Behaviour: Scanning Sessions

I analyze here the behaviour of participants in the scanning sessions, across all 5 runs and for each run separately. The purpose of this analysis is to serve as a first-line sanity check and to decide on run or subject exclusion based on our pre-regitered criteria.

0. Load data

```
clear;
clc;

data_struct = loadData()
```

```
data_struct =
  Map with properties:

       Count: 54
     KeyType: char
   ValueType: any
```

```
subjects = {'01RoYi','02XiHo','03JaVe','04NiSi','05PeYa','06KuSh',...
    '07AnWo','08LiBa', '09KeVa', '10MaIv', '11YaSi', '12JaGu',...
    '13ChSc','14SaMc','15ChFi', '16JoDa', '17IvSi','18LuHe','19ElBo','20MiLa',...
    '21ShZh'};
toExclude = zeros(length(subjects),5);
```

1. Trial Misses

The cutoff criterion for trial misses is 20%. The reference line indicates the exclusion criterion.

```
totalMissesExclusions = [0,0];

for s = 1:length(subjects)

    DisMisses = [];
    DetMisses = [];
    subject = data_struct(subjects{s});
    figure;

    for run_num = 1:length(subject.DisRT)/40

        DisNaNCount = sum(isnan(subject.DisRT((run_num-1)*40+1:run_num*40)));
        DetNaNCount = sum(isnan(subject.DetRT((run_num-1)*40+1:run_num*40)));

        DisMisses = [DisMisses DisNaNCount];
        DetMisses = [DetMisses DetNaNCount];

    end
```

```
    if any(DisMisses>8)

        if mean(DisMisses)>8
            disp(sprintf('Participant %s is excluded for missing too many discrimination trial
            disp(repmat('=',1,60))
            toExclude(s,:)=1;
            totalMissesExclusions(1) = totalMissesExclusions(1)+1;
        else
            disp(sprintf('For participant %s:',subjects{s}))
            disp(sprintf('Run %d was excluded for missing too many discrimination trials \n',
            disp(repmat('=',1,60))
            toExclude(s, find(DisMisses>8))=1;
            totalMissesExclusions(2) = totalMissesExclusions(2)+1;
        end
    end

   if any(DetMisses>8)

