Perceive Medtronic-CU Anschutz Collaboration

LEFT

Part 1: Import all necessary values and create global variables.

```
%% loads in json file
%loads in file
cd('C:\Users\sydne\Documents\github\perceive\patientData\Patient3_0630')
jsonFiles = 'Report_Json_Session_Report_20210630T155026.json';
js = jsondecode(fileread(jsonFiles));
%sets it back to the path where all the other functions are
cd('C:\Users\sydne\Documents\github\perceive')

%declares "global" variables AND determines if .json comes from
%single or double battery B)
channels = unique({js.LfpMontageTimeDomain.Channel}, 'stable');
leng = numel({js.LfpMontageTimeDomain.Channel});
startindex = 1; %MUST BE MANUALLY SET IN CLINIC
sides = {'LEFT', 'RIGHT'};
if any((contains(channels, sides{1}))) && any((contains(channels, sides{2})))
    doubleBattery = false;
    %json has both left and right data
    channelsLeft = channels(contains(channels, sides{1}));
    channelsRight = channels(contains(channels, sides{2}));
    channelSides = {channelsLeft, channelsRight};
    highestBetas = {' ', ' '};
else
    doubleBattery = true;
    %added this to help with titling figures
    if contains(channels, sides{1})
        side = 'LEFT';
    else
        side = 'RIGHT';
    end
end
```

Part 2: Create freq vs pwr plot for all 6 contacts. Also reports the max betas.

