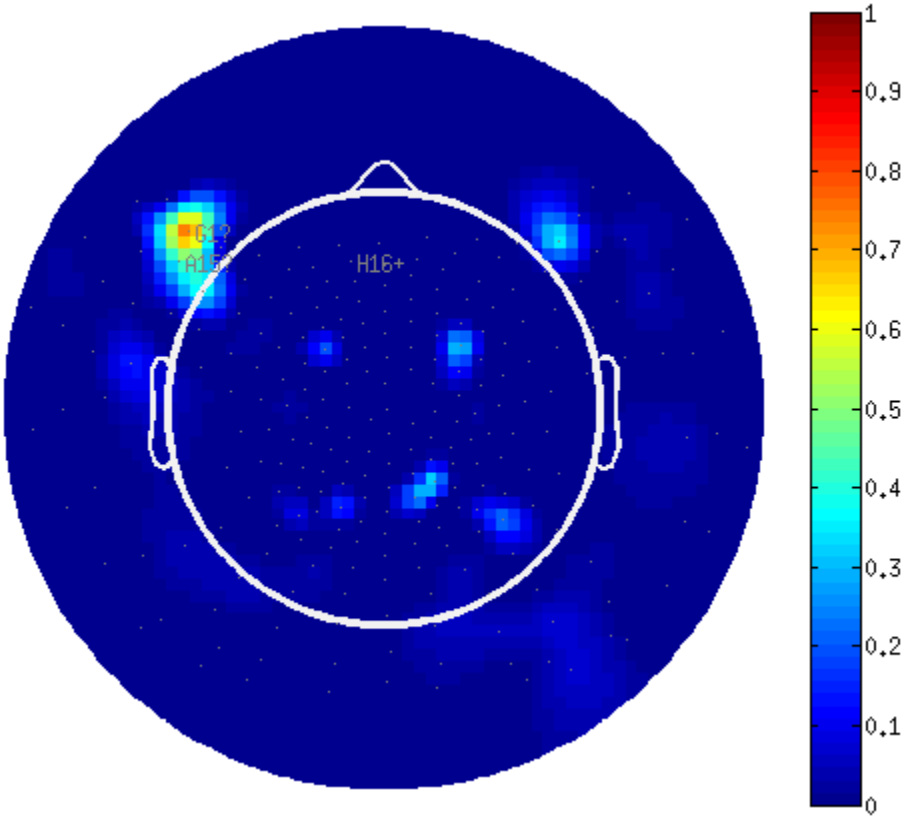
Correlation window statistics

```
Max correlation window statistics (over 4215 windows):
Overall median maximum correlation [before=0.88947, after=0.8437]
Low max correlation fraction [before=0.0029359, after=0.00058834]
Minimum max correlation level [before=0.15476, after=0.22846]
Average fraction 0.0029359 (0.72811 channels):
   not meeting threshold before in each window
Average fraction 0.00058834 (0.14591 channels):
   not meeting threshold after in each window
Windows with > 1/4 bad channels: [before=0, after=0]
Windows with > 1/2 bad channels: [before=0, after=0]
```

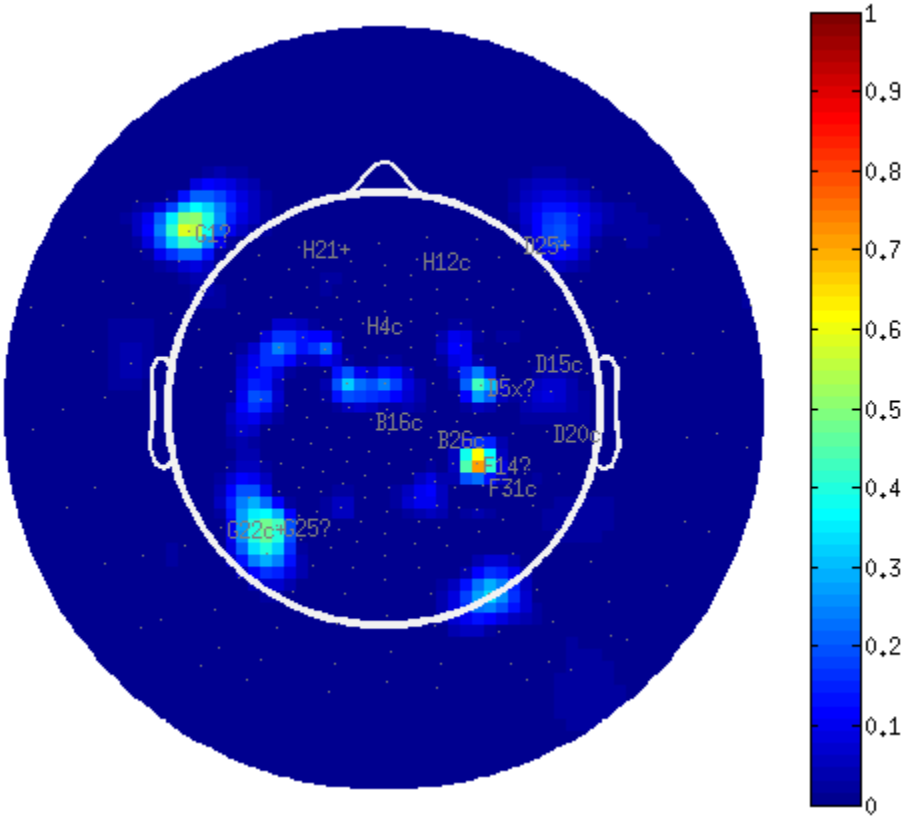

RSVP Study, session 1, task main, recording 1
Maximum correlation distribution
Original
Before interp
Final
Cumulative probability
Maximum correlation
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1