       if mean(DetMisses)>8 && any(toExclude(s,:)==0)
            disp(sprintf('Participant %s is excluded for missing too many detection trials',su
            disp(repmat('=',1,60))
            toExclude(s,:)=1;
            totalMissesExclusions(1) = totalMissesExclusions(1)+1;
        elseif toExclude(s,run_num)==0
            disp(sprintf('For participant %s:',subjects{s}))
            disp(sprintf('Run %d was excluded for missing too many detection trials \n',find(D
            disp(repmat('=',1,60))
            toExclude(s,find(DisMisses>8))=1;
            totalMissesExclusions(2) = totalMissesExclusions(2)+1;
        end
    end

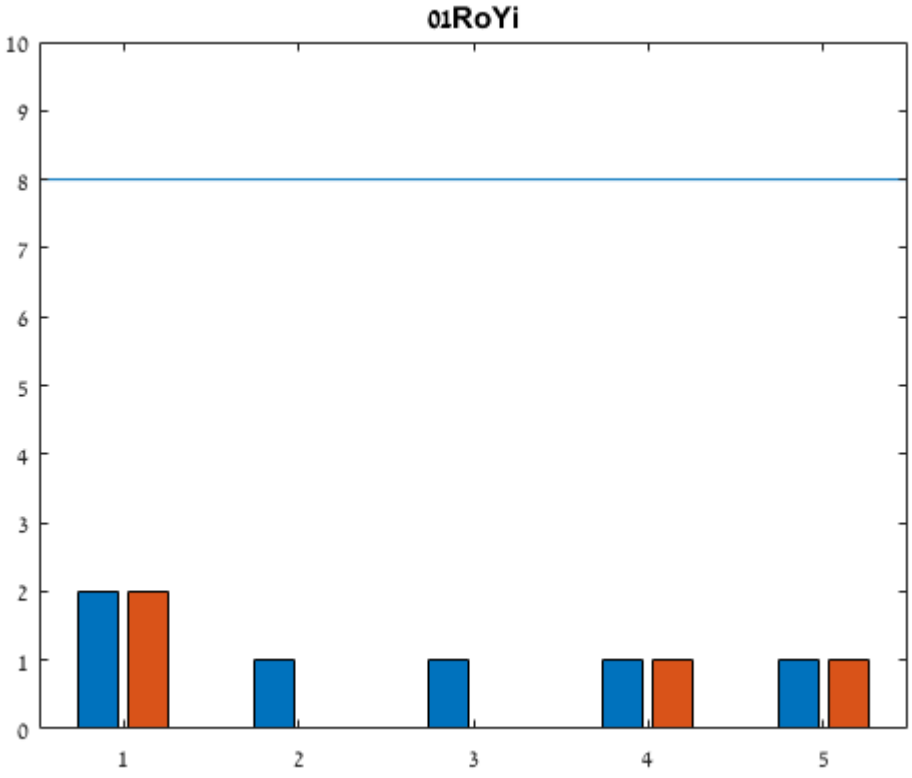
     bar([DisMisses' DetMisses']);

     refline(0,8);

     ylim([0,10]);

     title(subjects{s});
end
```

```
For participant 12JaGu:
Run 1 was excluded for missing too many discrimination trials
============================================================
```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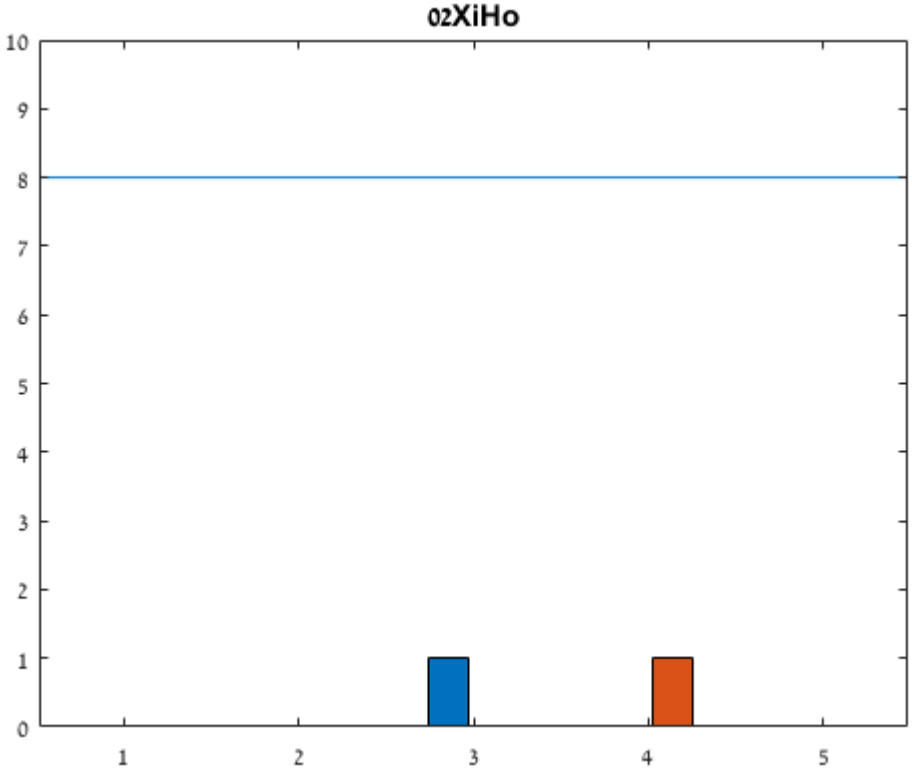
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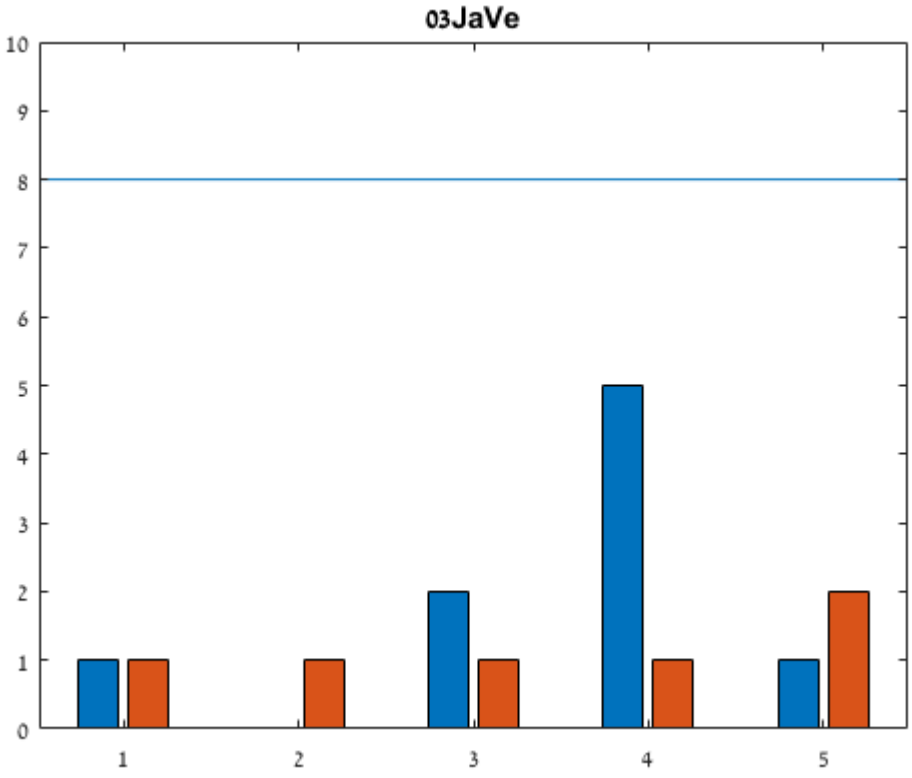
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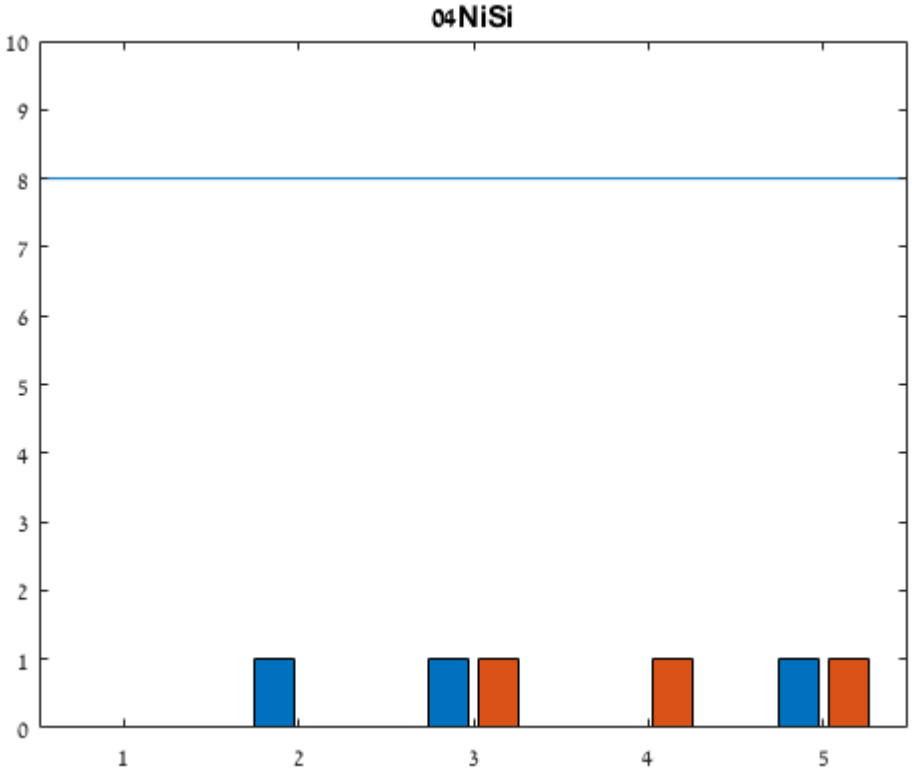
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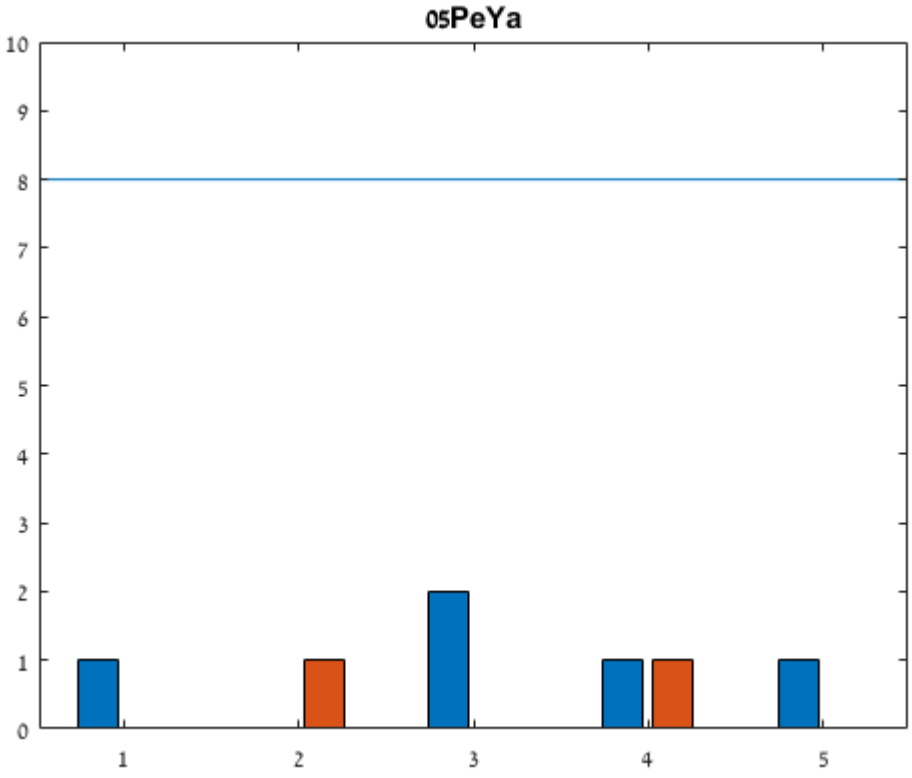
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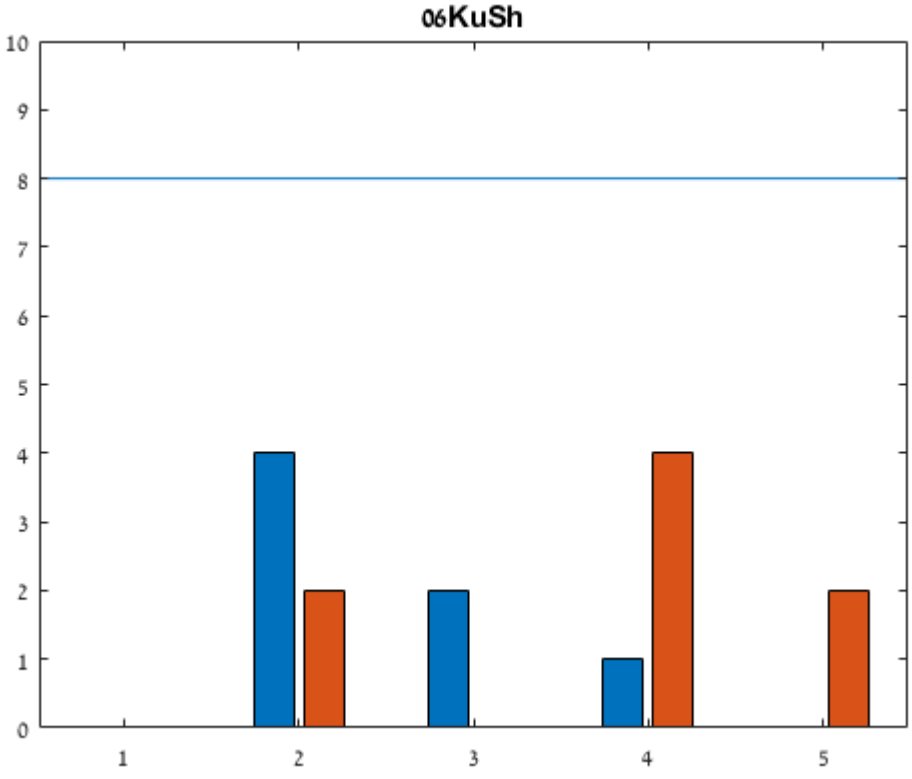
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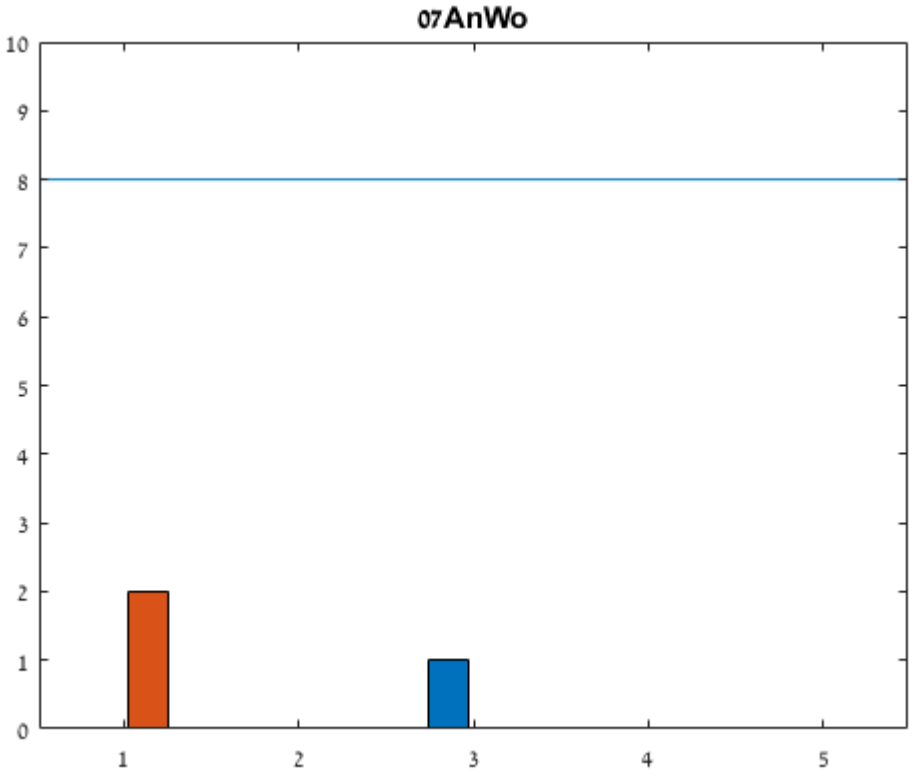
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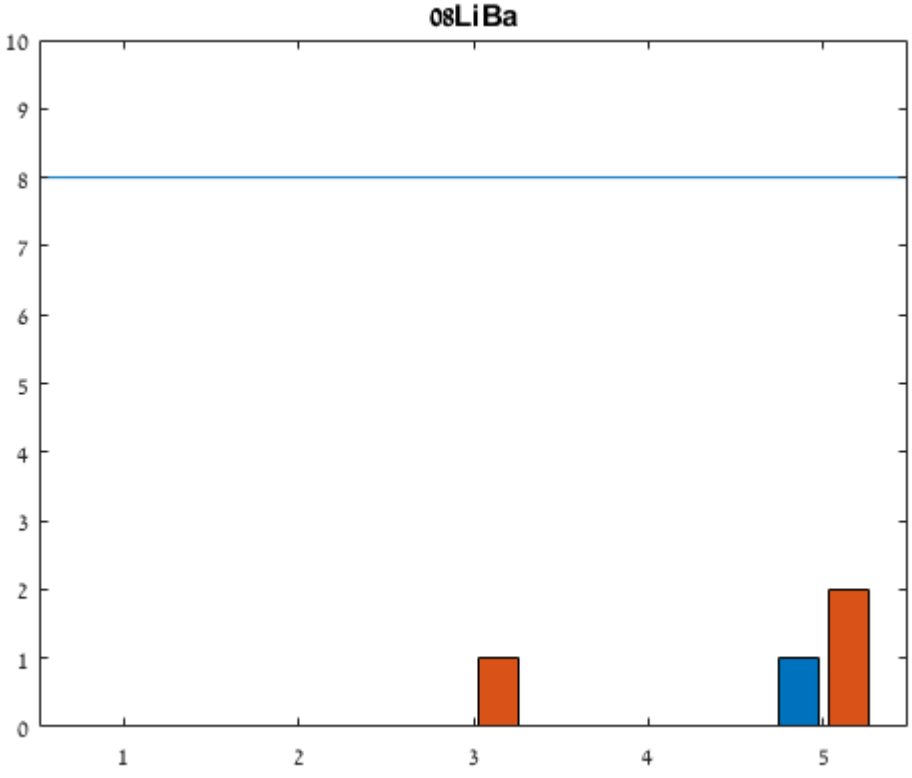
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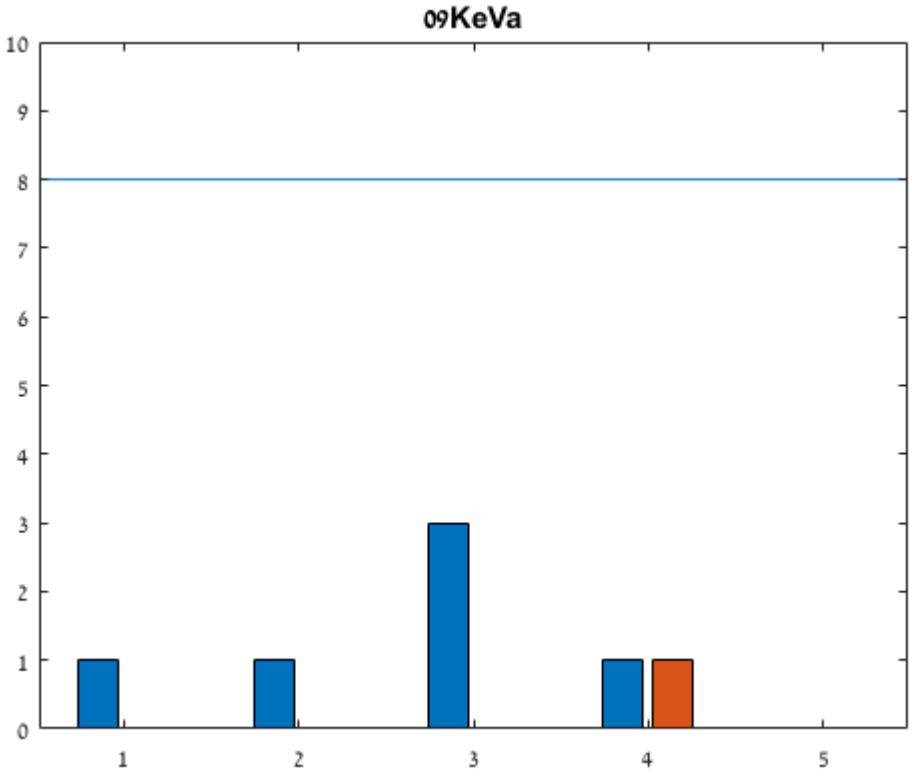
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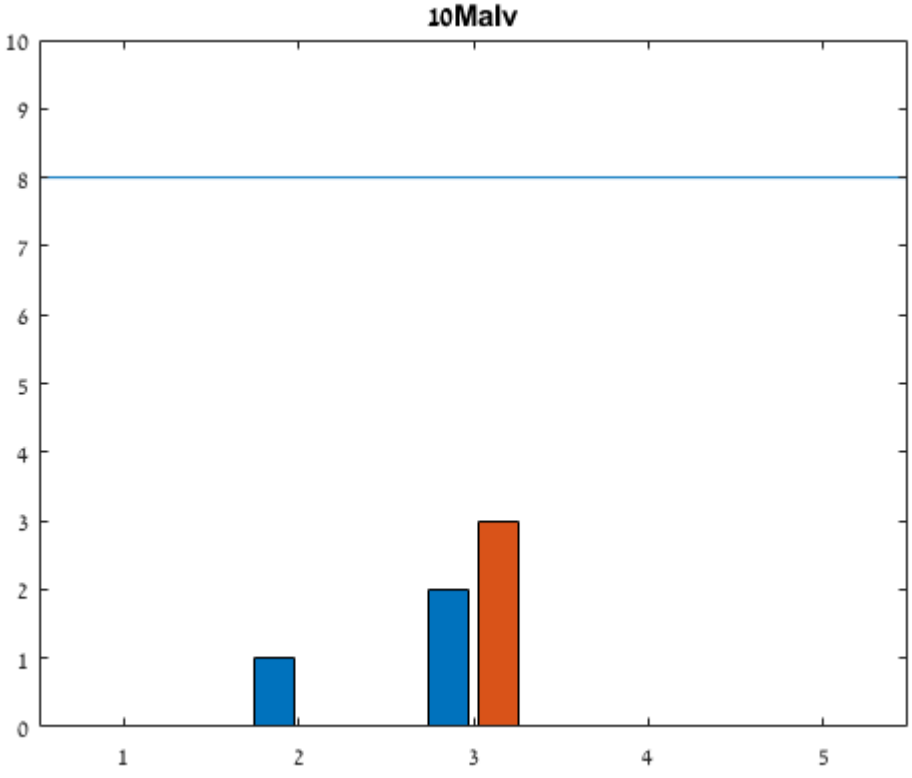
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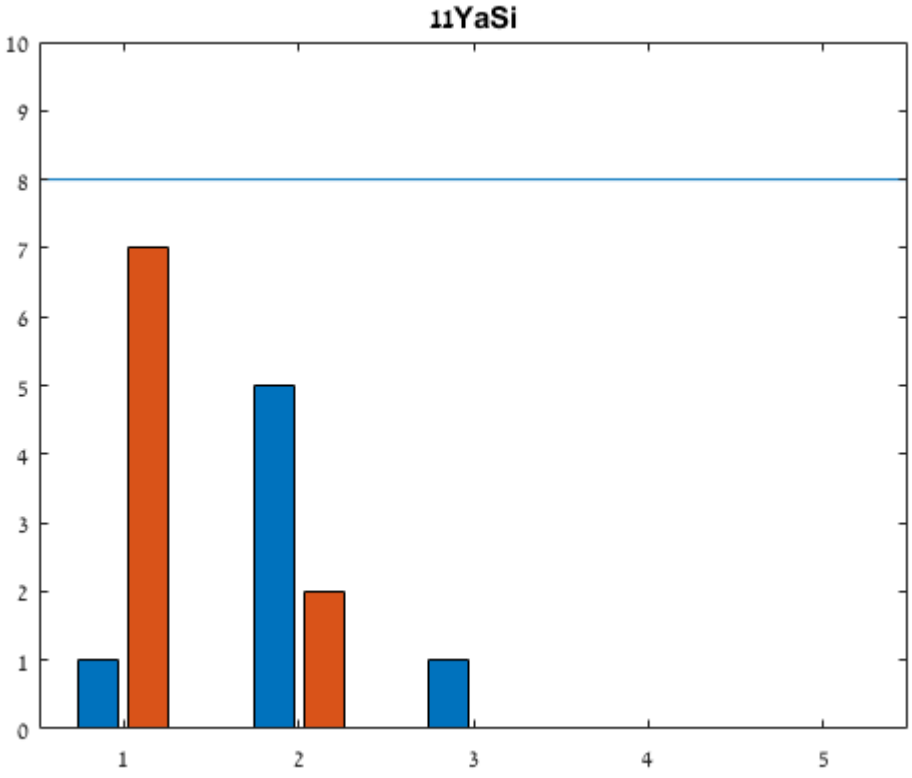
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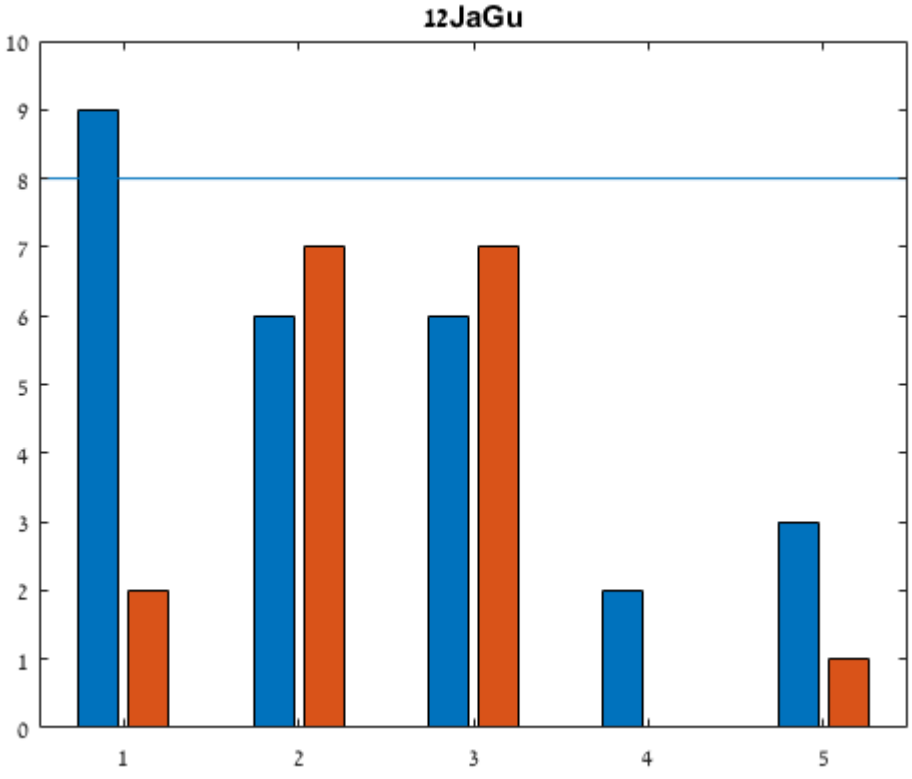