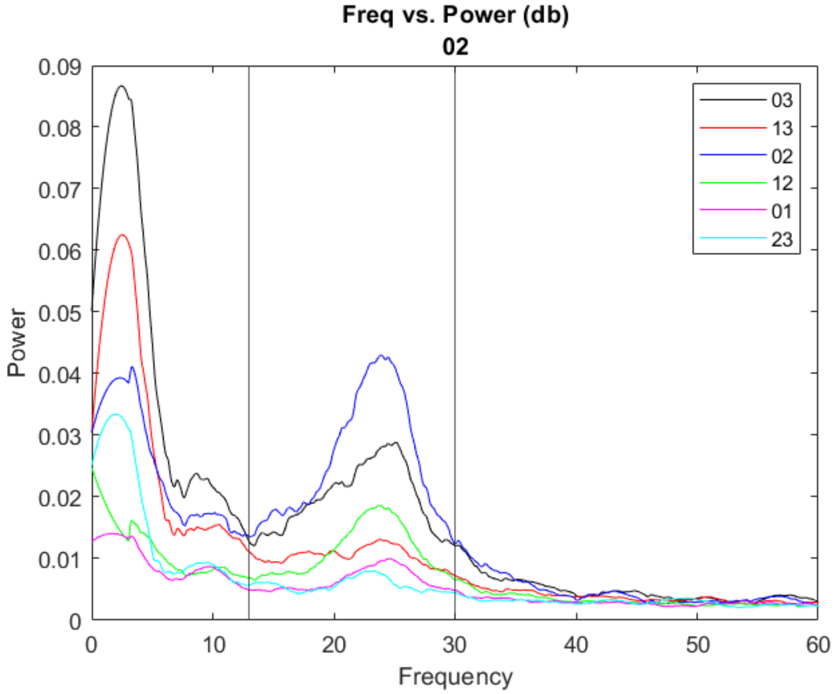
```
%% run to get full graph
%{} gets the thing from the actual cell array
%() gets cell ARRAY!

close

if doubleBattery == false
```

```
     %this should be true if the json returns both left and right data,
     %single battery
     for  i = 1:2
         subplot(2, 1, i)
         channels2 = channels(contains(channels,sides{i}));
         colors = 'krbgmc';
         maxValues = zeros(length(channels2), 1);
         for c=1:length(channels2)
             maxValues(c) = tempAvgPlot(startindex, leng, js, channels2{c},
colors(c));
             hold on;
         end

         [M, I] = max(maxValues);
         highestBeta = channels2{I};
         highestBetas{i} = highestBeta;

         %add all the plot info
         xline(13);
         xline(30);

         %formats the channels to be suitable for the legend
         legendChan = cell(6);
         oldchar = {'LEFT', 'RIGHT', '0', '1', '2', '3', '4', '5', '_', 'AND'};
         newchar = {''};
         oldnum = {'ZERO', 'ONE', 'TWO', 'THREE'};
         newnum = {'0', '1', '2', '3'};
         for b = 1:length(channels2)
             legendChan{b} = replace(channels2{b}, oldchar, newchar);
             legendChan{b} = replace(legendChan{b}, oldnum, newnum);
         end

         legend(legendChan{1}, legendChan{2}, legendChan{3}, legendChan{4},
legendChan{5}, legendChan{6})
         title(["Freq vs. Power (db)", sides{i}, legendChan{I}])
         xlim([0 60])
         xlabel("Frequency")
         ylabel("Power")

         disp(['The highest beta comes from contact pair ', legendChan{I}])


     end


 else
```

```
     %should be true if a double battery
     x = 0;
     %leng = numel({js.LfpMontageTimeDomain.Channel});
     %channels2 = channels(contains(channels,sides{i}));

     disp(["The following information is for the",
convertCharsToStrings(side)]);

     colors = 'krbgmc';
     maxValues = zeros(length(channels), 1);
     for c=1:length(channels)
         maxValues(c) = tempAvgPlot(startindex, leng, js, channels{c},
colors(c));
         hold on;
     end

     [M, I] = max(maxValues);
     highestBeta = channels{I};

     %add all the plot info

     xline(13);
     xline(30);

     %these are the order presented in channels

     legendChan = cell(6);
     oldchar = {'LEFT', 'RIGHT', '0', '1', '2', '3', '4', '5', '_', 'AND'};
     newchar = {''};
     oldnum = {'ZERO', 'ONE', 'TWO', 'THREE'};
     newnum = {'0', '1', '2', '3'};
     for b = 1:length(channels)
         legendChan{b} = replace(channels{b}, oldchar, newchar);
         legendChan{b} = replace(legendChan{b}, oldnum, newnum);
     end


     legend(legendChan{1}, legendChan{2}, legendChan{3}, legendChan{4},
legendChan{5}, legendChan{6})
     title(["Freq vs. Power (db)", legendChan{I}])
     xlim([0 60])
     xlabel("Frequency")
     ylabel("Power")

     disp(['The highest beta comes from contact pair ', legendChan{I}])
```

```
end
```

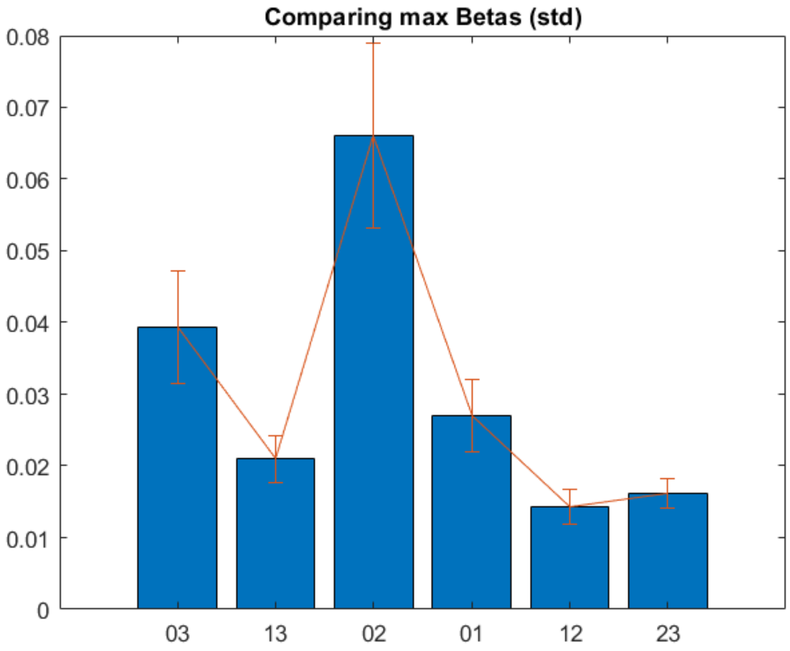
```
"The following information is for the"    "LEFT"
```



```
The highest beta comes from contact pair 02
```