RSVP Study, session 1, task main, recording 1
Channels not meeting Maximum correlation threshold
Number of channels (out of 248)
Seconds
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5
10
15
20
25
Original
Before interp
Final

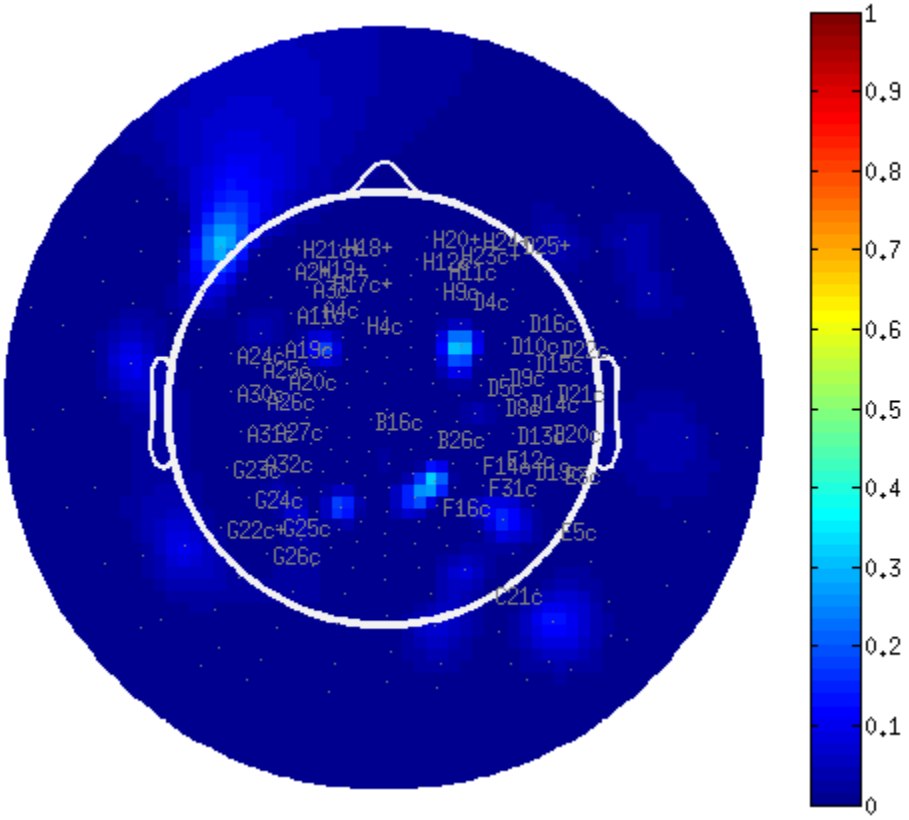
Bad ransac fraction (referenced)



Bad ransac fraction (original)