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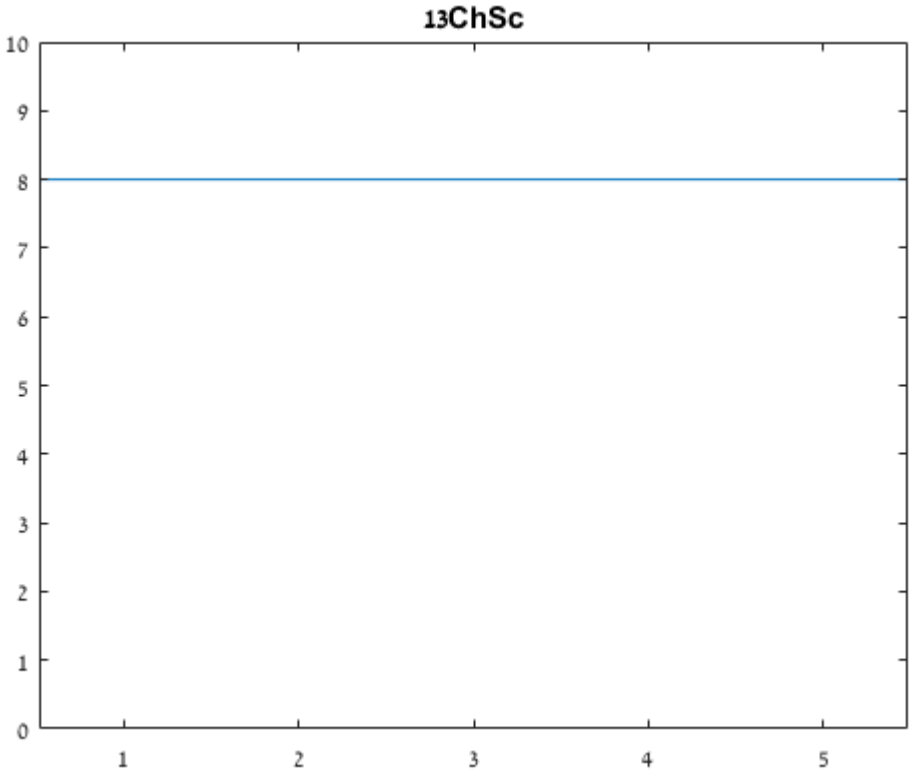
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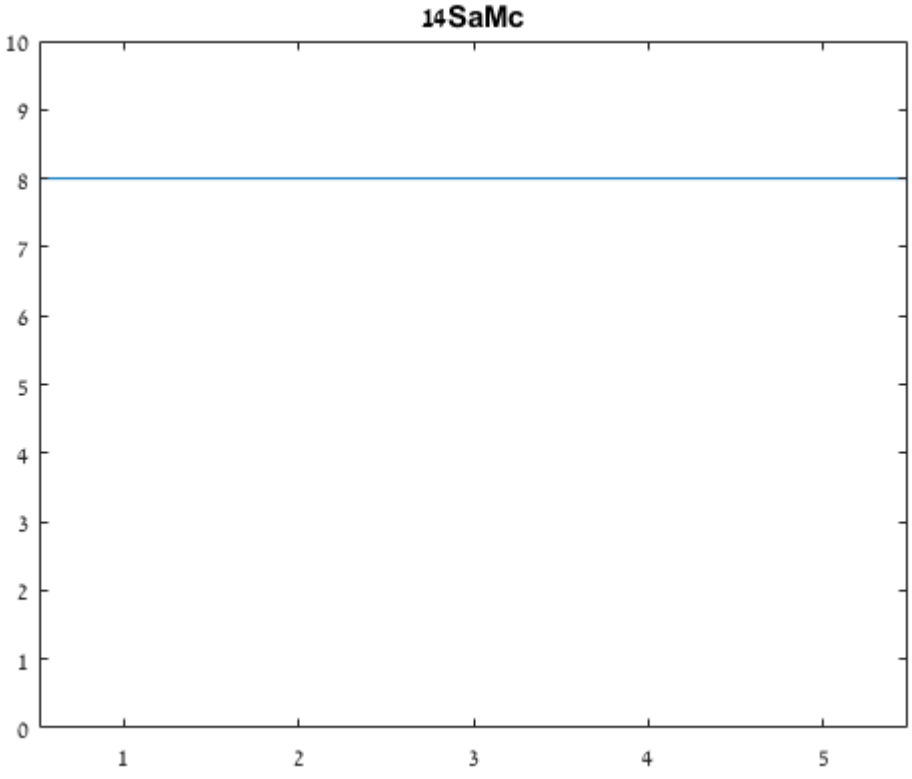
14SaMc
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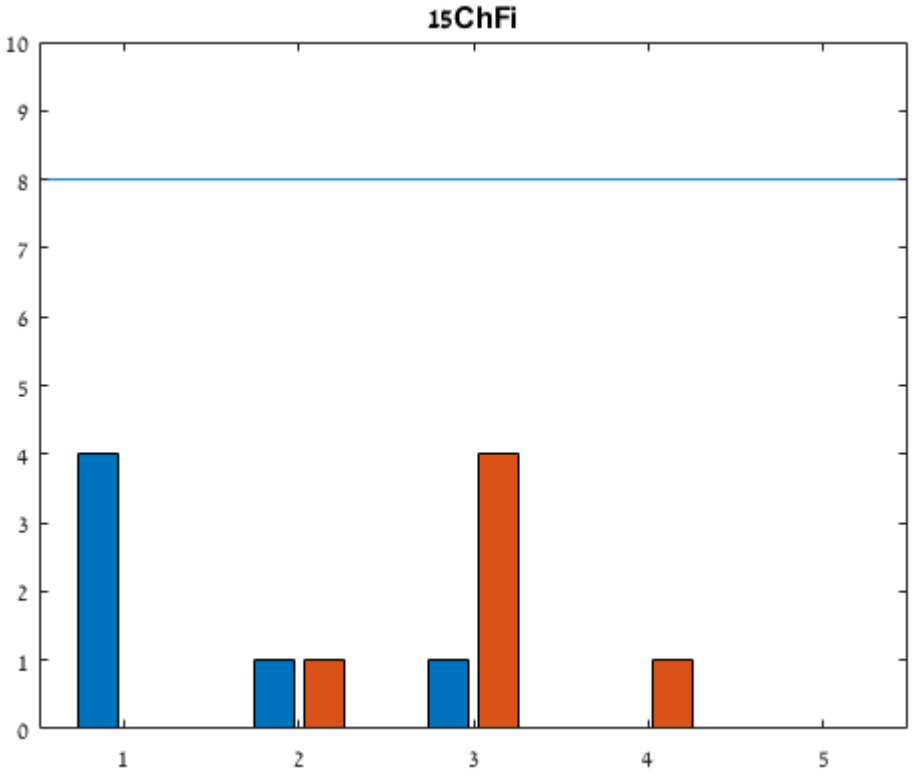
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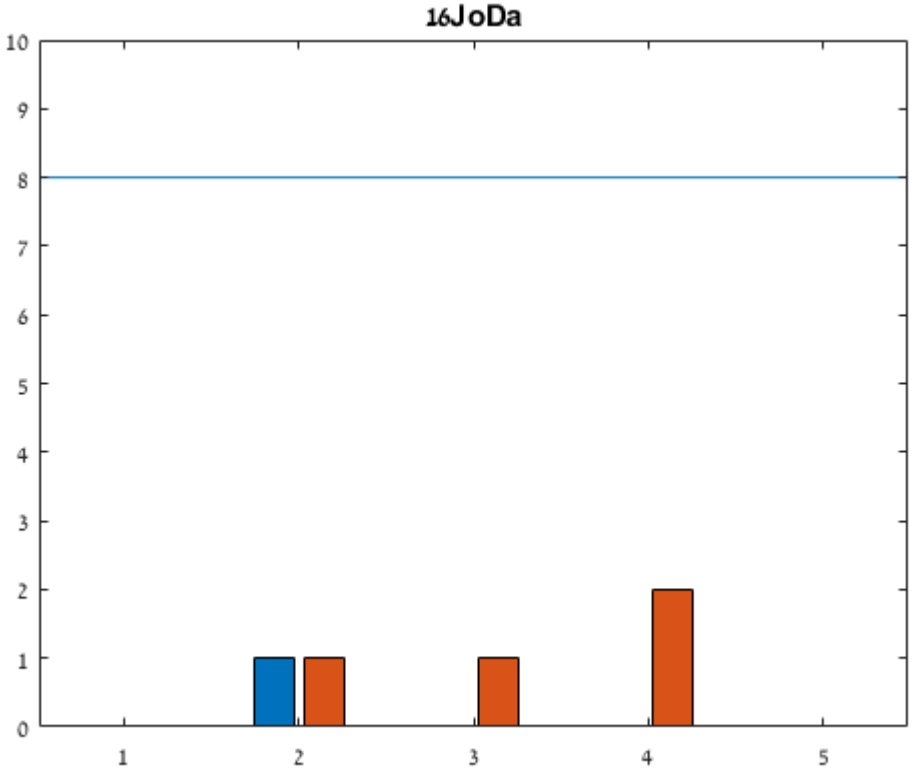
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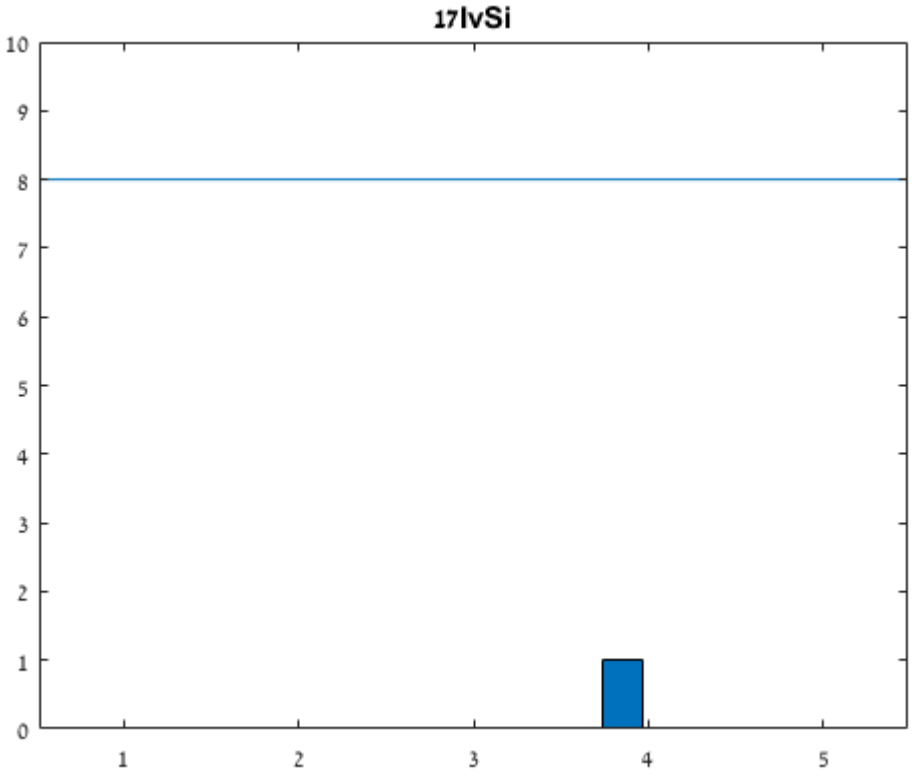
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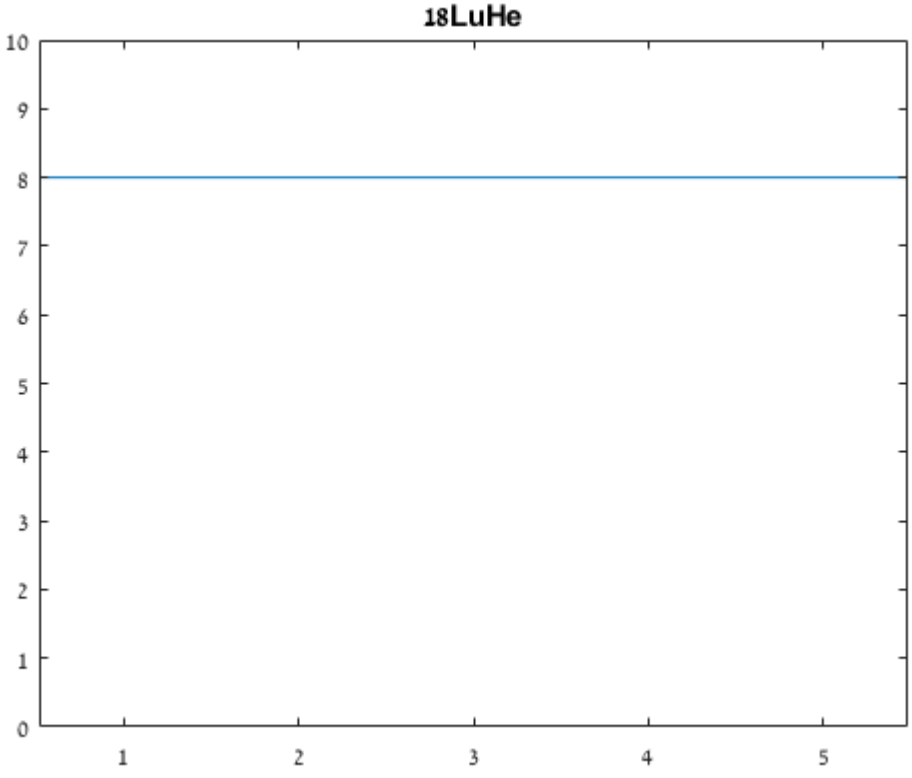
18LuHe
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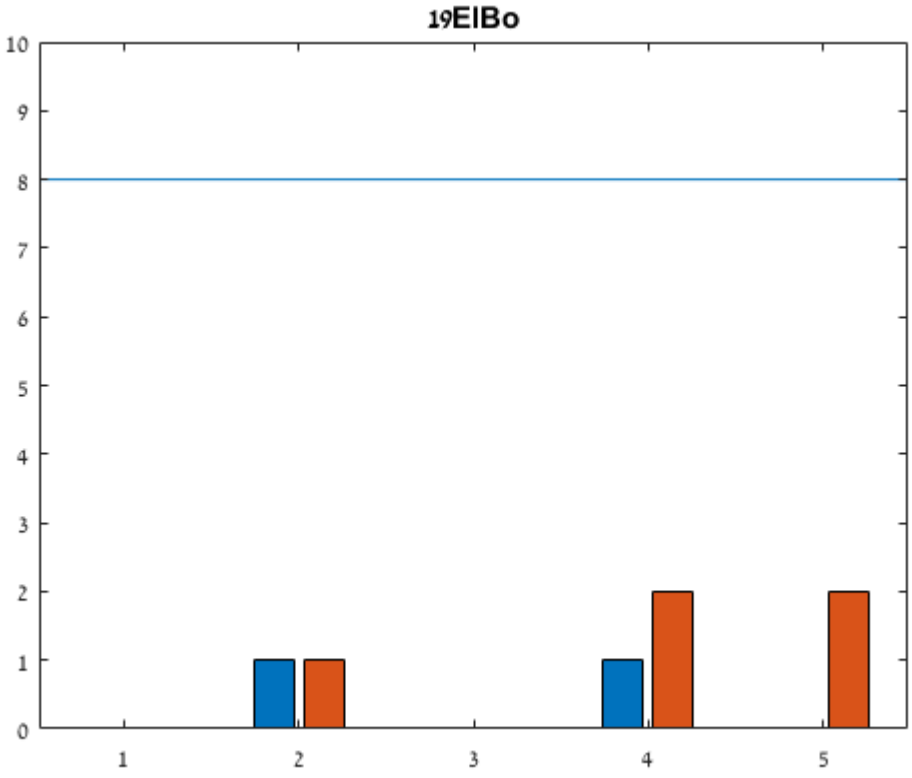
19ElBo
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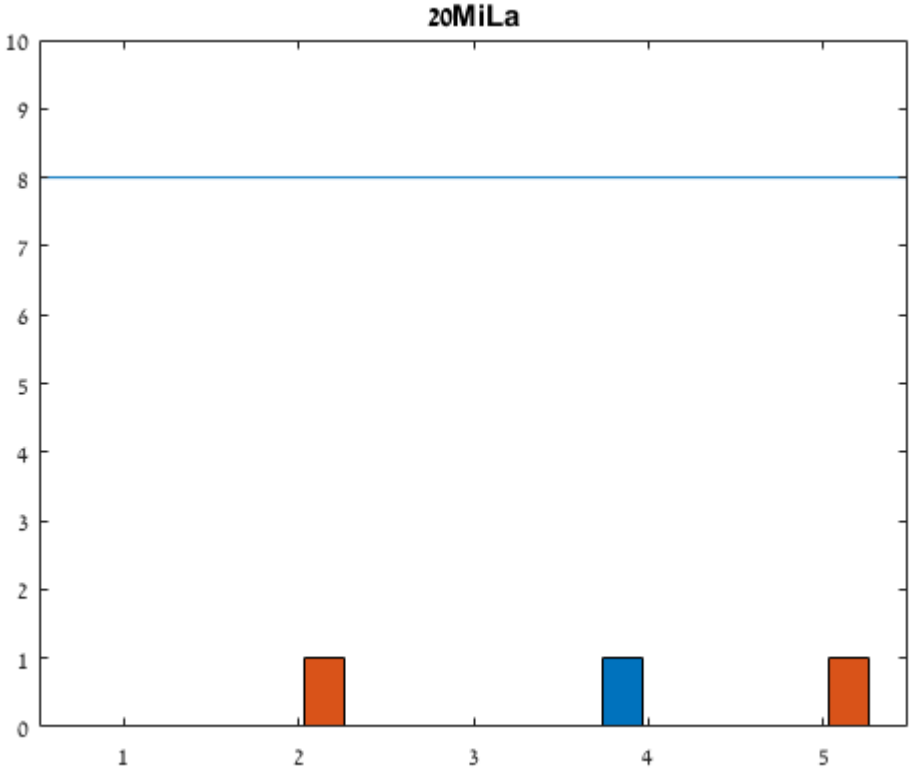
20MiLa
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1
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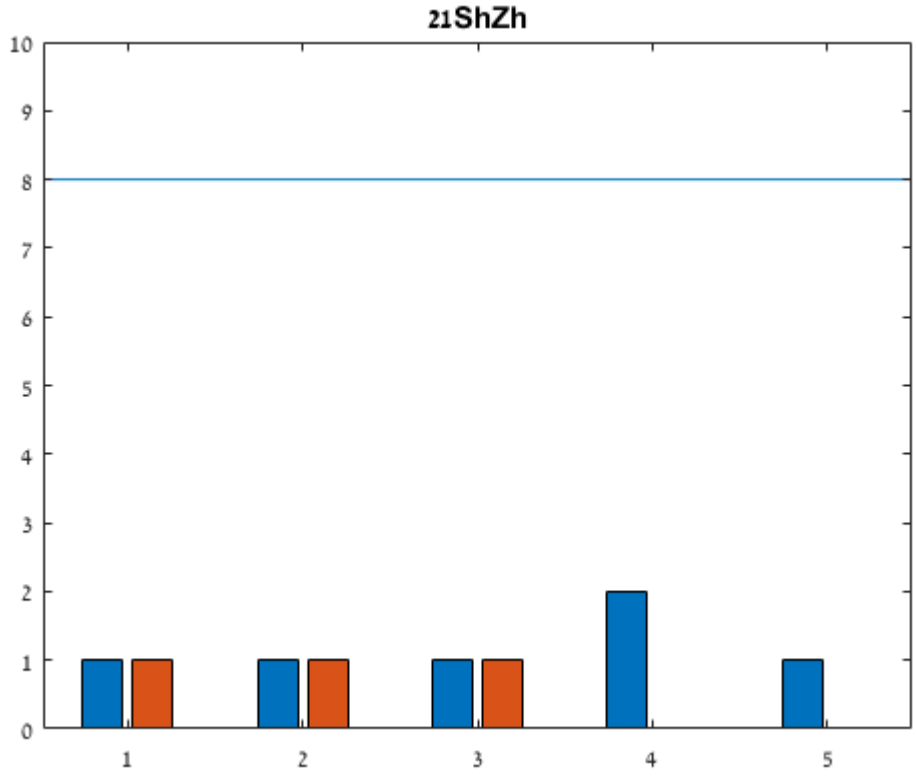


2. Accuracy

Runs in which accuracy in at least one of the tasks was below 60% are excluded from further analysis.

Subjects for which overall accuracy in at least one of the tasks was below 60% are excluded from further analysis.

```
totalAccuracyExclusions = [0,0];

for s = 1:length(subjects)

    DisAcc = [];
    DetAcc = [];
    subject = data_struct(subjects{s});
    figure;
    hold on;

    for run_num = 1:length(subject.DisRT)/40

        DisMeanCorrect = nanmean(subject.DisCorrect((run_num-1)*40+1:run_num*40));
        DetMeanCorrect = nanmean(subject.DetCorrect((run_num-1)*40+1:run_num*40));

        DisAcc = [DisAcc DisMeanCorrect];
        DetAcc = [DetAcc DetMeanCorrect];

    end
```

```
    bar([DisAcc' DetAcc']);

    %plot mean accuracy as a point
    scatter(length(DisAcc)+2,mean(DisAcc), 'MarkerEdgeColor','black','MarkerFaceColor','blue'
    scatter(length(DetAcc)+2,mean(DetAcc), 'MarkerEdgeColor','black','MarkerFaceColor','yellow

    refline(0,0.6);

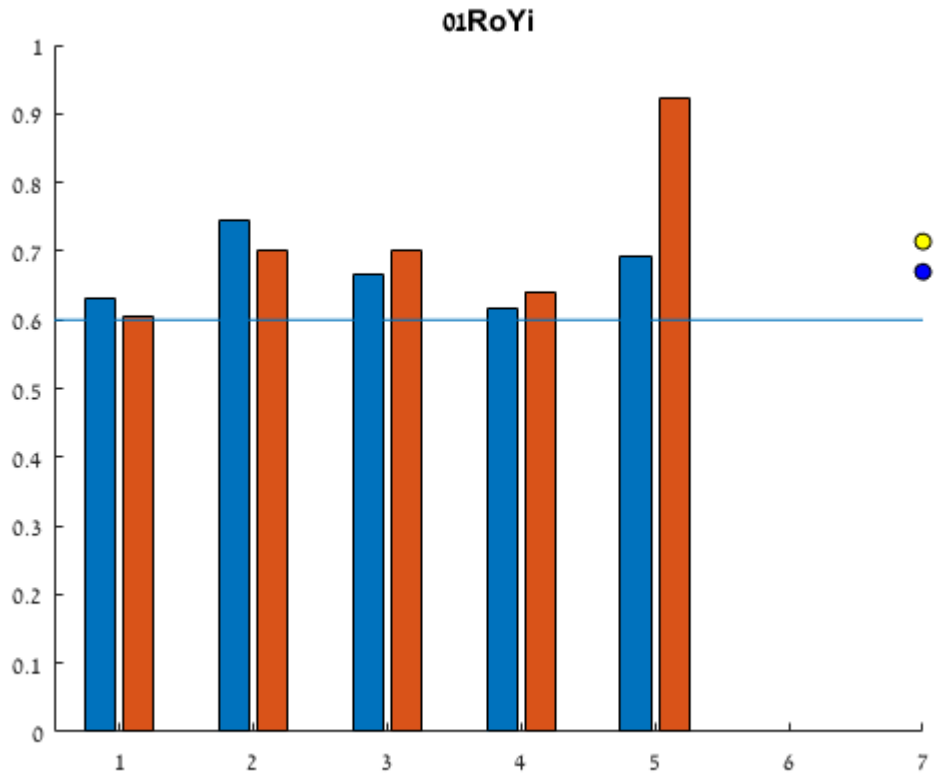