Part 3: Compare beta values with stds across contacts

```

if doubleBattery == false
    for i = 1:2
        disp(['Max Betas ', sides{i}])
        compareBetaBarChart(startindex, leng, js, channelSides{i});
        figure;
    end
else
    compareBetaBarChart(startindex, leng, js, channels);
end
```



Part 4: Show table of data across each run

```
if doubleBattery == false
    for i = 1:2
        disp(['Table of means and stds per channel ', sides{i}])
        maxMeanBetaAllRuns(startindex, js, leng, channelSides{i});
        figure;
    end
else
    maxMeanBetaAllRuns(startindex, js, leng, channels);
    figure;
end
```

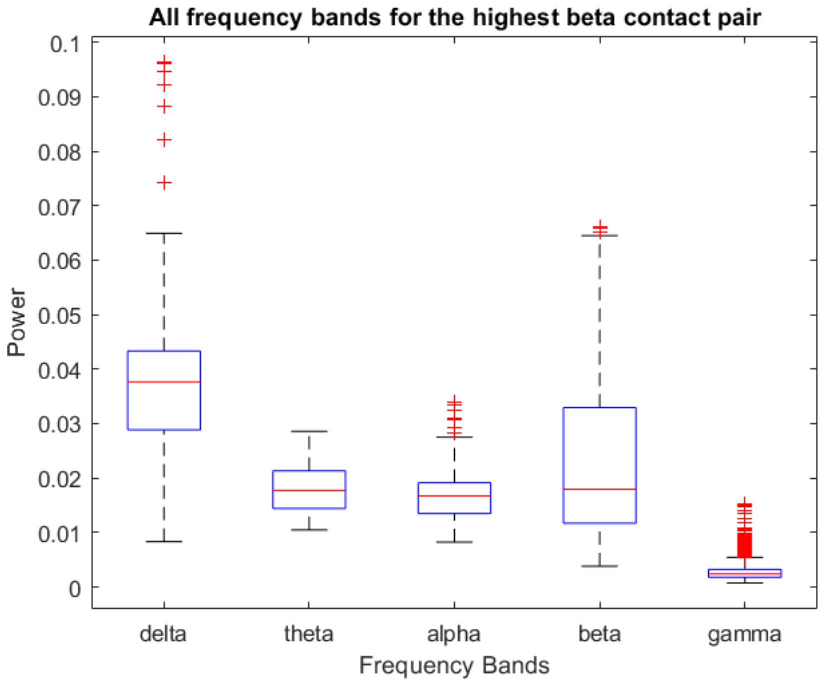
```
ans = 6×7 table
```

	Var1	Mean R1	Mean R2	Mean R3	STD R1	STD R2	STD R3
1	'ZERO_AND_TWO_LEFT'	0.0255	0.0289	0.0236	0.0163	0.0195	0.0146
2	'ZERO_AND_THREE_LEFT'	0.0201	0.0222	0.0167	0.0115	0.0133	0.0094
3	'ONE_AND_TWO_LEFT'	0.0111	0.0129	0.0099	0.0062	0.0080	0.0060
4	'ONE_AND_THREE_LEFT'	0.0109	0.0114	0.0089	0.0051	0.0055	0.0044
5	'ZERO_AND_ONE_LEFT'	0.0065	0.0067	0.0064	0.0036	0.0035	0.0034
6	'TWO_AND_THREE_LEFT'	0.0061	0.0054	0.0058	0.0032	0.0035	0.0029