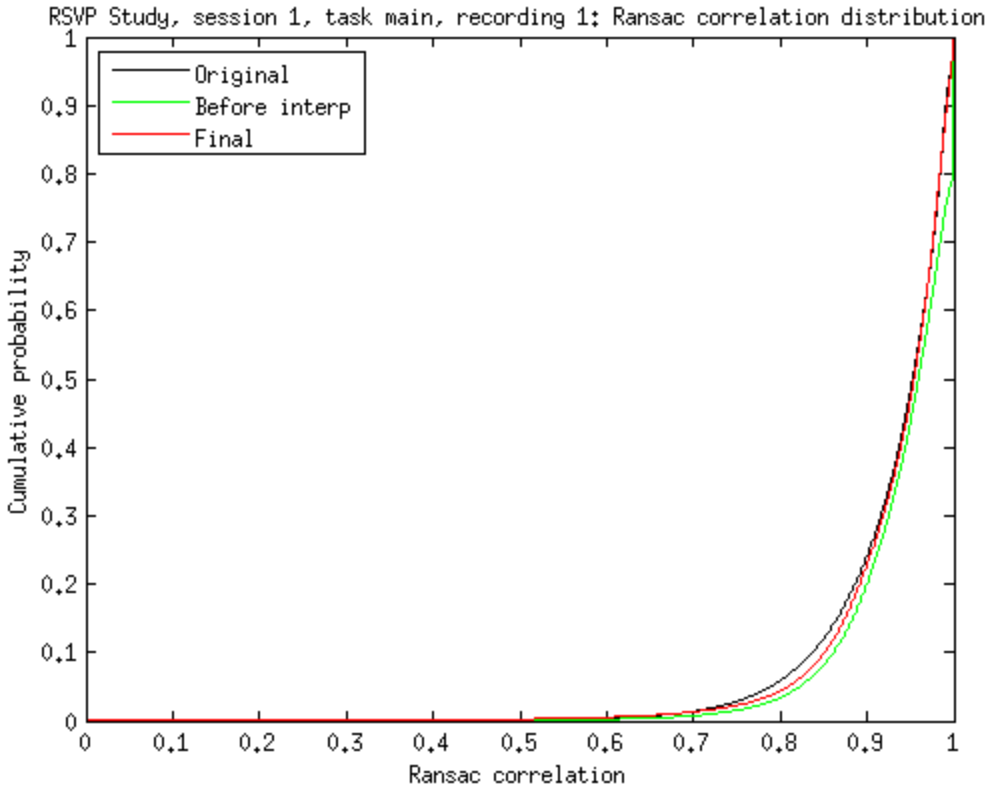


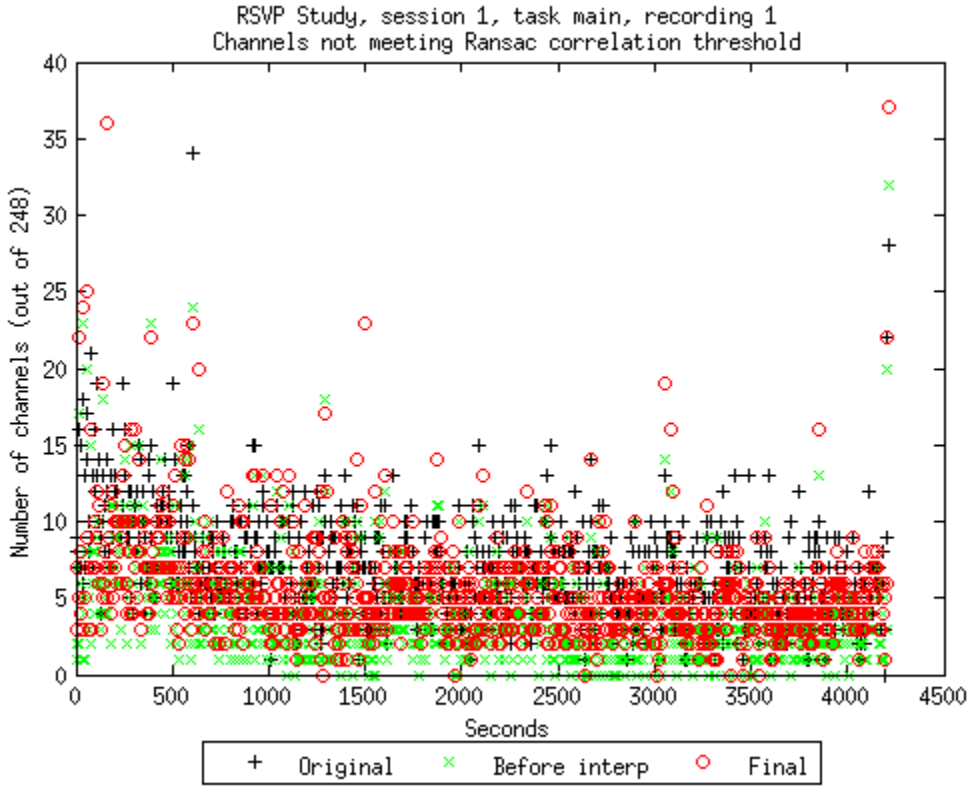
Bad ransac fraction (marking interpolated)