    if any(DisAcc<0.6)
        if mean(DisAcc)<0.6 && any(toExclude(s,:)== 0)
                disp(sprintf('Participant %s is excluded due to low accuracy in the discrimina
                disp(repmat('=',1,60))
                toExclude(s,:)=1;
                totalAccuracyExclusions(1) = totalAccuracyExclusions(1)+1;
        elseif toExclude(s,run_num)==1
                disp(sprintf('For participant %s:',subjects{s}))
                disp(sprintf('Run %d was excluded due to low accuracy in the discrimination ta
                disp(repmat('=',1,60))
                toExclude(s,find(DisAcc<0.6))=1;
                totalAccuracyExclusions(2) = totalAccuracyExclusions(2)+1;
        end
    end

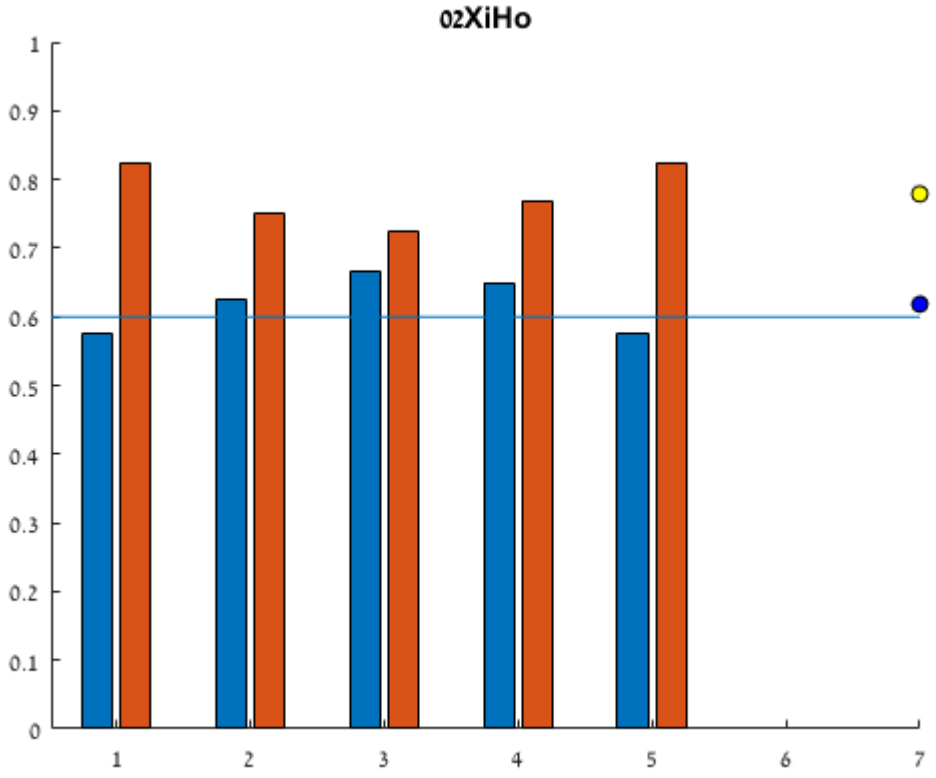
    if any(DetAcc<0.6)
        if mean(DetAcc)<0.6 && any(toExclude(s,:)== 0)
            disp(sprintf('Participant .%s is excluded due to low accuracy in the detection tas
            disp(repmat('=',1,60))
            toExclude(s,:)=1;
        elseif toExclude(s,run_num)==0
            disp(sprintf('For participant %s:',subjects{s}))
            disp(sprintf('Run %d was excluded due to low accuracy in the detection task \n',fi
            disp(repmat('=',1,60))
            toExclude(s,find(DetAcc<0.6))=1;
            totalAccuracyExclusions(2) = totalAccuracyExclusions(2)+1;
        end
    end

    ylim([0,1]);
    title(subjects{s});
end
```

```
For participant 03JaVe:
Run 2 was excluded due to low accuracy in the detection task
============================================================
For participant 12JaGu:
Run 5 was excluded due to low accuracy in the detection task
============================================================
For participant 14SaMc:
Run 2 was excluded due to low accuracy in the detection task
============================================================
For participant 15ChFi:
Run 3 was excluded due to low accuracy in the detection task
```

```