Part 5: Show all frequency data for contact pair that provides highest beta

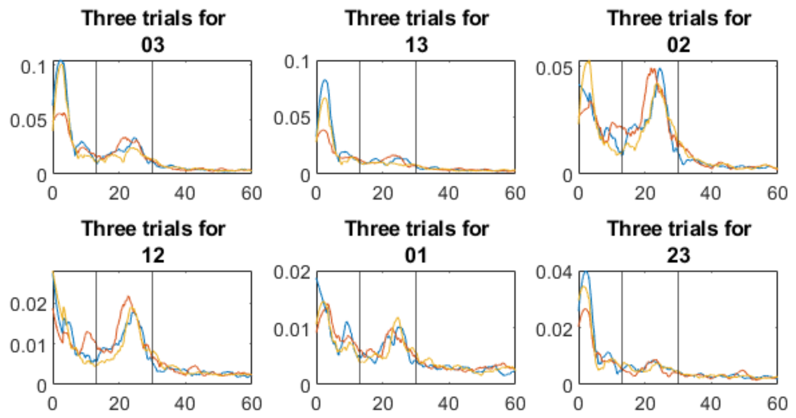
```
figure;
```

```
if doubleBattery == false
    for i = 1:2
        disp(['All frequency data for ', legendChan{I}, sides{i}])
        allFreqBarChart(startindex, leng, js, highestBetas{i});
        figure;
    end
else
    allFreqBarChart(startindex, leng, js, highestBeta);
    figure;
end
```



Part 6: Show variability between trials for each pair

```
%graphEachTrials(startindex, js, leng, channels);
figure;
if doubleBattery == false
    for i = 1:2
        disp(['Trial variability for the ', sides{i}])
        graphEachTrials(startindex, js, leng, channelSides{i});
        figure;
    end
else
   graphEachTrials(startindex, js, leng, channels);
   figure;
end
```



RIGHT

Part 1: Import all necessary values and create global variables.

```
%% loads in json file
%loads in file
cd('C:\Users\sydne\Documents\github\perceive\patientData\Patient3_0630')
jsonFiles = 'Report_Json_Session_Report_20210630T143145.json';
js = jsondecode(fileread(jsonFiles));
%sets it back to the path where all the other functions are
cd('C:\Users\sydne\Documents\github\perceive')

%declares "global" variables AND determines if .json comes from
%single or double battery B)
channels = unique({js.LfpMontageTimeDomain.Channel}, 'stable');
leng = numel({js.LfpMontageTimeDomain.Channel});
startindex = 7; %MUST BE MANUALLY SET IN CLINIC
sides = {'LEFT', 'RIGHT'};
```

```
if any((contains(channels, sides{1}))) && any((contains(channels, sides{2})))
    doubleBattery = false;
    %json has both left and right data
    channelsLeft = channels(contains(channels, sides{1}));
    channelsRight = channels(contains(channels, sides{2}));
    channelSides = {channelsLeft, channelsRight};
    highestBetas = {' ', ' '};
else
    doubleBattery = true;
    %added this to help with titling figures
    if contains(channels, sides{1})
        side = 'LEFT';
    else
        side = 'RIGHT';
    end
end
```

Part 2: Create freq vs pwr plot for all 6 contacts. Also reports the max betas.