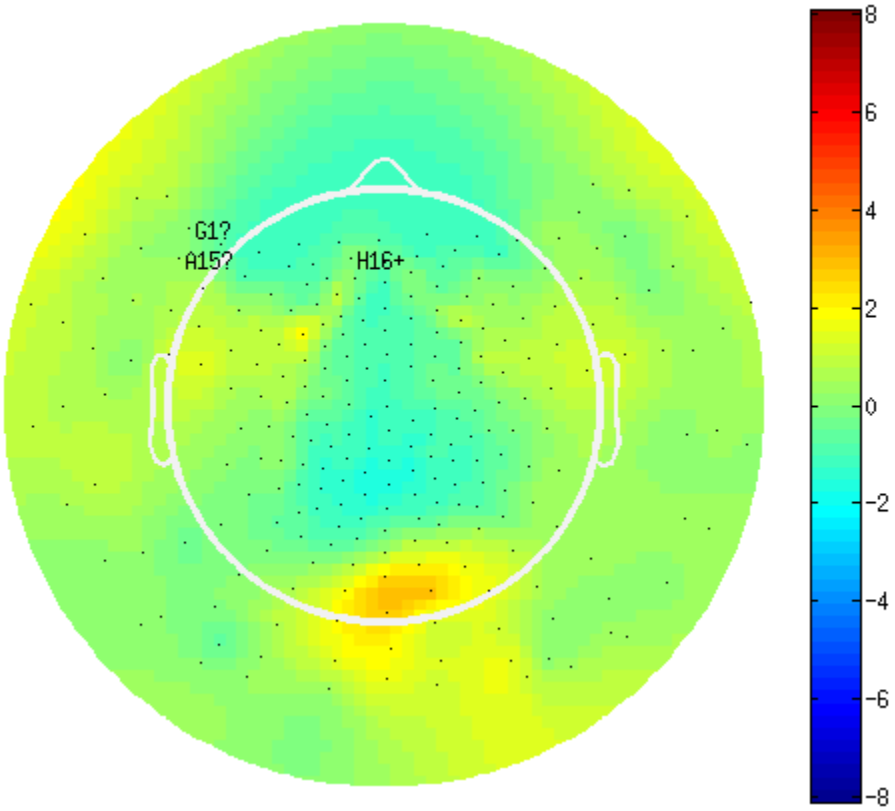
Channels with poor ransac correlations

```
Ransac window statistics (over 843 windows):
Low ransac channel fraction [before=0.028192, after=0.022677]
Minimum ransac correlation [before=-0.11639, after=-0.73665]
Average fraction 0.028192 (6.9917 channels):
   not meeting threshold before in each window
Average fraction 0.022677 (5.624 channels):
   not meeting threshold after in each window
Windows with > 1/4 bad ransac channels: [before=0, after=0]
Windows with > 1/2 bad ransac channels: [before=0, after=0]
```

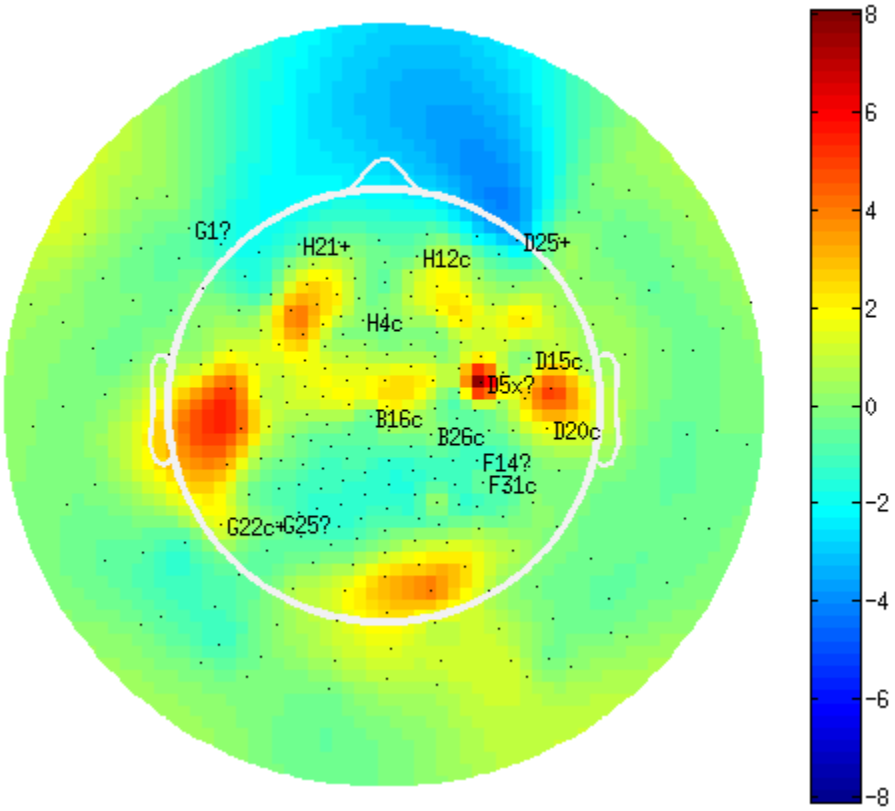

RSVP Study, session 1, task main, recording 1: Ransac correlation distribution
Original
Before interp
Final
Cumulative probability
Ransac correlation
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1


RSVP Study, session 1, task main, recording 1
Channels not meeting Ransac correlation threshold
Number of channels (out of 248)
Seconds
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5
10
15
20
25
30
35
40
Original
Before interp
Final