============================================================
For participant 19ElBo:
Run 3 was excluded due to low accuracy in the detection task
============================================================
Participant 21ShZh is excluded due to low accuracy in the discrimination task
============================================================
```




02XiHo
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0.9
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0.3
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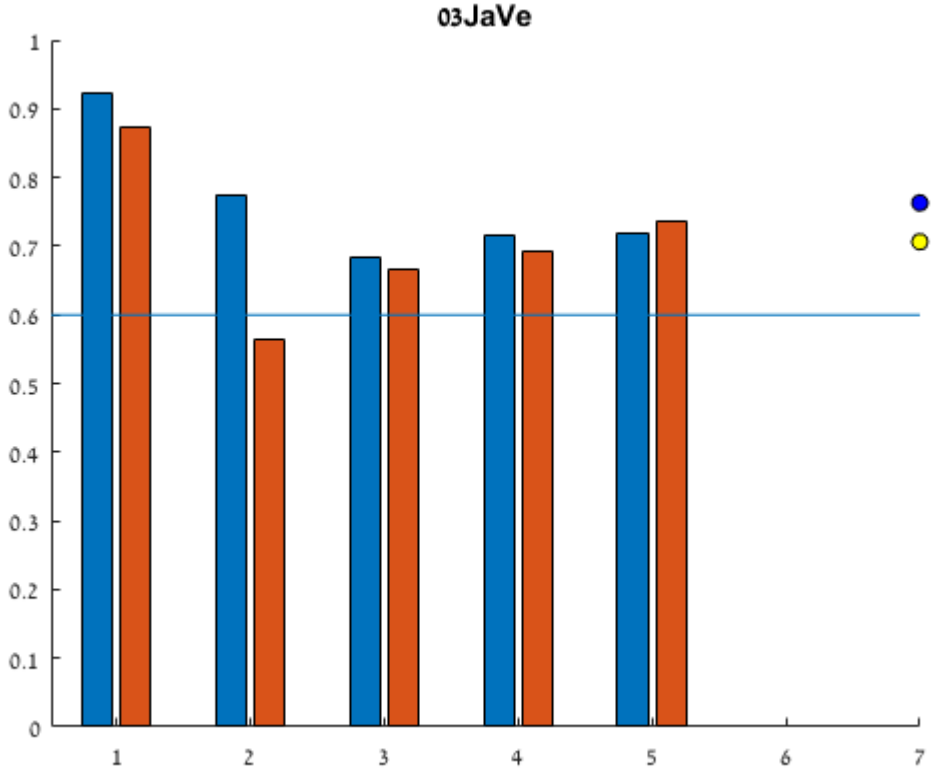
03JaVe
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0.9
0.8
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0.5
0.4
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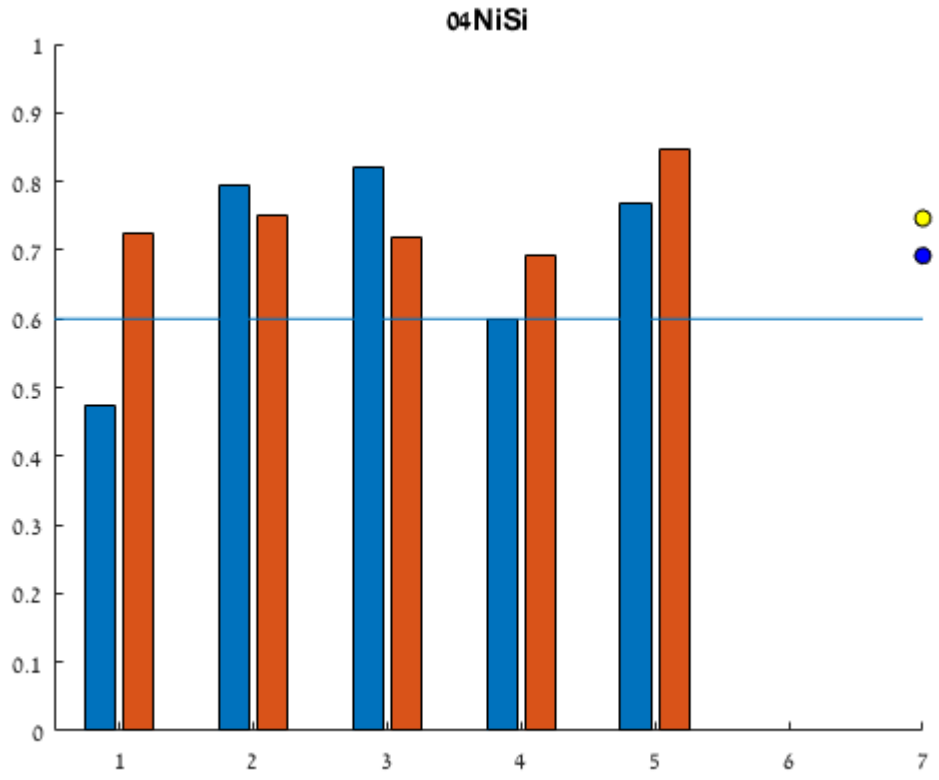
04NiSi
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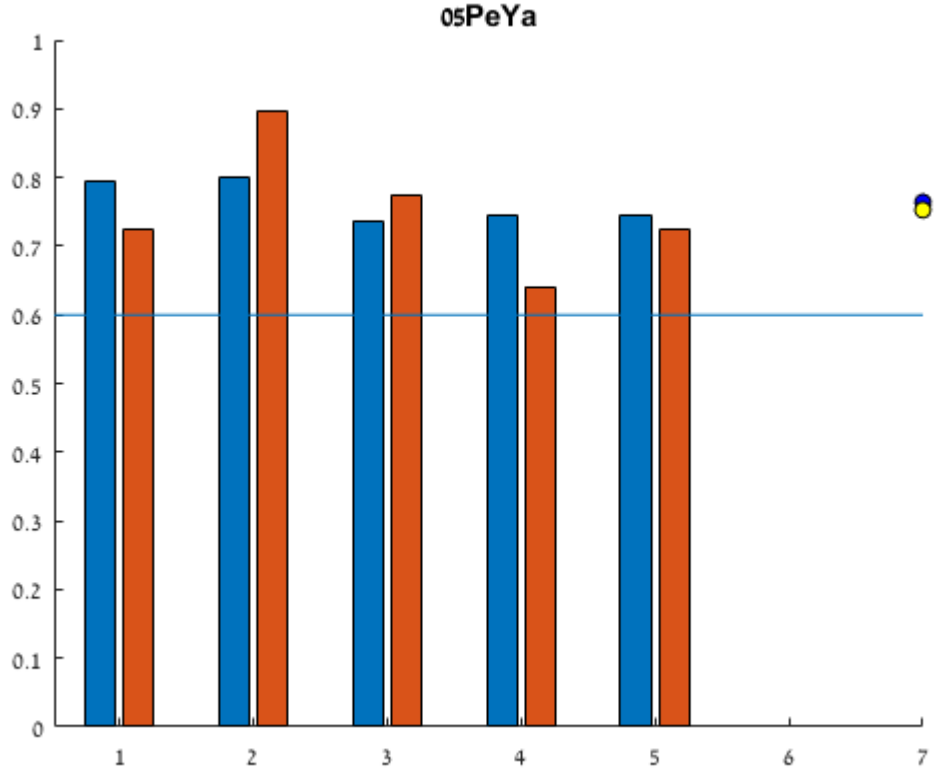
05PeYa
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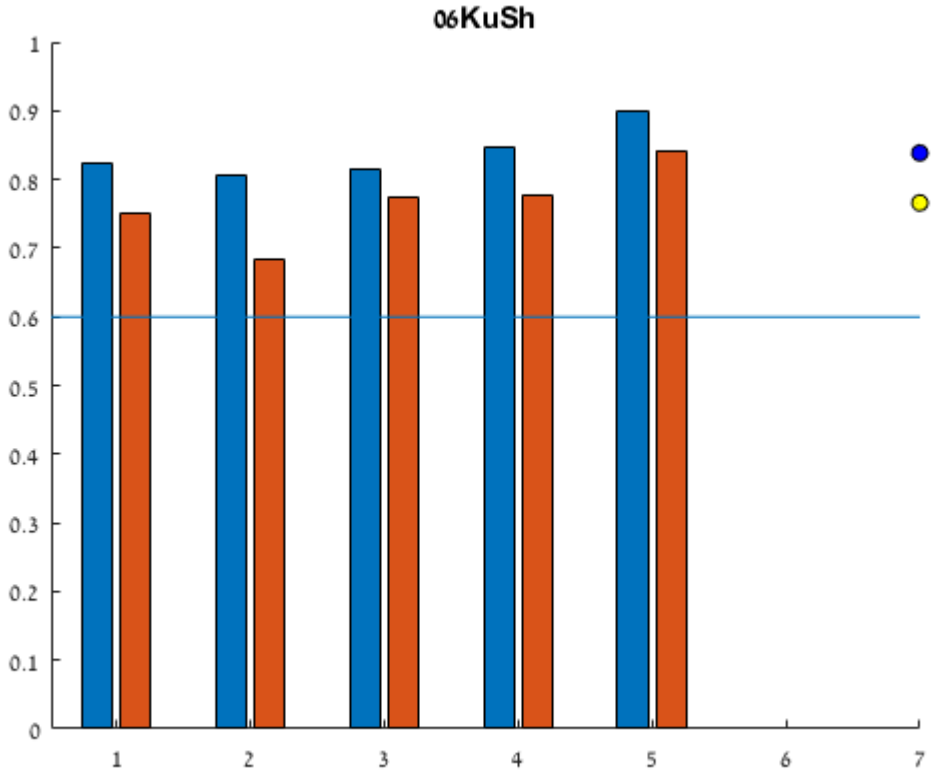
06KuSh
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0.9
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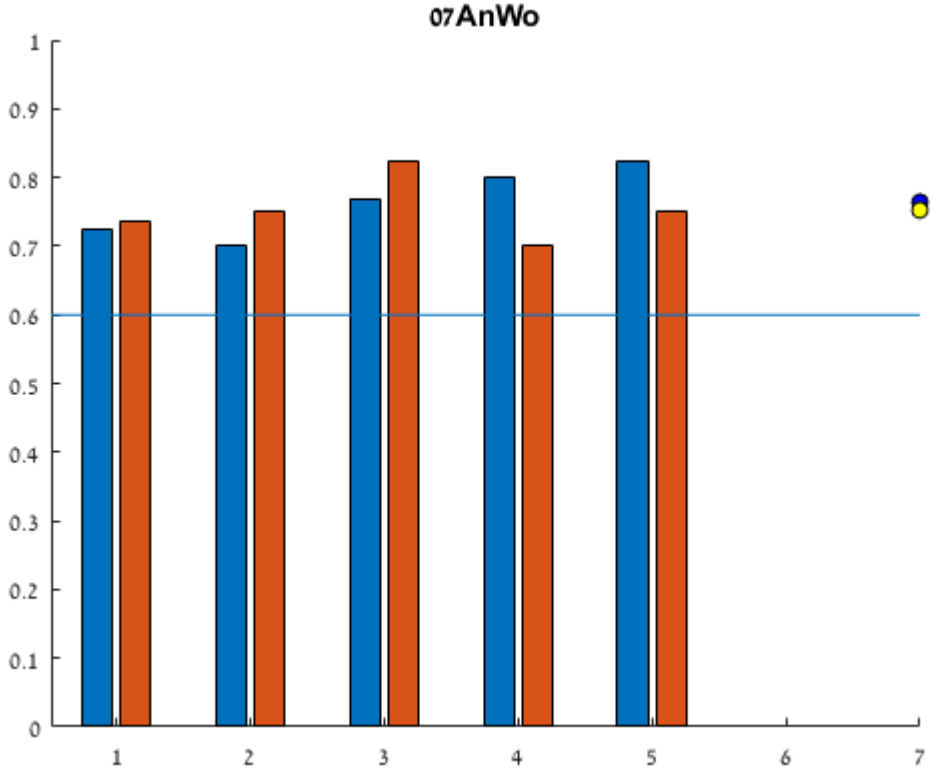
07AnWo
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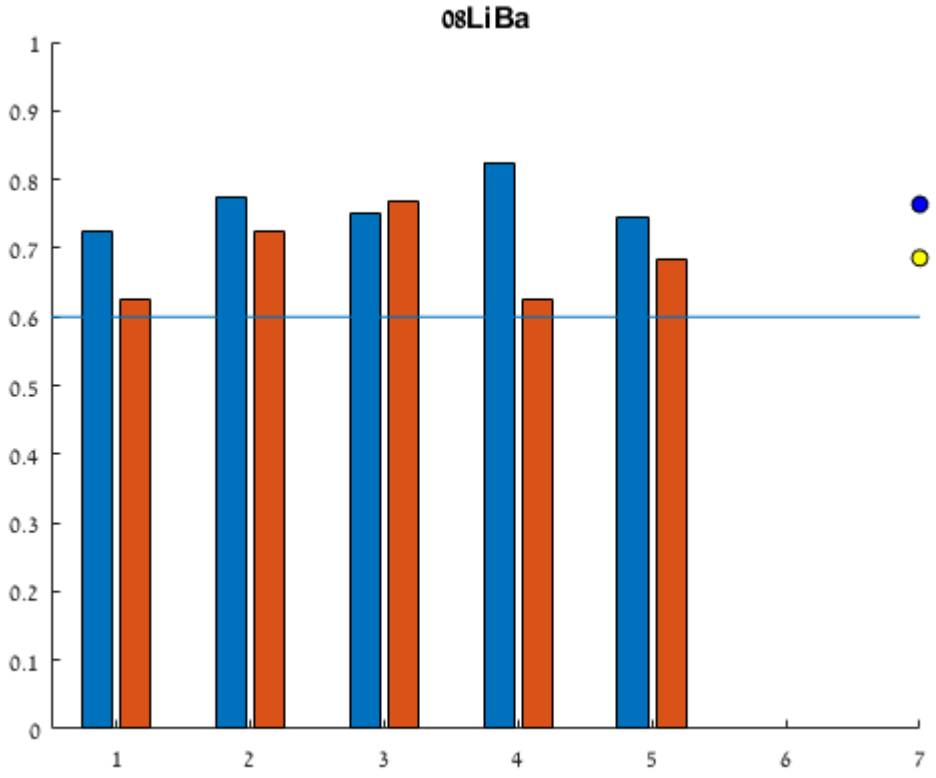
08LiBa
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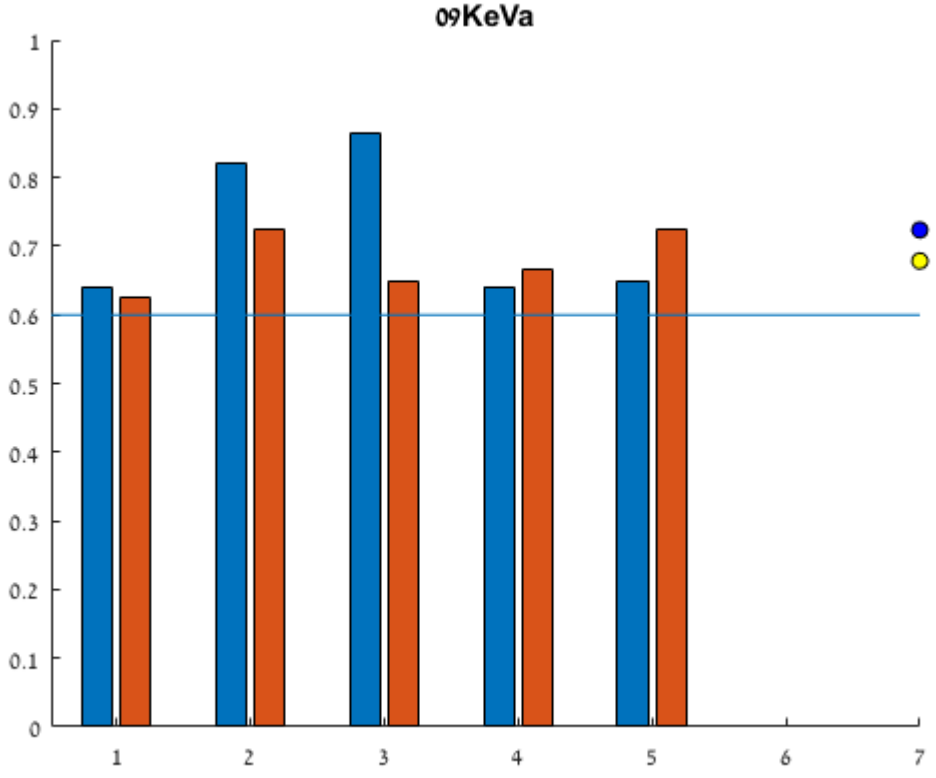
09KeVa
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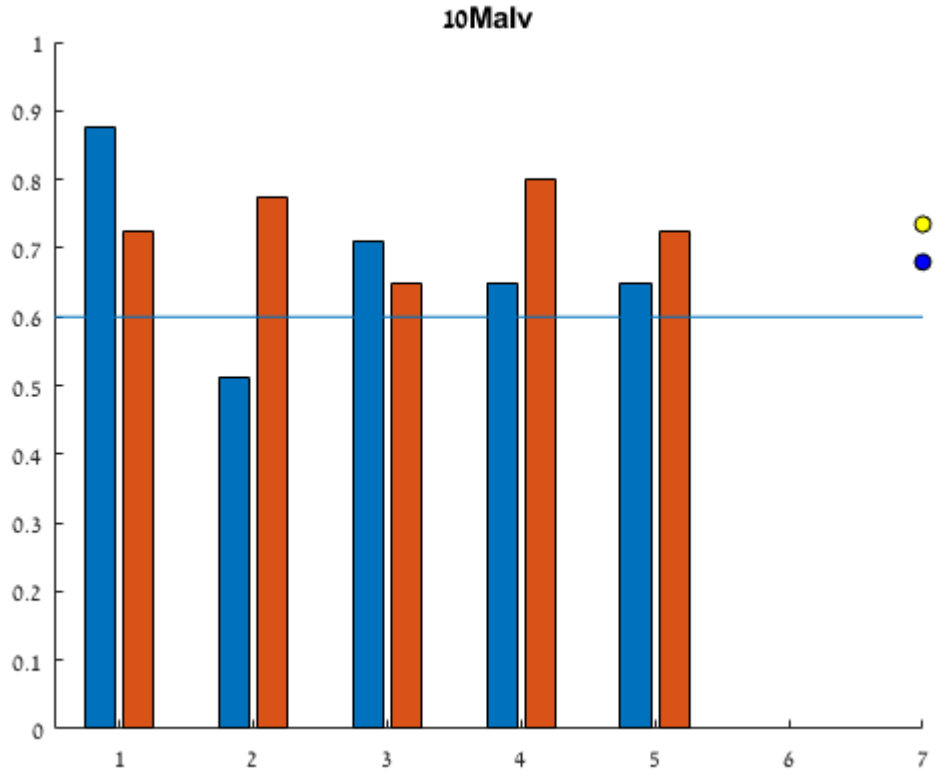
10Malv
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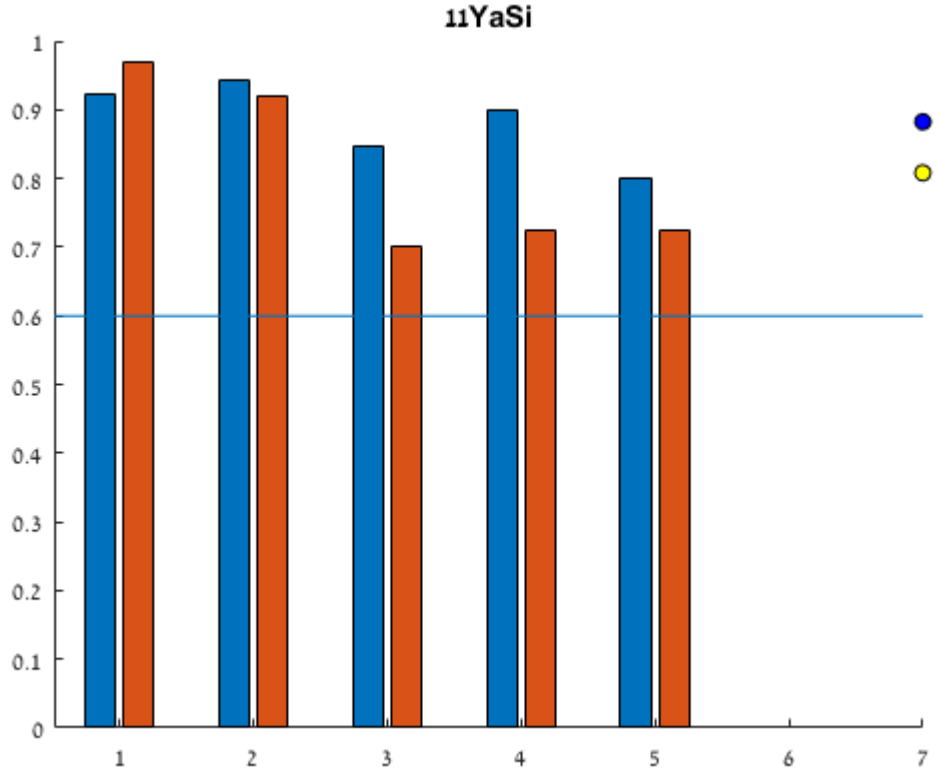
11YaSi
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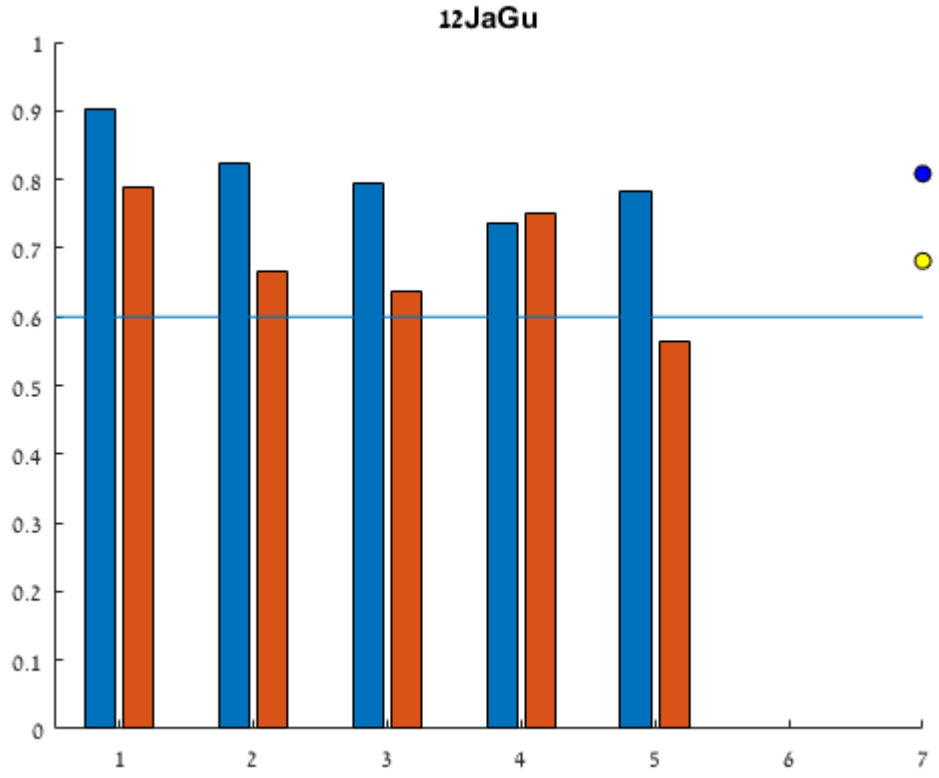
12JaGu
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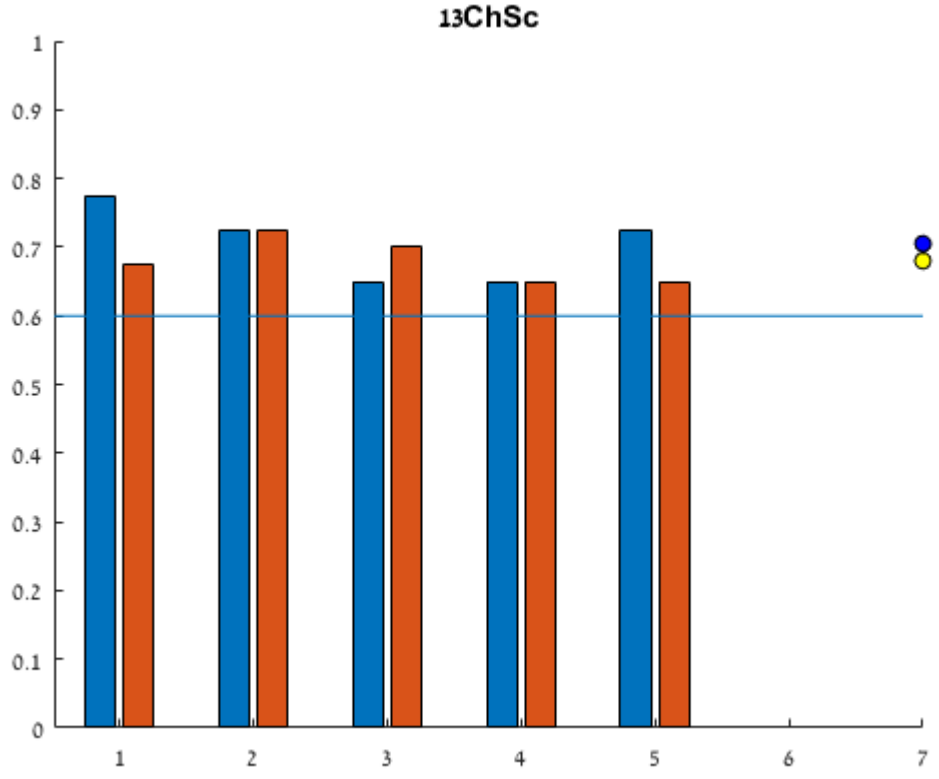
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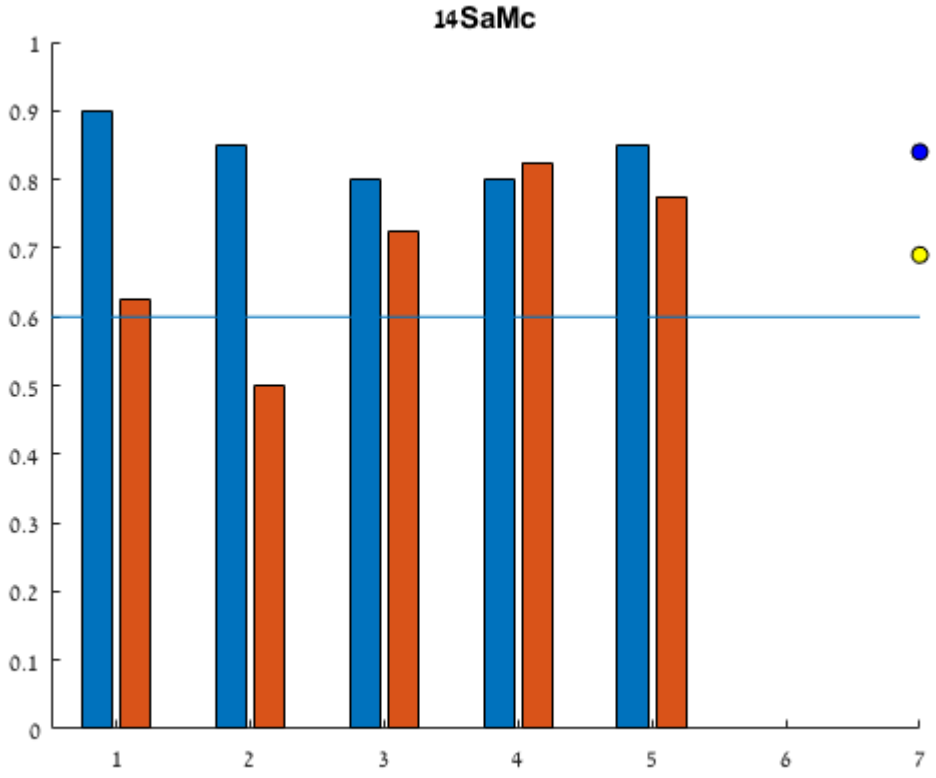
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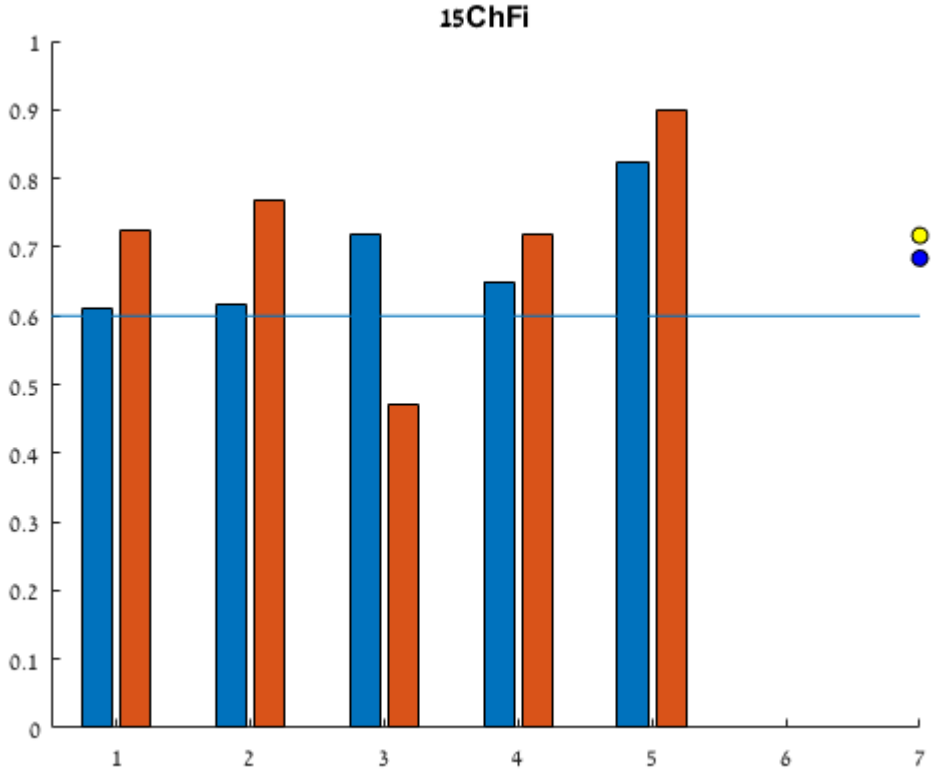
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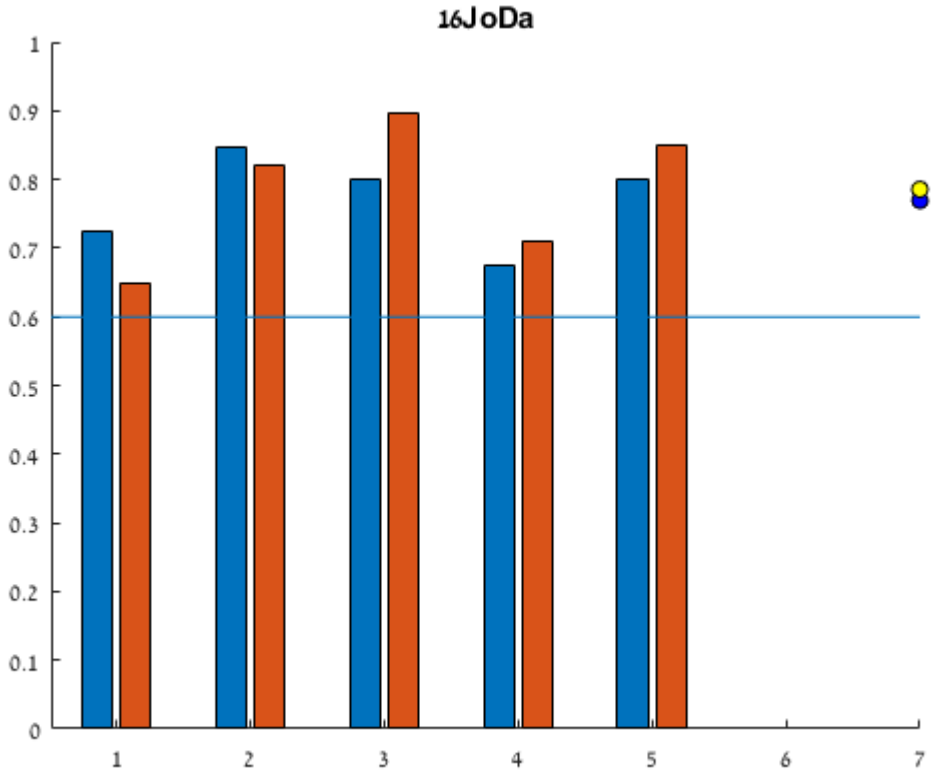