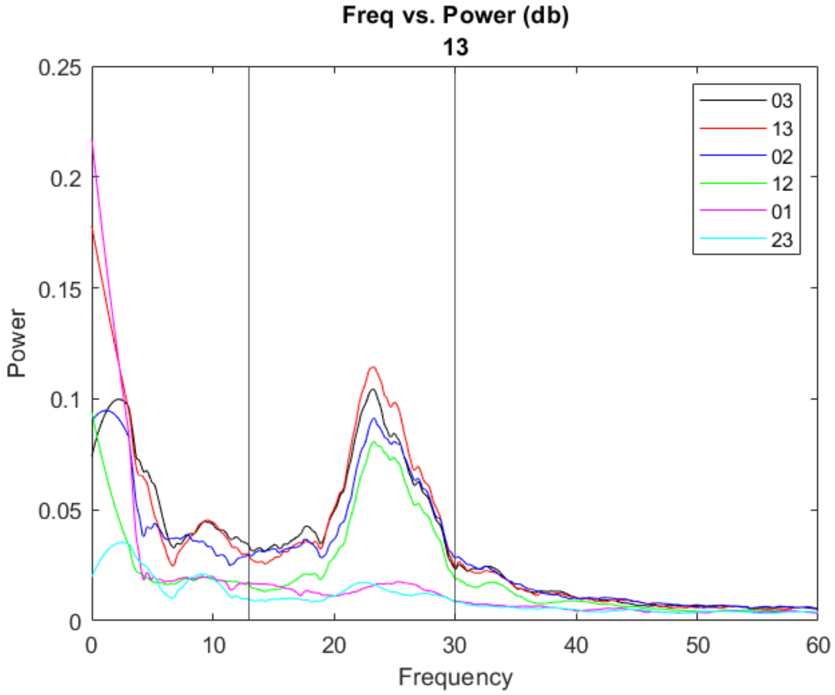
```
%% run to get full graph
%{} gets the thing from the actual cell array
%() gets cell ARRAY!

close

if doubleBattery == false
    %this should be true if the json returns both left and right data,
    %single battery
    for  i = 1:2
```

```
        subplot(2, 1, i)
        channels2 = channels(contains(channels,sides{i}));
        colors = 'krbgmc';
        maxValues = zeros(length(channels2), 1);
        for c=1:length(channels2)
            maxValues(c) = tempAvgPlot(startindex, leng, js, channels2{c}, colors(c));
            hold on;
        end

        [M, I] = max(maxValues);
        highestBeta = channels2{I};
        highestBetas{i} = highestBeta;

        %add all the plot info
        xline(13);
        xline(30);

        %formats the channels to be suitable for the legend
        legendChan = cell(6);
        oldchar = {'LEFT', 'RIGHT', '0', '1', '2', '3', '4', '5', '_', 'AND'};
        newchar = {''};
        oldnum = {'ZERO', 'ONE', 'TWO', 'THREE'};
        newnum = {'0', '1', '2', '3'};
        for b = 1:length(channels2)
            legendChan{b} = replace(channels2{b}, oldchar, newchar);
            legendChan{b} = replace(legendChan{b}, oldnum, newnum);
        end
```

```

         legend(legendChan{1}, legendChan{2}, legendChan{3}, legendChan{4},
legendChan{5}, legendChan{6})
         title(["Freq vs. Power (db)", sides{i}, legendChan{I}])
         xlim([0 60])
         xlabel("Frequency")
         ylabel("Power")

         disp(['The highest beta comes from contact pair ', legendChan{I}])


     end


 else
     %should be true if a double battery
     x = 0;
     %leng = numel({js.LfpMontageTimeDomain.Channel});
     %channels2 = channels(contains(channels,sides{i}));

     disp(["The following information is for the",
convertCharsToStrings(side)]);

     colors = 'krbgmc';
     maxValues = zeros(length(channels), 1);
     for c=1:length(channels)
         maxValues(c) = tempAvgPlot(startindex, leng, js, channels{c},
colors(c));
         hold on;
```

```
    end

    [M, I] = max(maxValues);
    highestBeta = channels{I};

    %add all the plot info

    xline(13);
    xline(30);

    %these are the order presented in channels

    legendChan = cell(6);
    oldchar = {'LEFT', 'RIGHT', '0', '1', '2', '3', '4', '5', '_', 'AND'};
    newchar = {''};
    oldnum = {'ZERO', 'ONE', 'TWO', 'THREE'};
    newnum = {'0', '1', '2', '3'};
    for b = 1:length(channels)
        legendChan{b} = replace(channels{b}, oldchar, newchar);
        legendChan{b} = replace(legendChan{b}, oldnum, newnum);
    end


    legend(legendChan{1}, legendChan{2}, legendChan{3}, legendChan{4}, legendChan{5}, legendChan{6})
    title(["Freq vs. Power (db)", legendChan{I}])
    xlim([0 60])
    xlabel("Frequency")
    ylabel("Power")
    disp(['The highest beta comes from contact pair ', legendChan{I}])
end
```