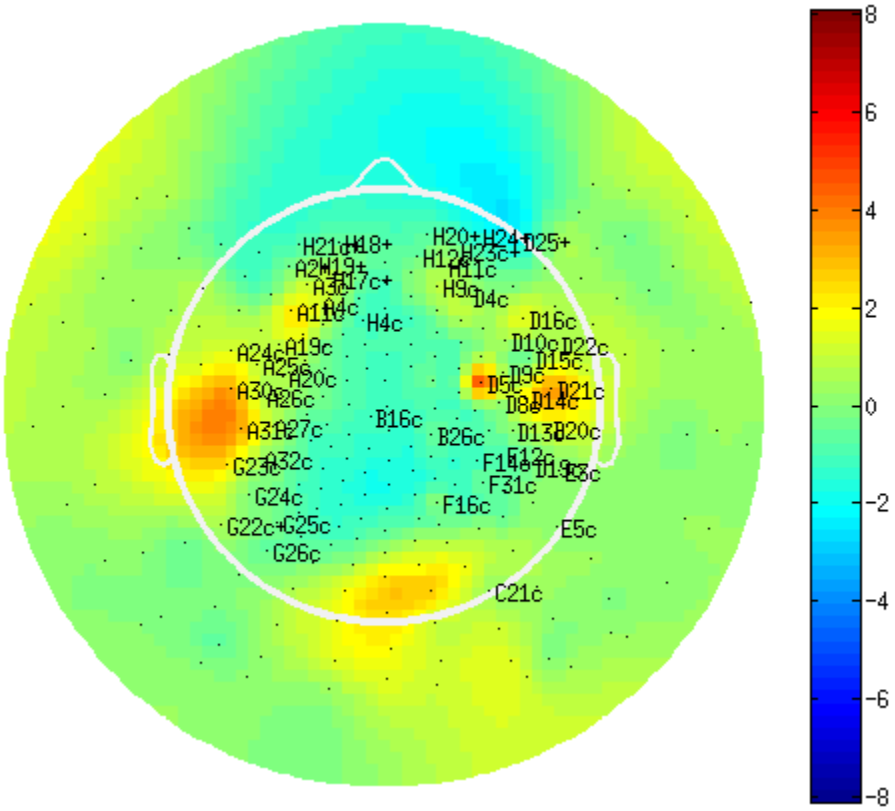
HF noise Z-score (referenced)



HF noise Z-score (original)