16JoDa
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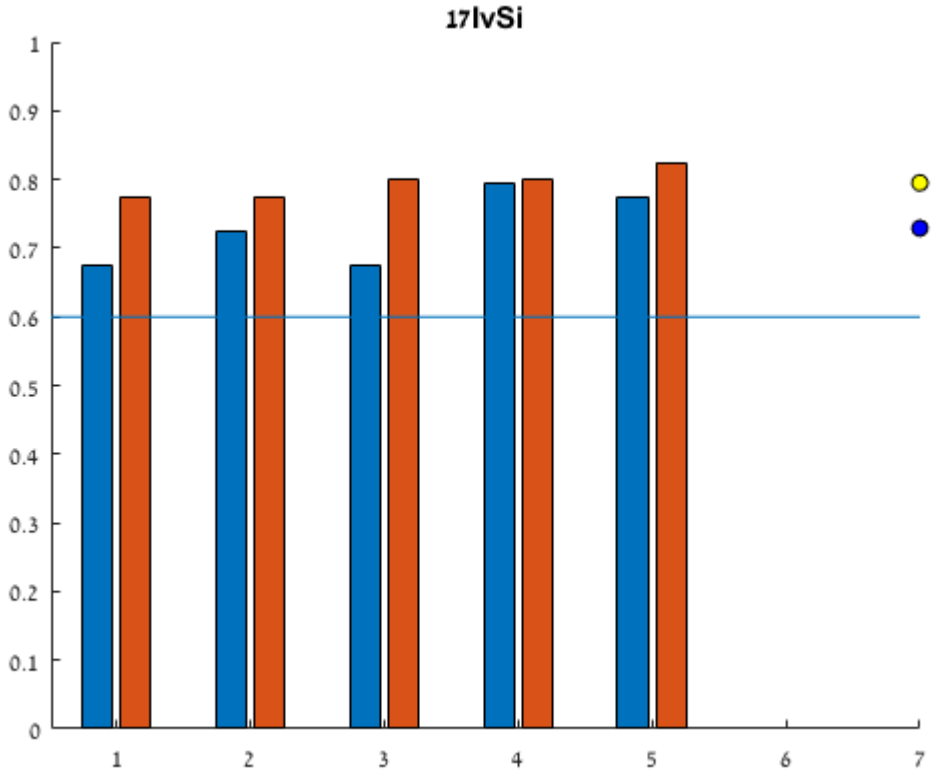
17IvSi
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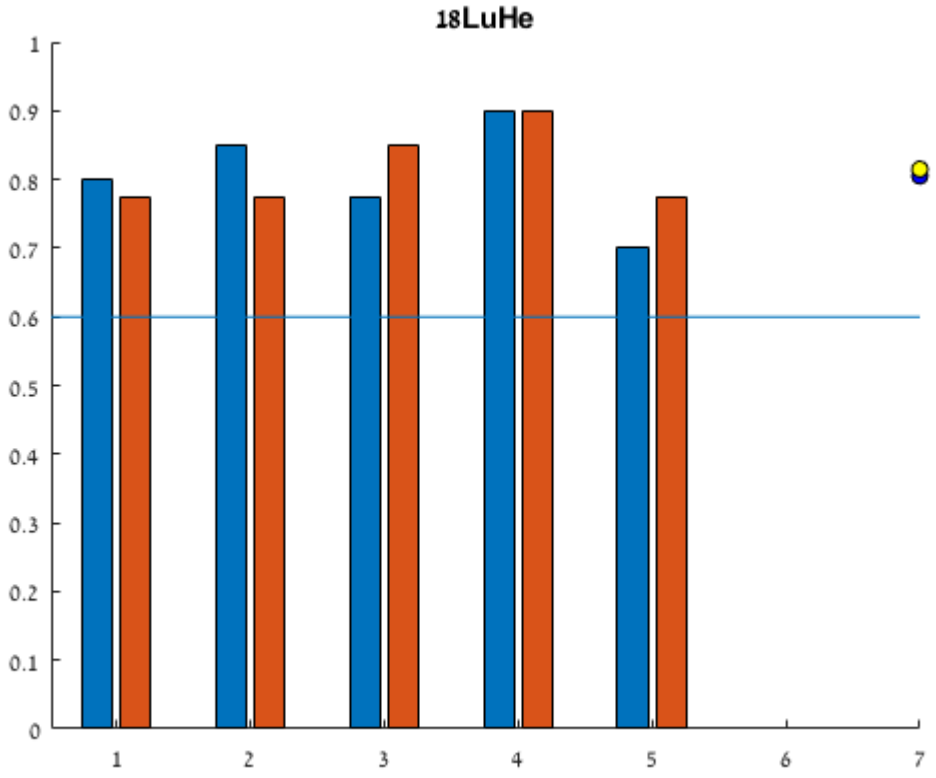
18LuHe
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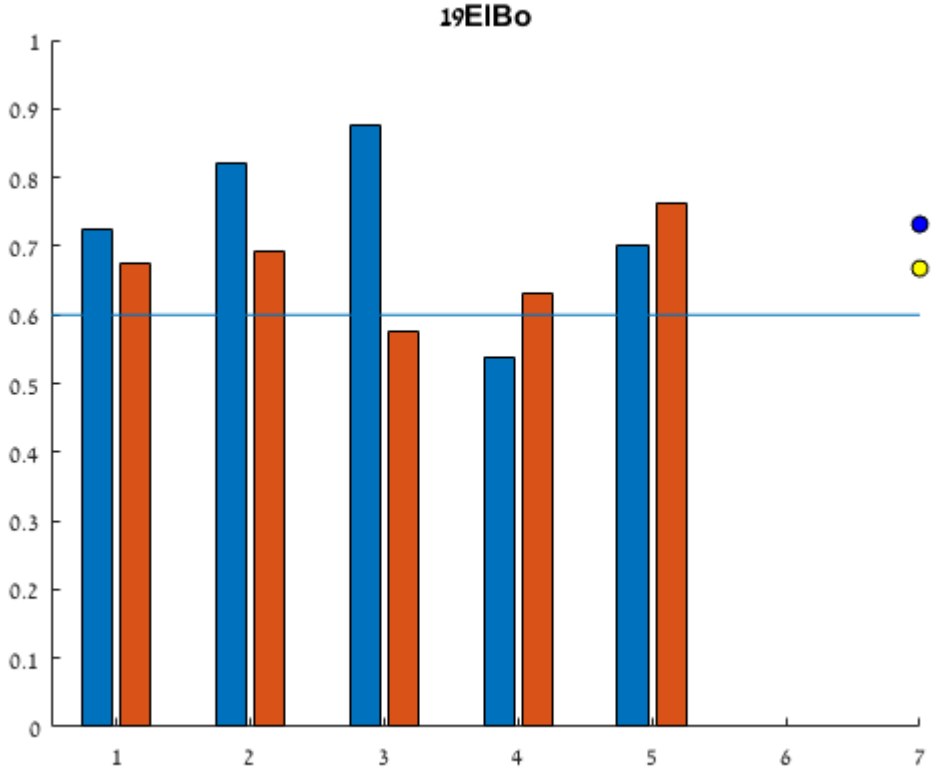
19ElBo
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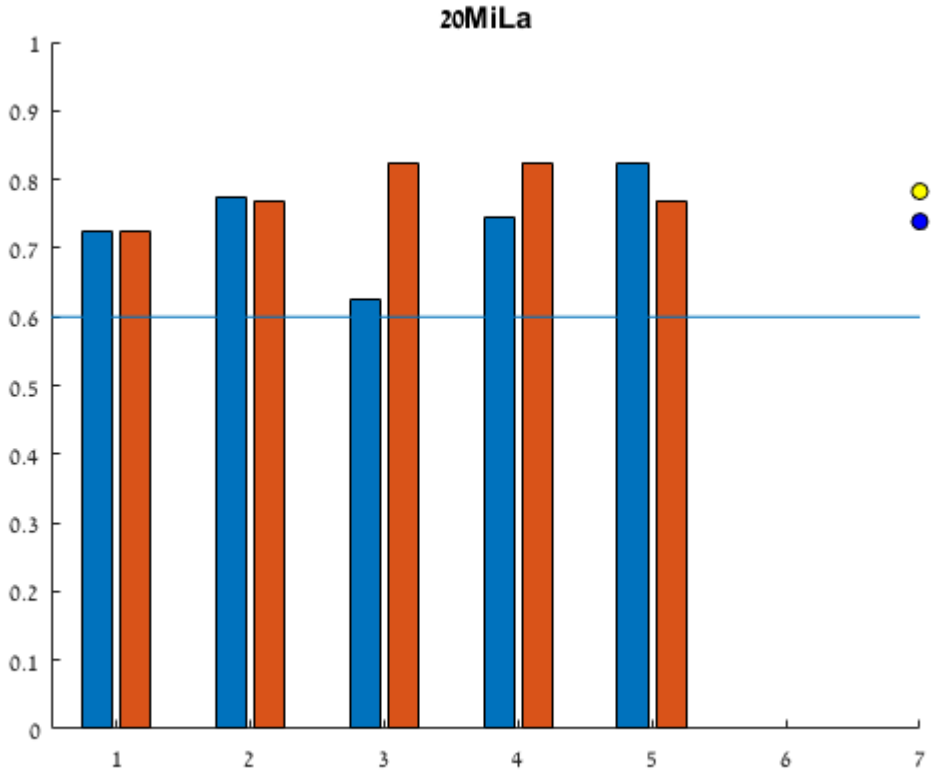
20MiLa
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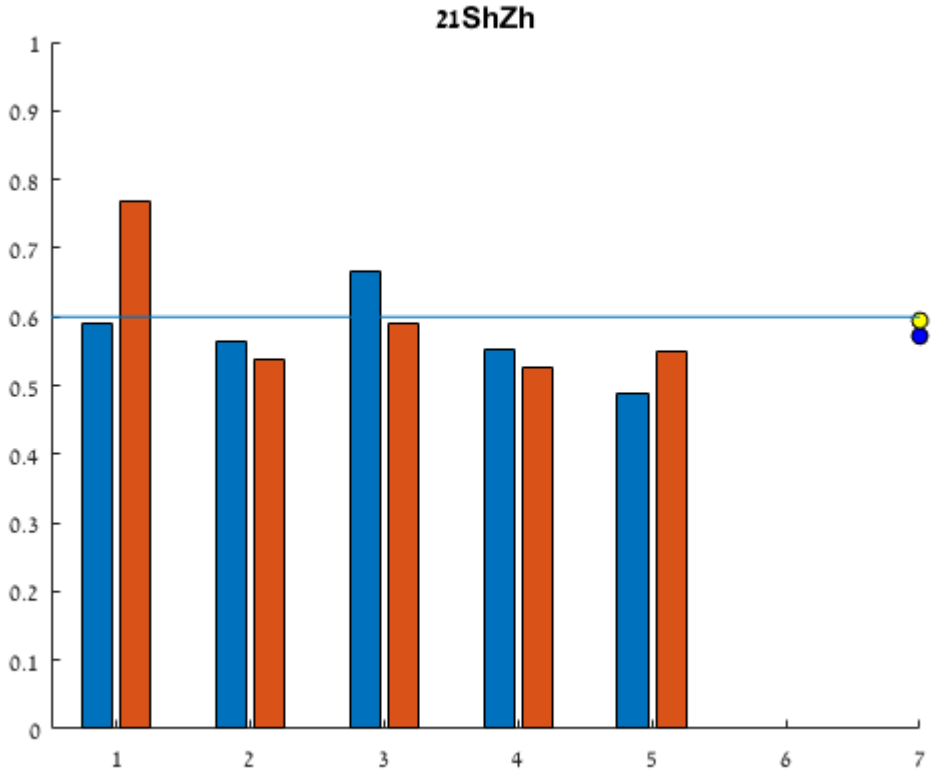
21ShZh
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0.8
0.7
0.6
0.5
0.4
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0.2
0.1
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3. Response Bias

Runs in which participants had a heavy response bias (>0.8) in one or more of the tasks are excluded.

Participants with a heavy overall response bias (>0.75) are excluded.

```
totalBiasExclusions = [0,0];

for s = 1:length(subjects)

    DisBias = [];
    DetBias = [];
    subject = data_struct(subjects{s});
    figure;
    hold on;

    for run_num = 1:length(subject.DisRT)/40

        DisMeanResp = nanmean(subject.DisResp((run_num-1)*40+1:run_num*40));
        DetMeanResp = nanmean(subject.DetResp((run_num-1)*40+1:run_num*40));

        DisBias = [DisBias DisMeanResp];
        DetBias = [DetBias DetMeanResp];

    end

    bar([DisBias' DetBias']);

    %plot mean response bias as a point
    scatter(length(DisBias)+2,mean(DisBias), 'MarkerEdgeColor','black','MarkerFaceColor','blue
    scatter(length(DetBias)+2,mean(DetBias), 'MarkerEdgeColor','black','MarkerFaceColor','yel

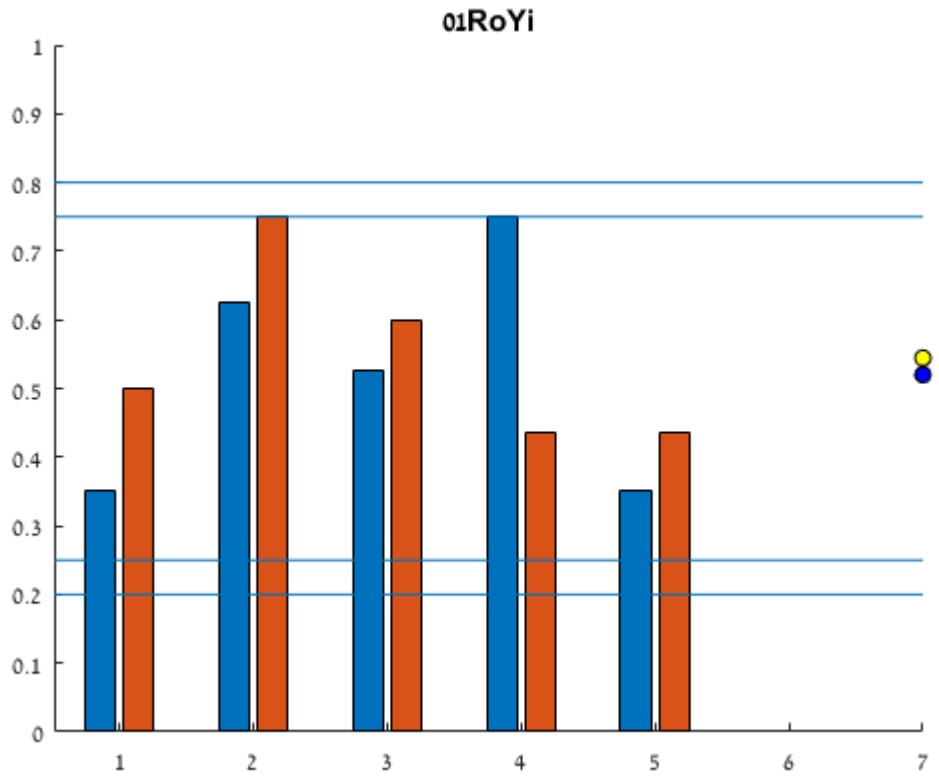
    refline(0,0.75); %the external lines are subject-wise criteria
    refline(0,0.25);
    refline(0,0.8); %the internal lines are run-wise criteria
    refline(0,0.2);

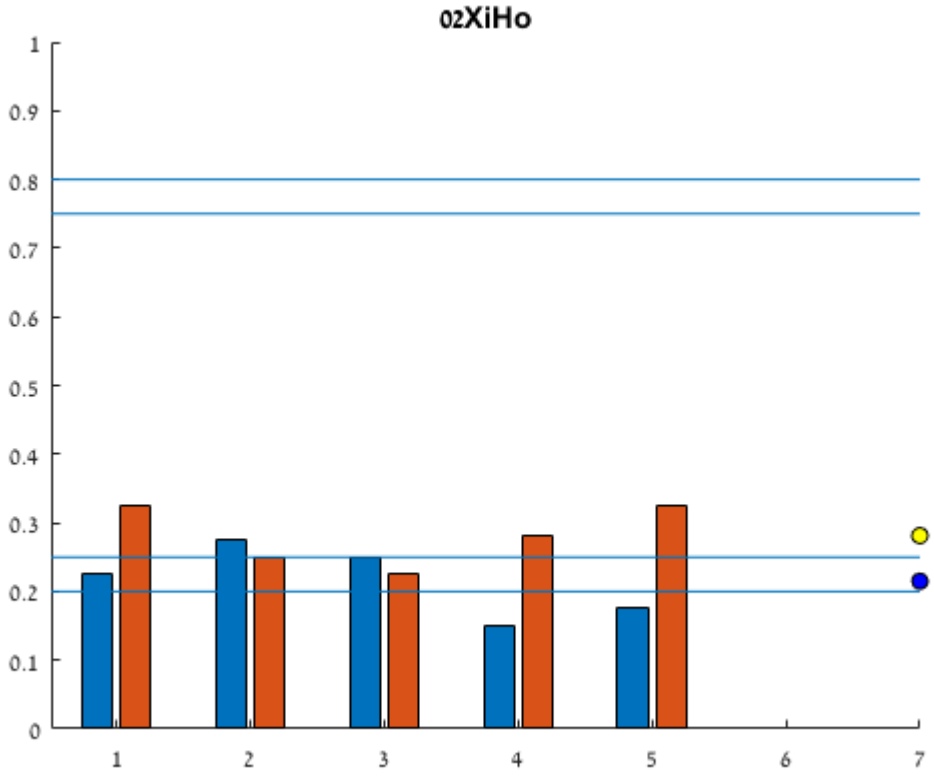

    if abs(mean(DisBias)-0.5)>0.25 && any(toExclude(s,:)==0)