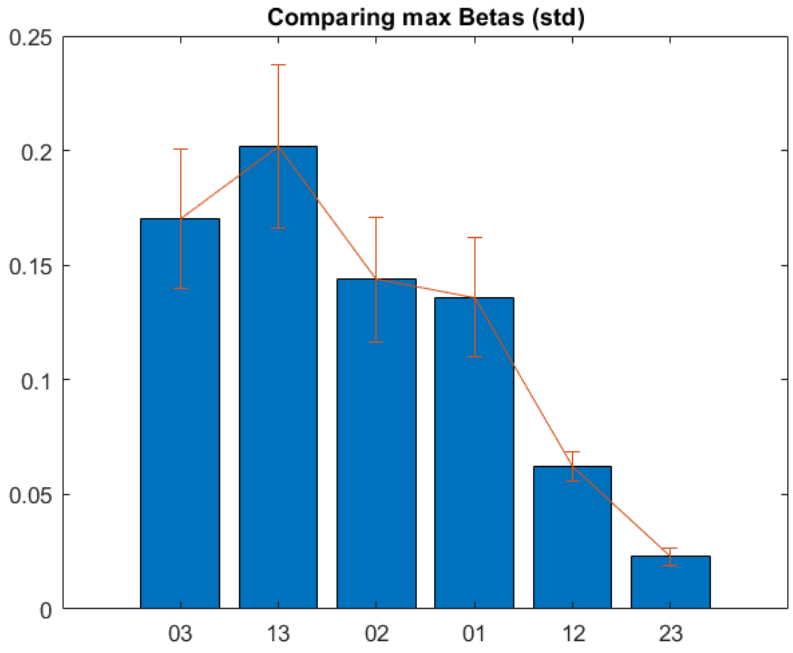
```
"The following information is for the"    "RIGHT"
```



```
The highest beta comes from contact pair 13
```

Part 3: Compare beta values with stds across contacts

```
if doubleBattery == false
    for i = 1:2
        disp(['Max Betas ', sides{i}])
        compareBetaBarChart(startindex, leng, js, channelSides{i});
        figure;
    end
else
    compareBetaBarChart(startindex, leng, js, channels);
end
```



Part 4: Show table of data across each run

```
if doubleBattery == false
    for i = 1:2
        disp(['Table of means and stds per channel ', sides{i}])
        maxMeanBetaAllRuns(startindex, js, leng, channelSides{i});
        figure;
    end
else
    maxMeanBetaAllRuns(startindex, js, leng, channels);
    figure;
end
```

```
ans = 6×7 table
```