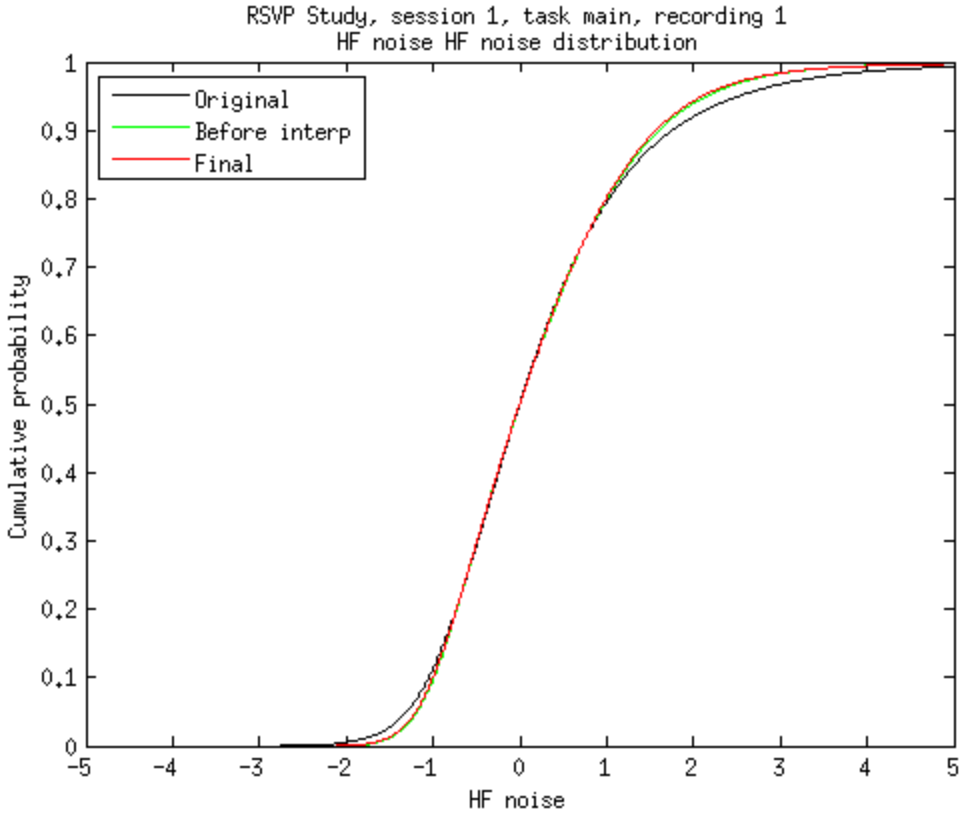


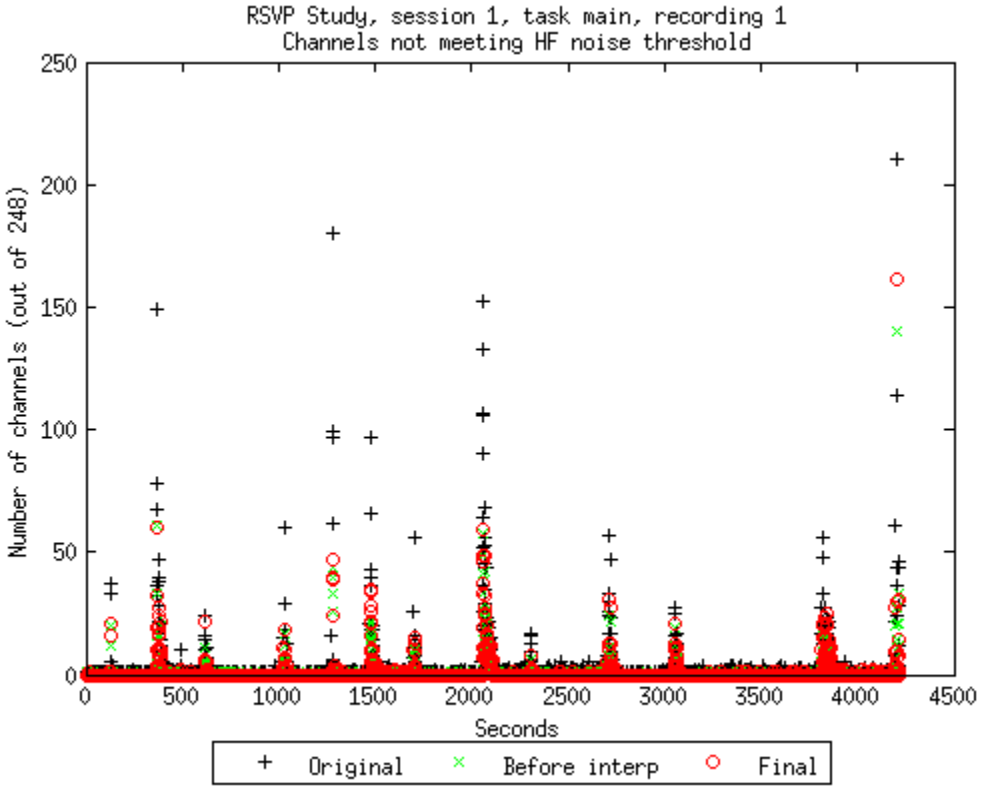
HF noise Z-score (marking interpolated)



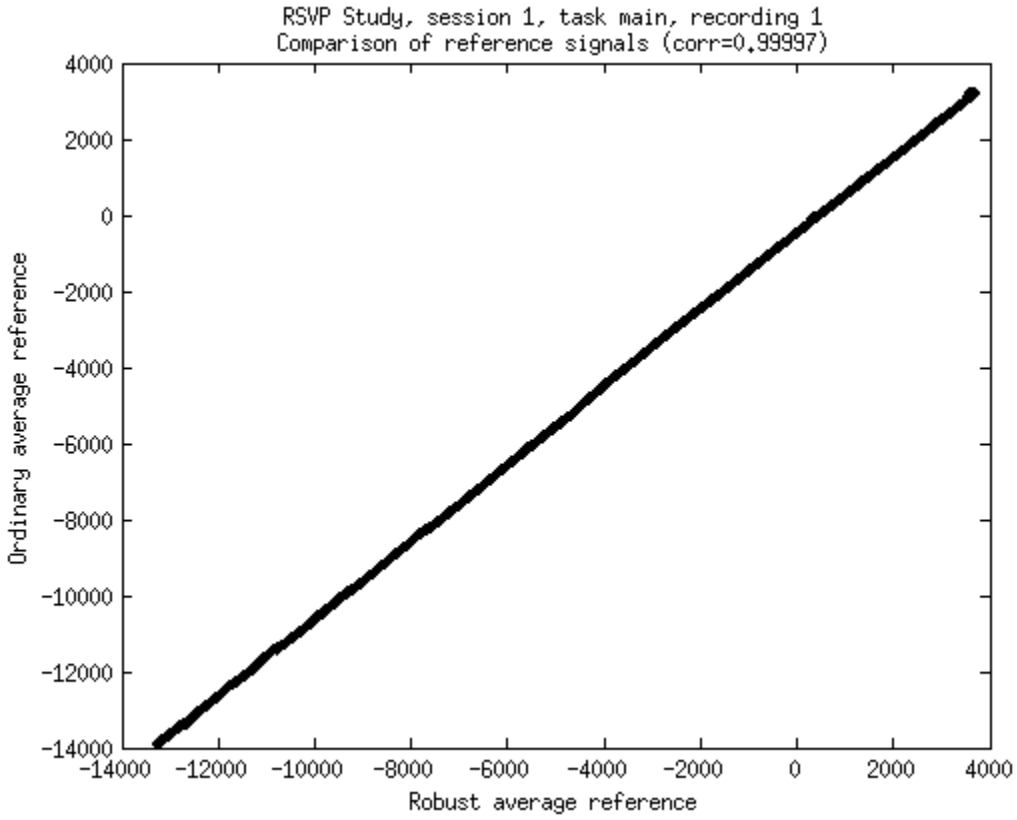
HF noise window stats

```
Noise window statistics (over 4215 windows):
Channel fraction with HF noise:
  [before=0.0067893, after=0.0026719]
Median noisiness: [before=0.32362, after=0.35698]
SD noisiness: [before=0.05775, after=0.10852]
Max HF noise levels [before=2.8765, after=2.6366]
Average fraction 0.0067893 (1.6837 channels):
   not meeting threshold before in each window
Average fraction 0.0026719 (0.66263 channels):
   not meeting threshold after in each window
   not meeting threshold after relative to before in each window
Windows with > 1/4 HF channels:
  [before=17, after=1]
Windows with > 1/2 HF channels:
  [before=5, after=1]
Median window HF: [before=0.34985, after=0.3766]
SD window HF: [before=0.12653, after=0.17708]
```