            disp(sprintf('Participant %s is excluded due to a heavy response bias in the discr
            disp(repmat('=',1,60))
            toExclude(s,:)=1;
            totalBiasExclusions(1) = totalBiasExclusions(1)+1;
    elseif any(abs(DisBias-0.5)>0.3 & toExclude(s,:)==0)
            disp(sprintf('For participant %s:',subjects{s}))
            disp(sprintf('Run %d was excluded due to a heavy response bias in the discriminati
            disp(repmat('=',1,60))
            toExclude(s,find(abs(DisBias-0.5)>0.3))=1;
            totalBiasExclusions(2) = totalBiasExclusions(2)+1;
    end
```

```
    if abs(mean(DetBias)-0.5)>0.25 && any(toExclude(s,:)==0)
            disp(sprintf('Participant %s is excluded due to a heavy response bias in the detec
            disp(repmat('=',1,60))
            toExclude(s,:)=1;
            totalBiasExclusions(1) = totalBiasExclusions(1)+1;
    elseif any(abs(DetBias-0.5)>0.3 & toExclude(s,:)==0)
            disp(sprintf('For participant %s:',subjects{s}))
            disp(sprintf('Run %d was excluded due to a heavy response bias in the detection ta
            disp(repmat('=',1,60))
            toExclude(s,find(abs(DetBias-0.5)>0.3))=1;
            totalBiasExclusions(2) = totalBiasExclusions(2)+1;
    end

    ylim([0,1]);
    title(subjects{s});
end
```

```
Participant 02XiHo is excluded due to a heavy response bias in the discrimination task
============================================================
For participant 09KeVa:
Run 1 was excluded due to a heavy response bias in the detection task
============================================================
For participant 10MaIv:
Run 2 was excluded due to a heavy response bias in the discrimination task
Run 4 was excluded due to a heavy response bias in the discrimination task
============================================================
```

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1
0.9
0.8
0.7