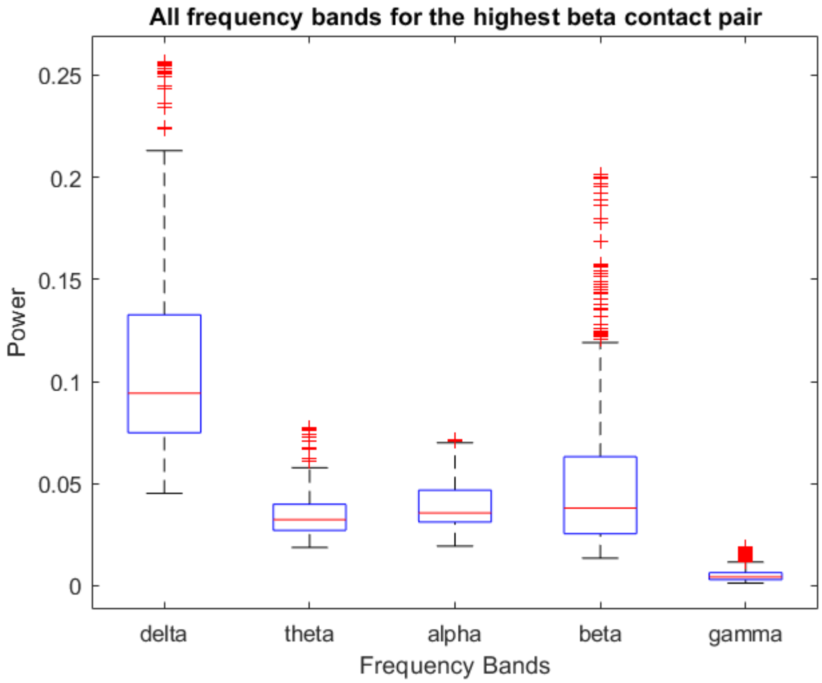
	Var1	Mean R1	Mean R2	Mean R3	STD R1	STD R2	...
1	'ZERO_AND_TWO_RIGHT'	0.0407	0.0507	0.0609	0.0250	0.0341	
2	'ZERO_AND_THREE_RIGHT'	0.0391	0.0569	0.0717	0.0208	0.0388	
3	'ONE_AND_THREE_RIGHT'	0.0378	0.0593	0.0782	0.0259	0.0454	
4	'ONE_AND_TWO_RIGHT'	0.0286	0.0420	0.0468	0.0209	0.0349	
5	'ZERO_AND_ONE_RIGHT'	0.0120	0.0132	0.0176	0.0082	0.0083	

	Var1	Mean R1	Mean R2	Mean R3	STD R1	STD R2	…
6	'TWO_AND_THREE_RIGHT'	0.0108	0.0103	0.0141	0.0051	0.0048	

note: since the first Brainsense run on contact pair 13 does not produce the maximum beta, it is not listed as the pair with the highest beta in this table. However, both runs 2 and 3 produce the highest beta out of all the contact pairs.

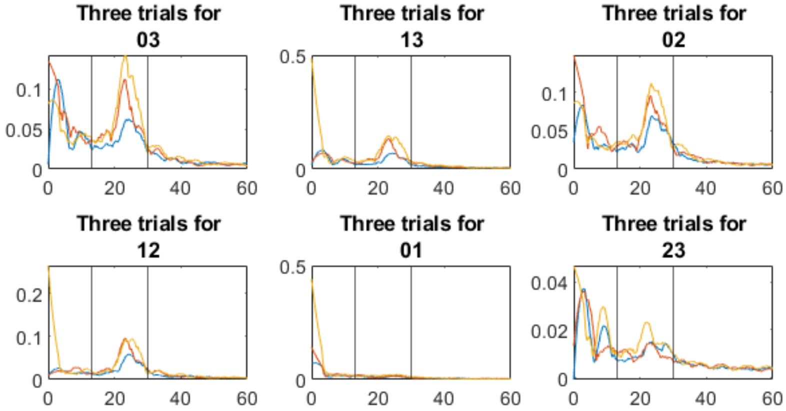
Part 5: Show all frequency data for contact pair that provides highest beta

```
figure;
if doubleBattery == false
    for i = 1:2
        disp(['All frequency data for ', legendChan{I}, sides{i}])
        allFreqBarChart(startindex, leng, js, highestBetas{i});
        figure;
    end
else
    allFreqBarChart(startindex, leng, js, highestBeta);
    figure;
end
```



Part 6: Show variability between trials for each pair

```
%graphEachTrials(startindex, js, leng, channels);
figure;
if doubleBattery == false
    for i = 1:2
        disp(['Trial variability for the ', sides{i}])
        graphEachTrials(startindex, js, leng, channelSides{i});
        figure;
    end
else
   graphEachTrials(startindex, js, leng, channels);
   figure;
end
```



Three trials for 03

Three trials for 13

Three trials for 02

Three trials for 12

Three trials for 01

Three trials for 23