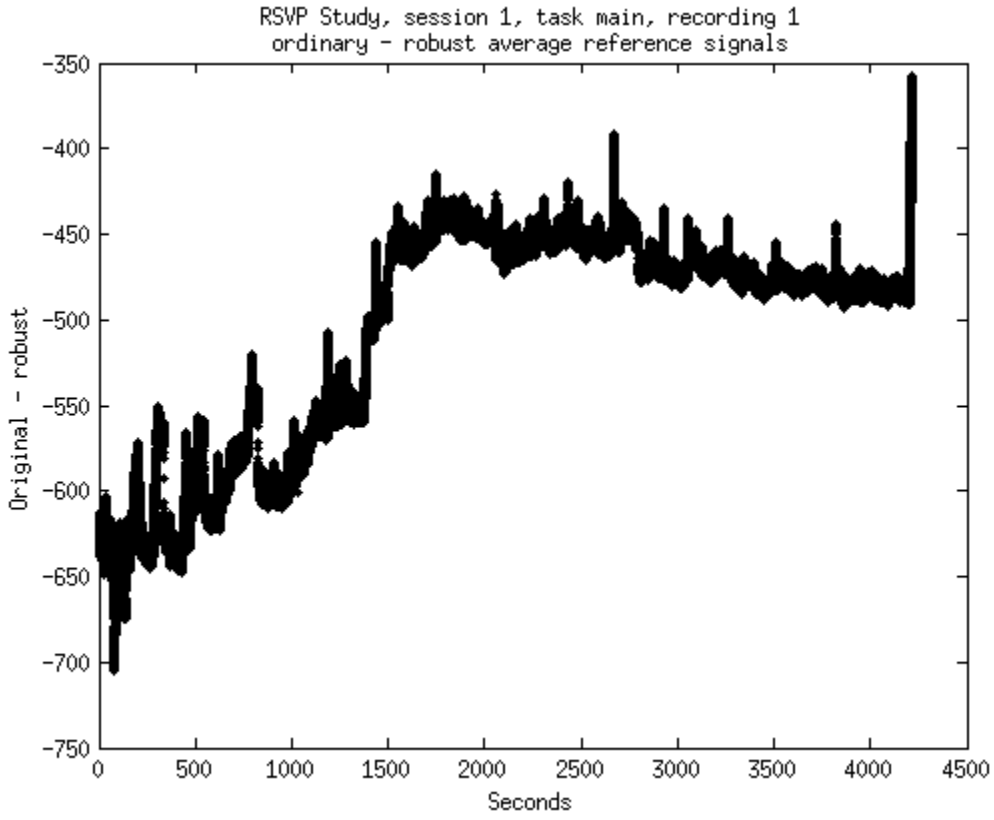

RSVP Study, session 1, task main, recording 1
HF noise HF noise distribution
Original
Before interp
Final
Cumulative probability
HF noise


RSVP Study, session 1, task main, recording 1
Channels not meeting HF noise threshold
Number of channels (out of 248)
Seconds
Original
Before interp
Final

Noisy average reference vs robust average reference

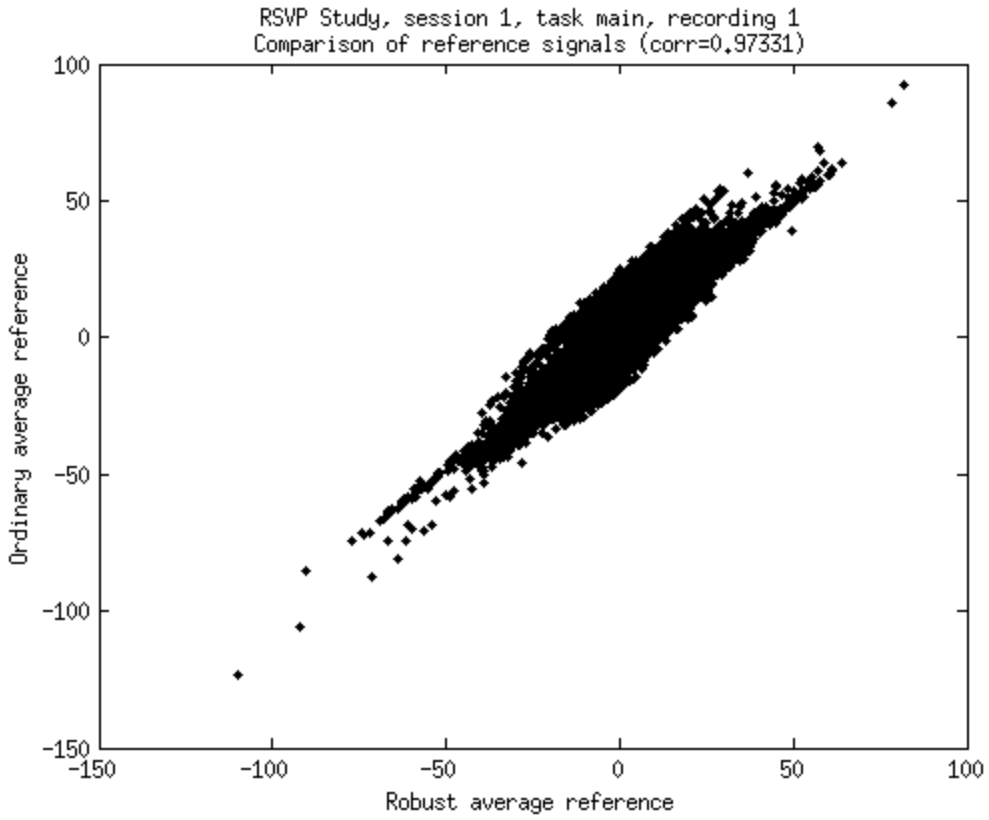


Noisy average reference - robust average reference by time

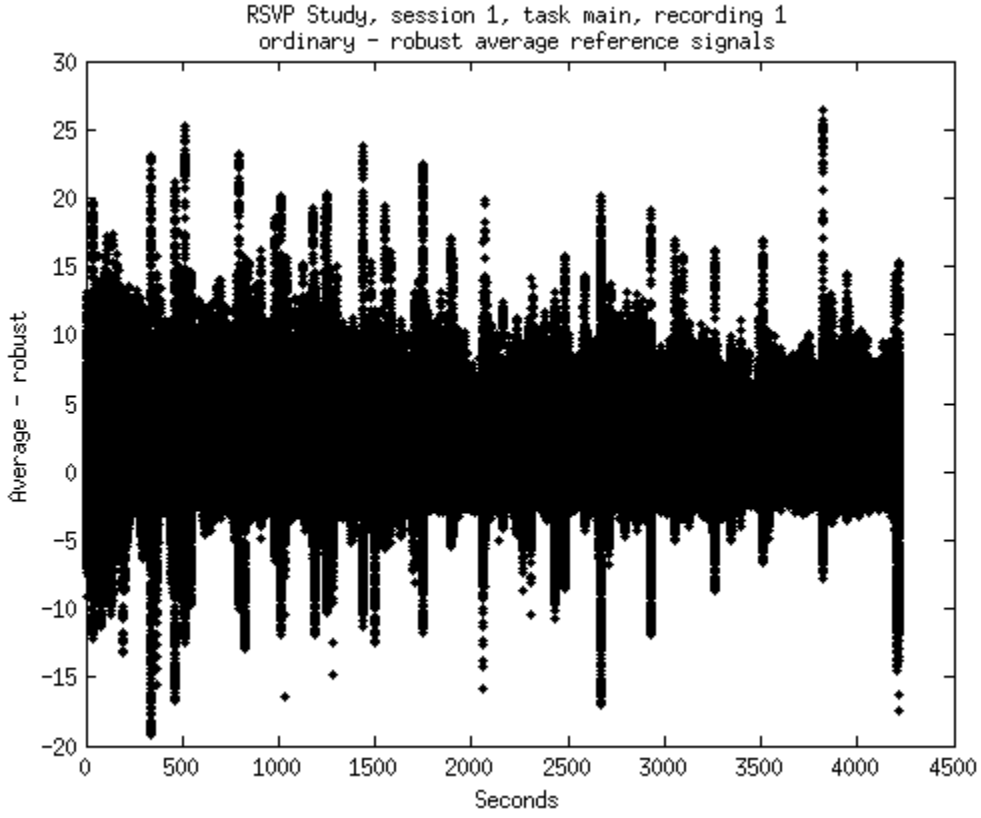


Noisy average reference vs robust average reference (filtered)

```
pop_eegfiltnew() - performing 847 point highpass filtering.
pop_eegfiltnew() - transition band width: 1 Hz
pop_eegfiltnew() - passband edge(s): 1 Hz
pop_eegfiltnew() - cutoff frequency(ies) (-6 dB): 0.5 Hz
pop_eegfiltnew() - filtering the data
firfilt(): |====================| 100%, ETE 00:00
```


RSVP Study, session 1, task main, recording 1
Comparison of reference signals (corr=0.97331)
Ordinary average reference
Robust average reference
100
50
0
-50
-100
-150
-150
-100
-50
0
50
100

Noisy average reference - robust average reference by time



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