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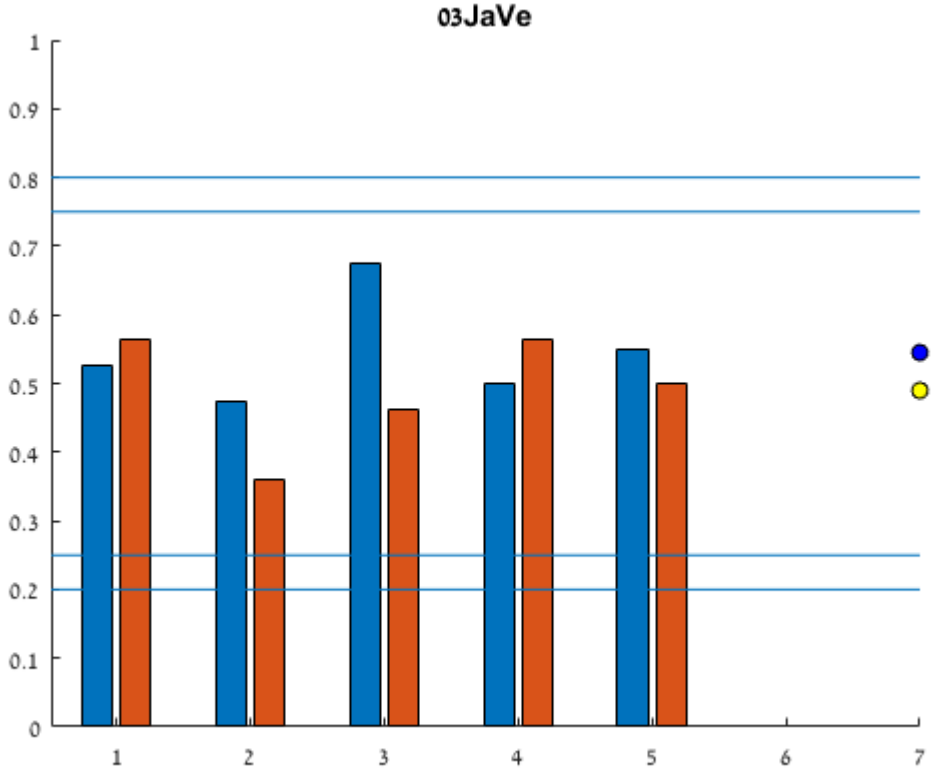
03JaVe
1
0.9
0.8
0.7
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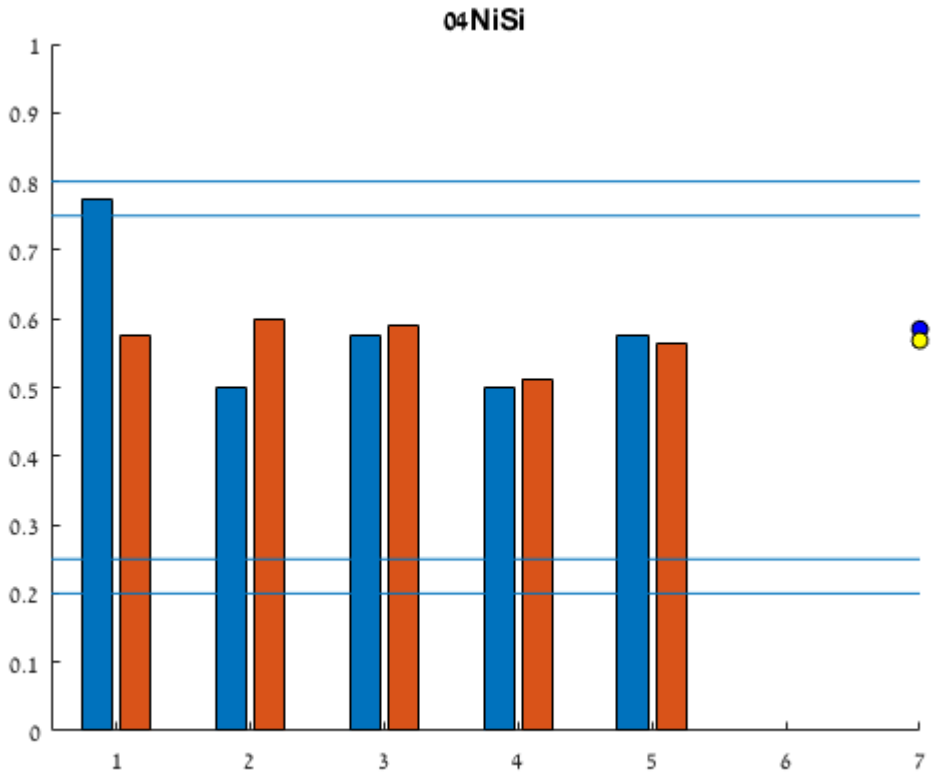
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1
0.9
0.8
0.7
0.6
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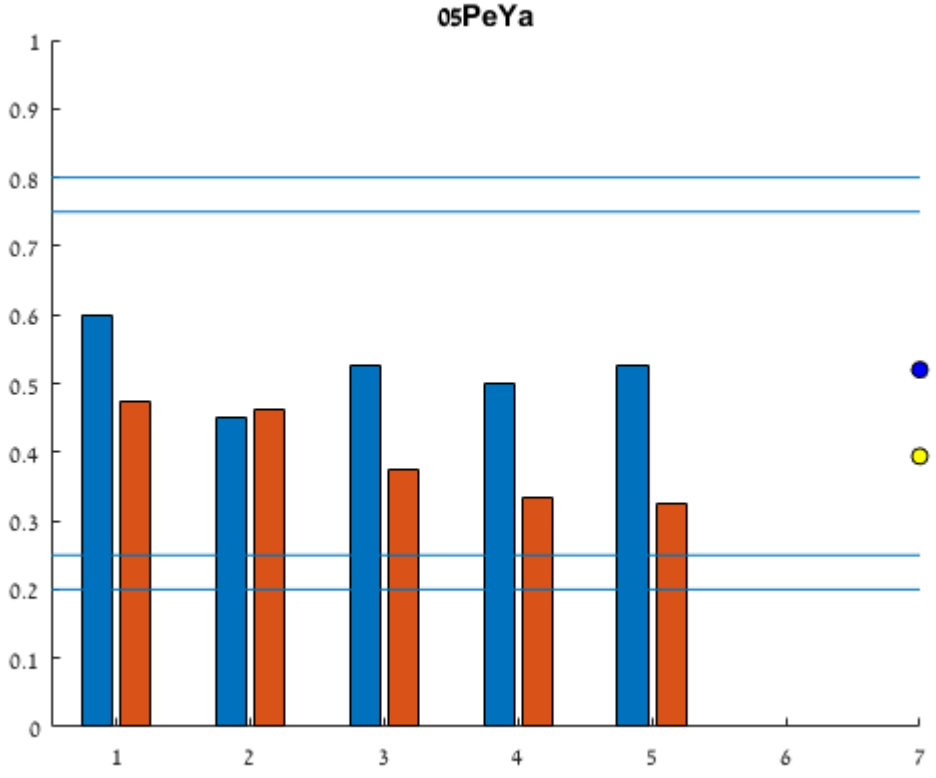
05PeYa
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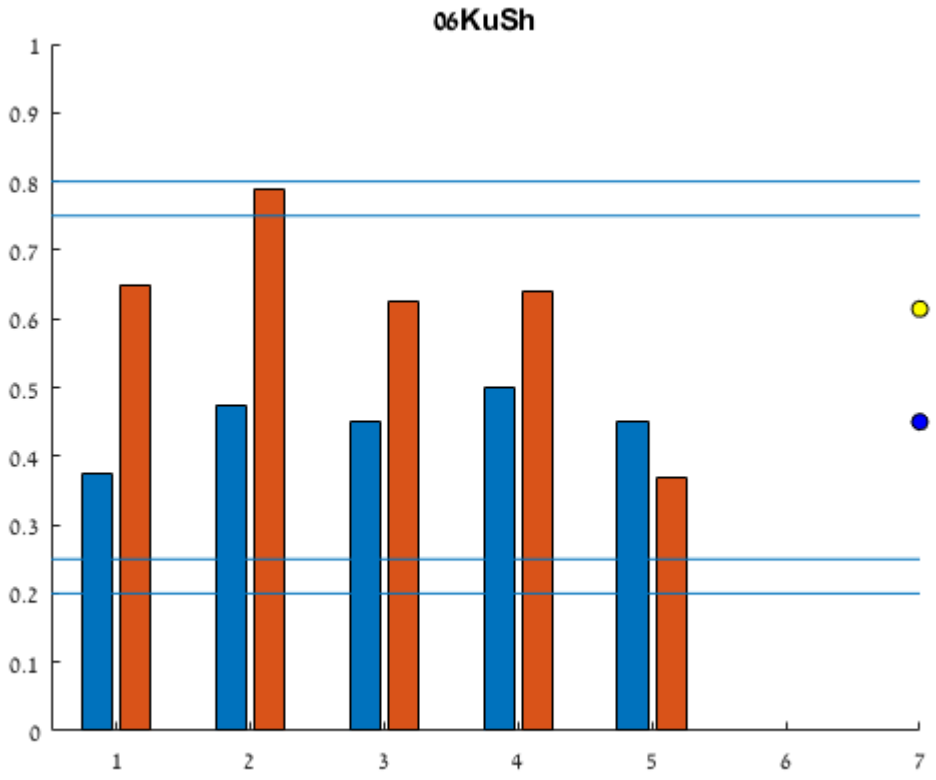
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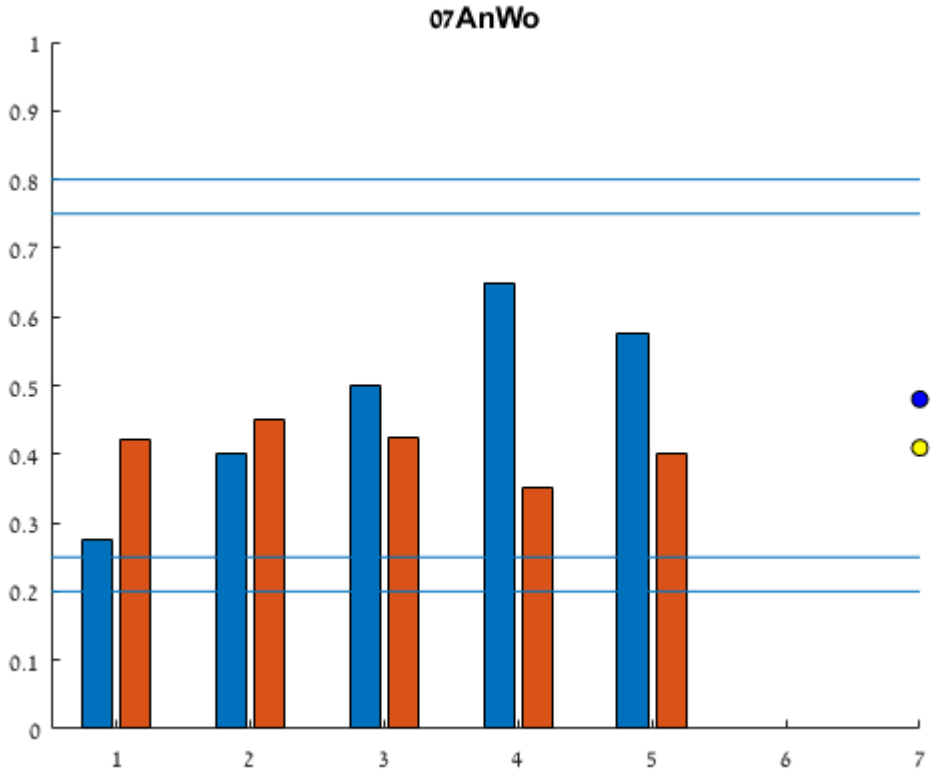
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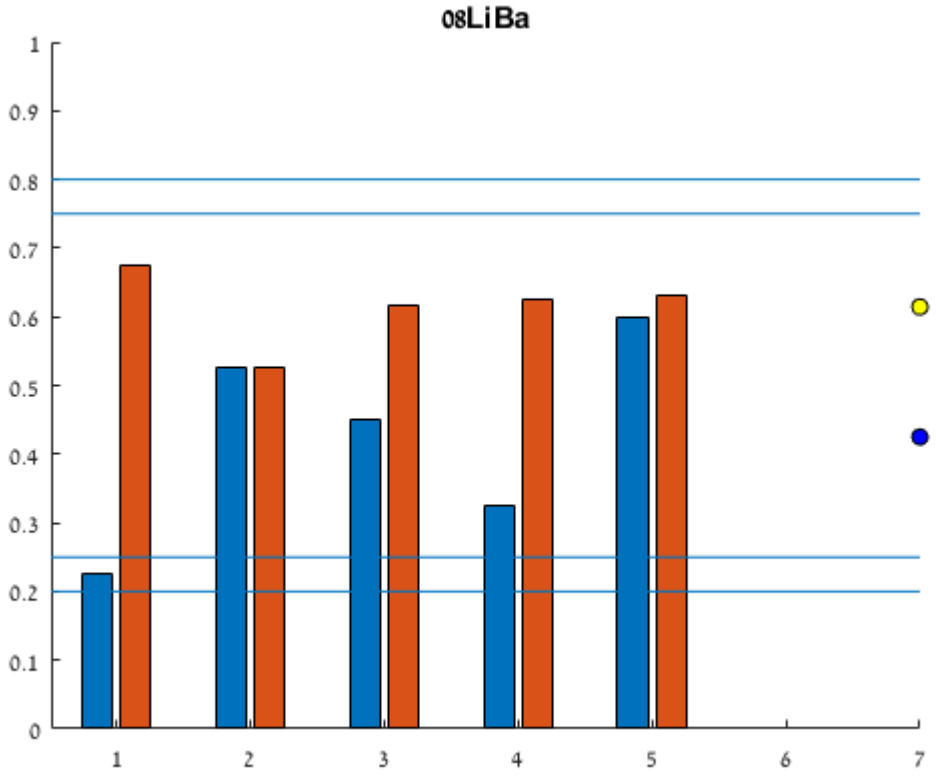
08LiBa
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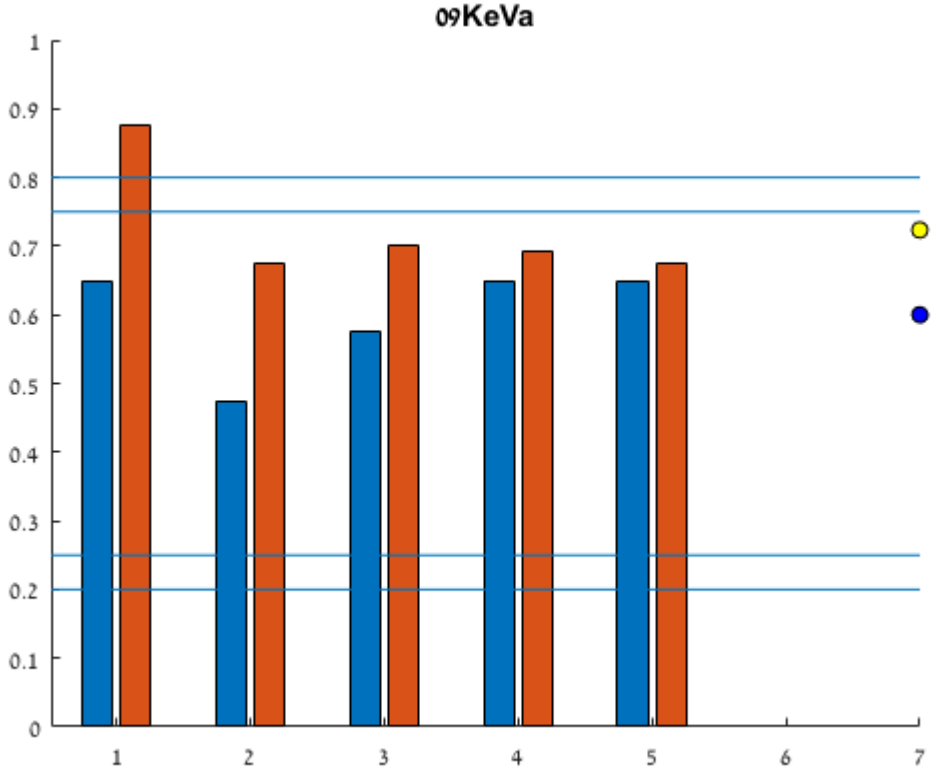
09KeVa
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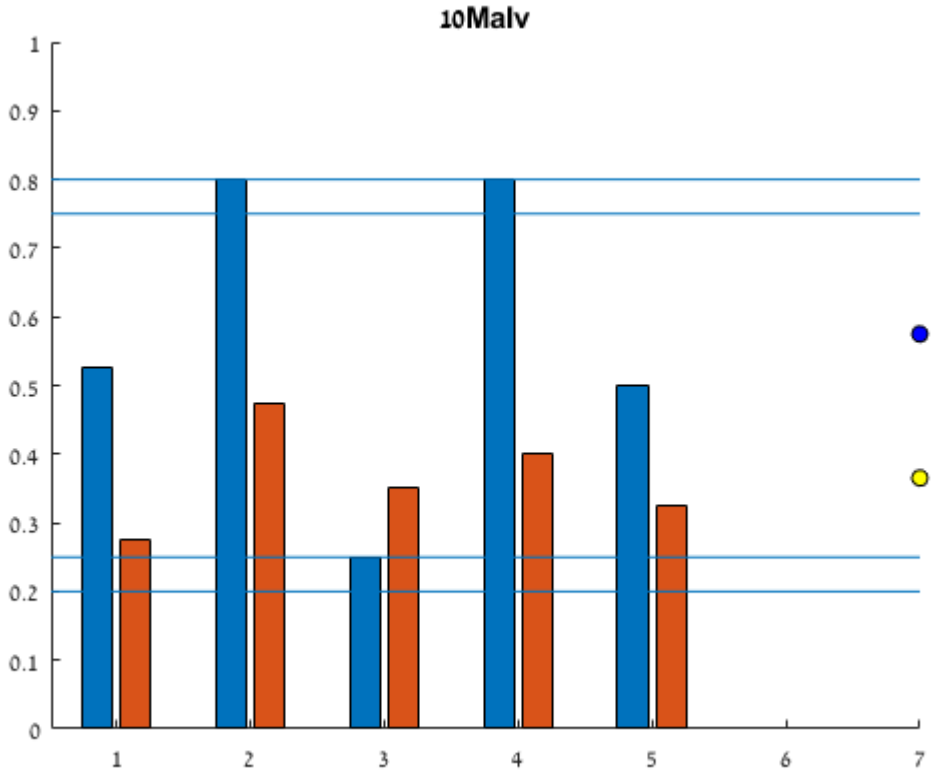
10Malv
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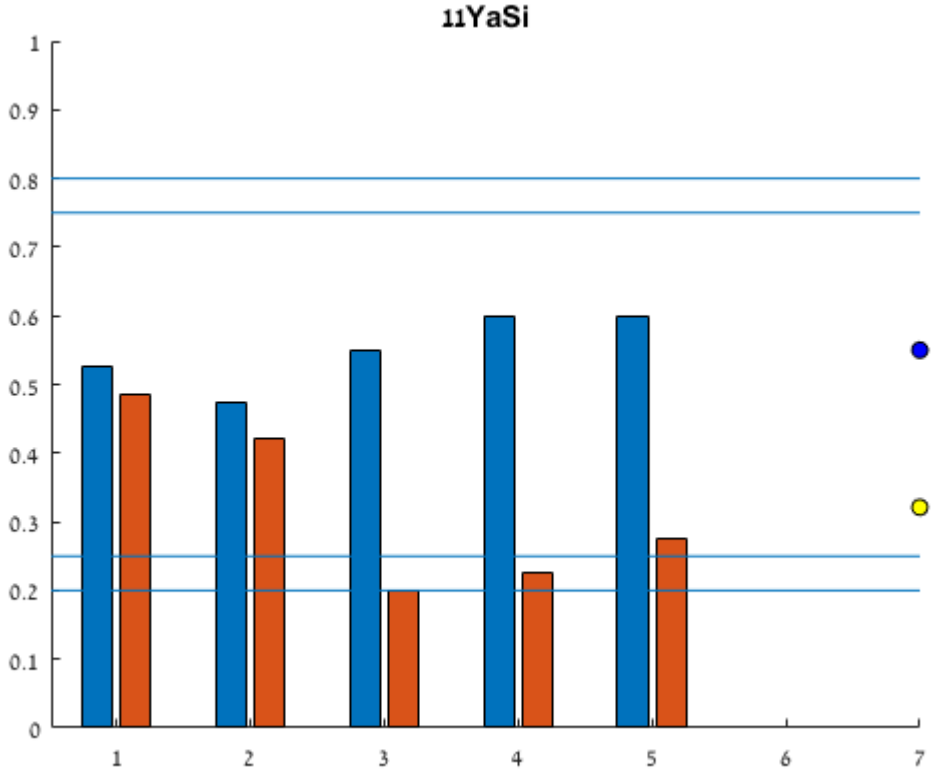
11YaSi
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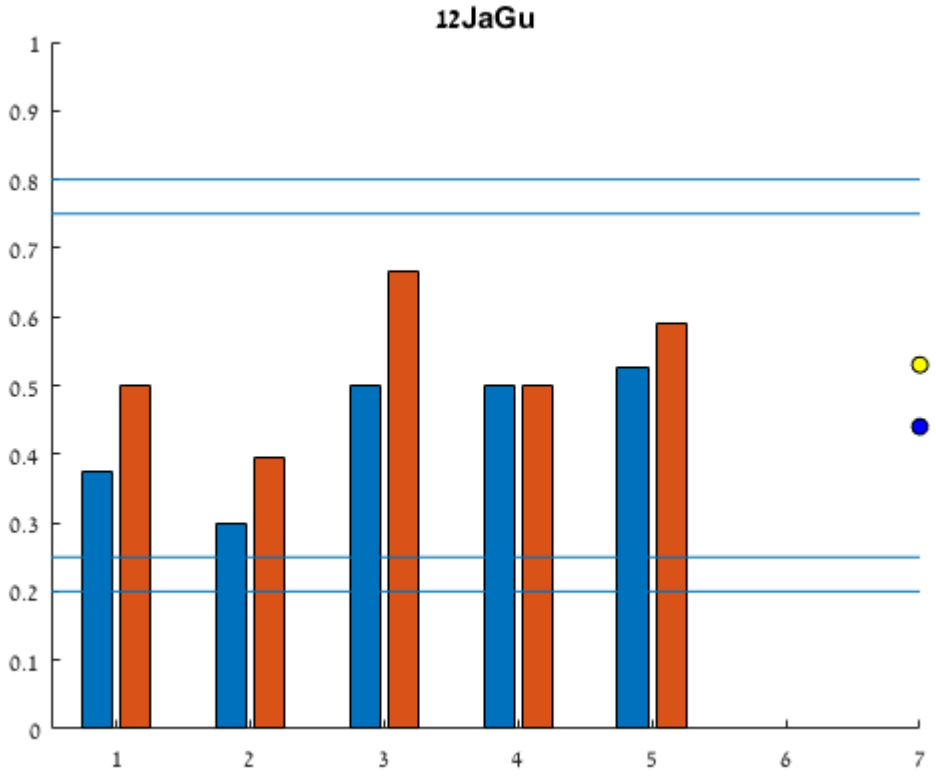
12JaGu
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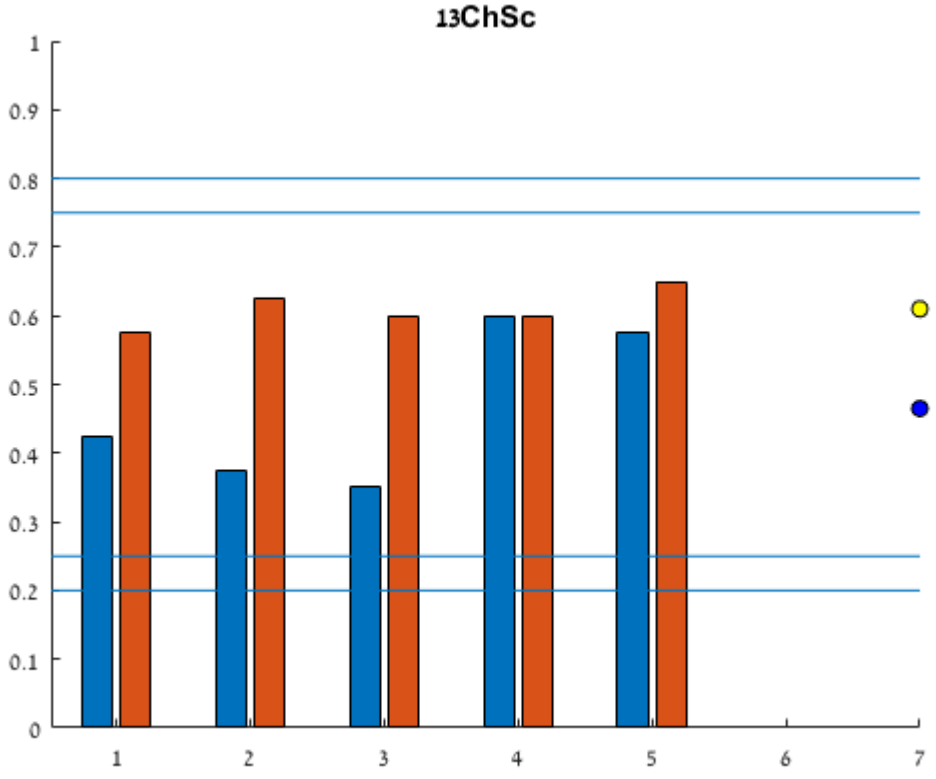
13ChSc
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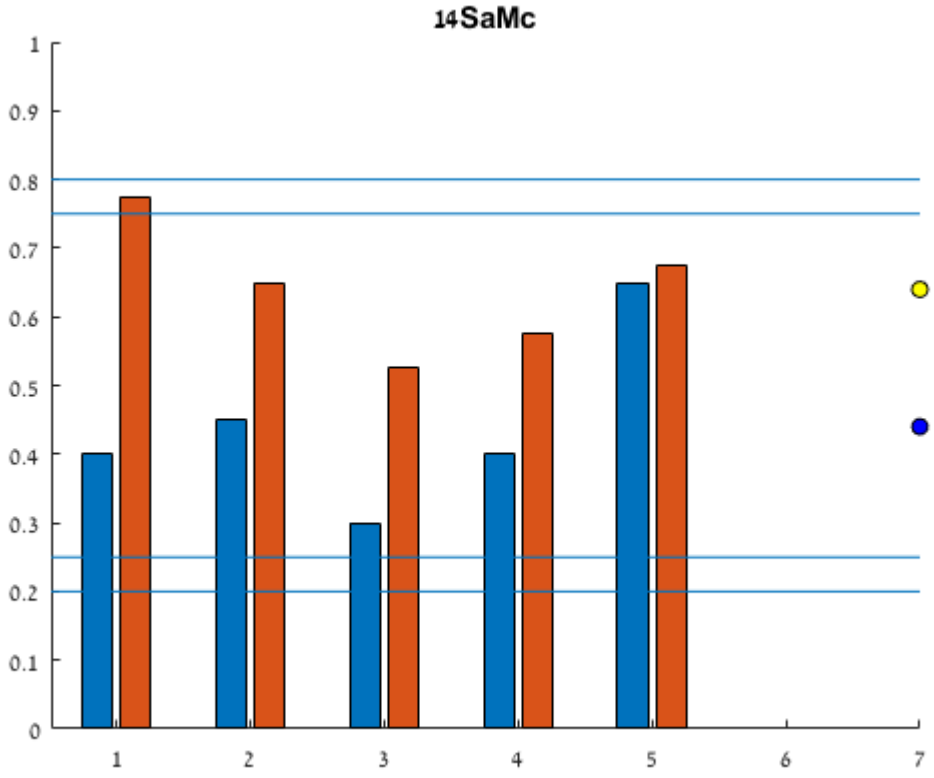
14SaMc
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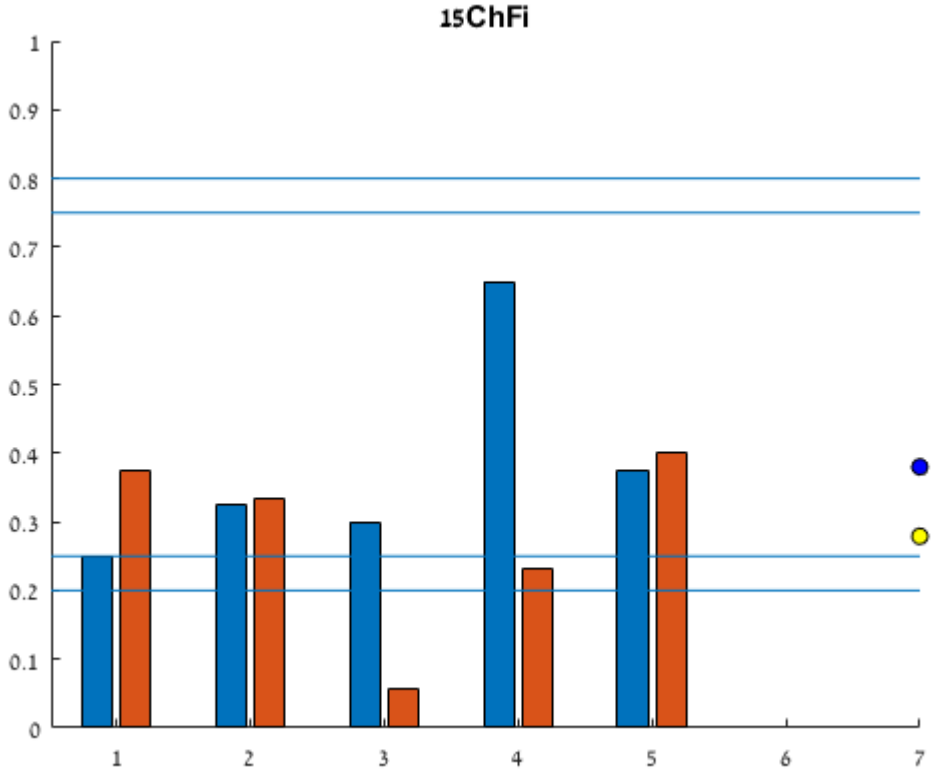
15ChFi
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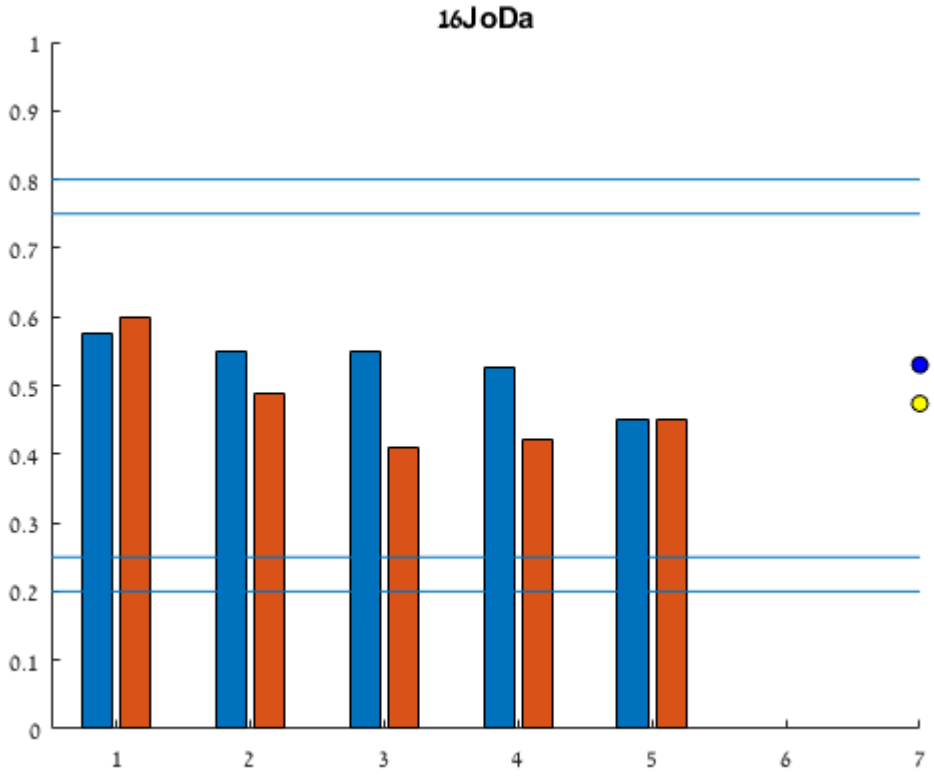
16JoDa
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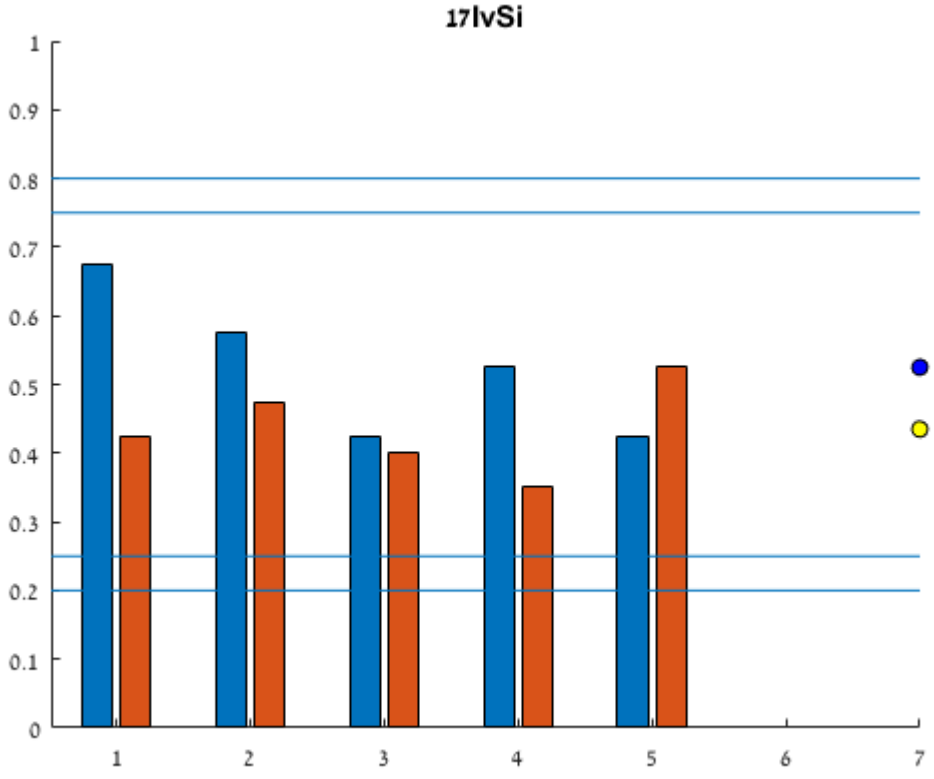
17IvSi
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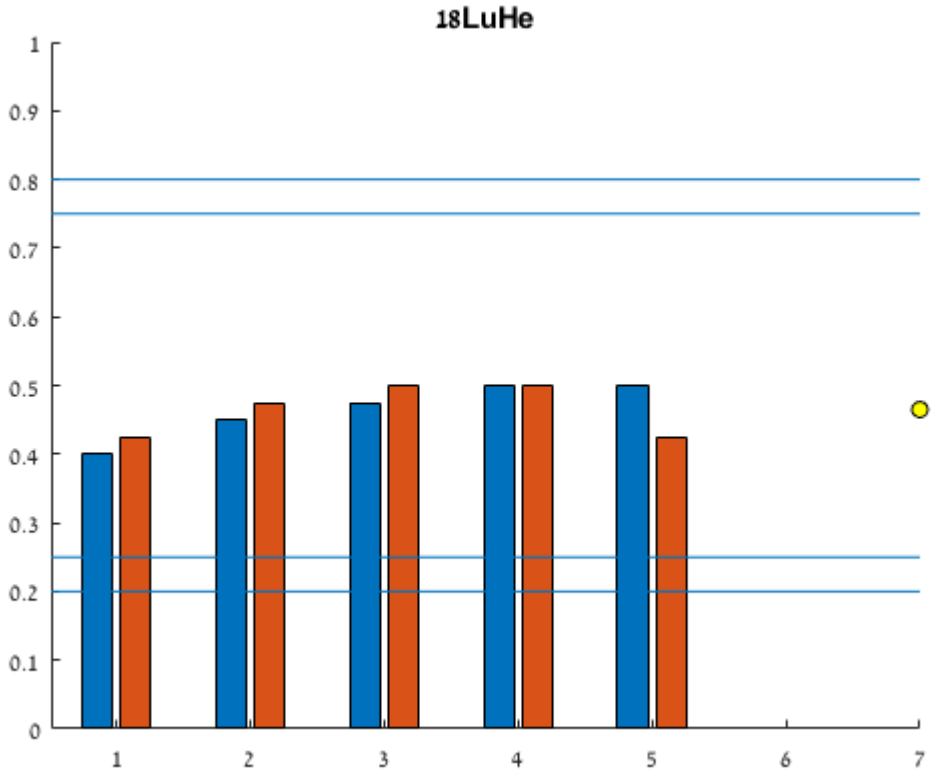
18LuHe
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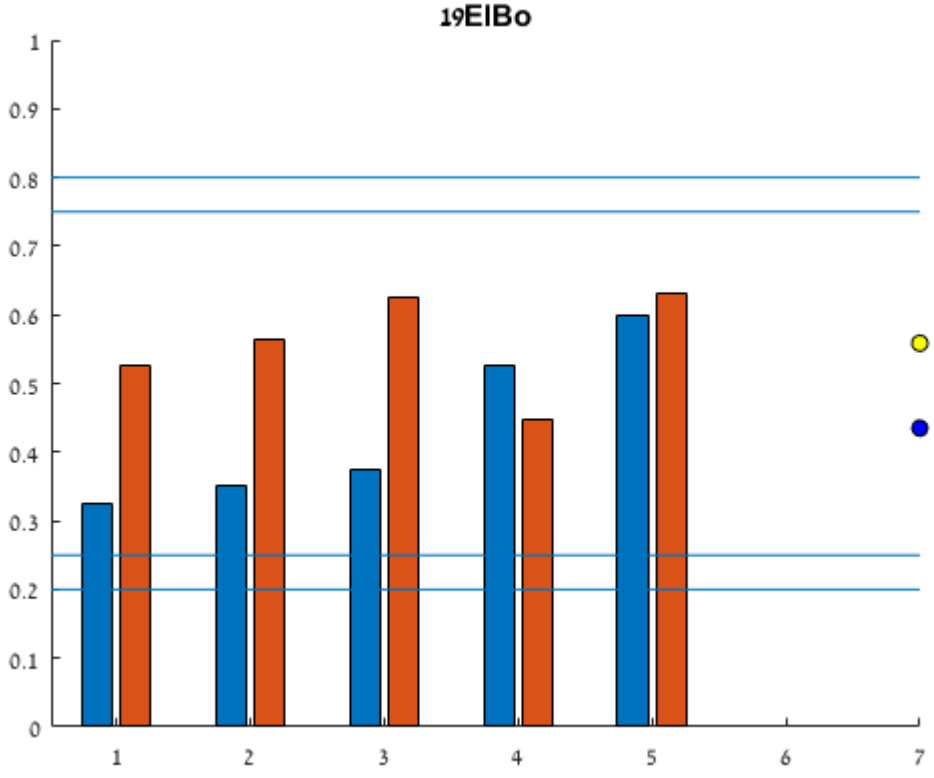
19ElBo
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0.9
0.8
0.7
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0.5
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0.1
0
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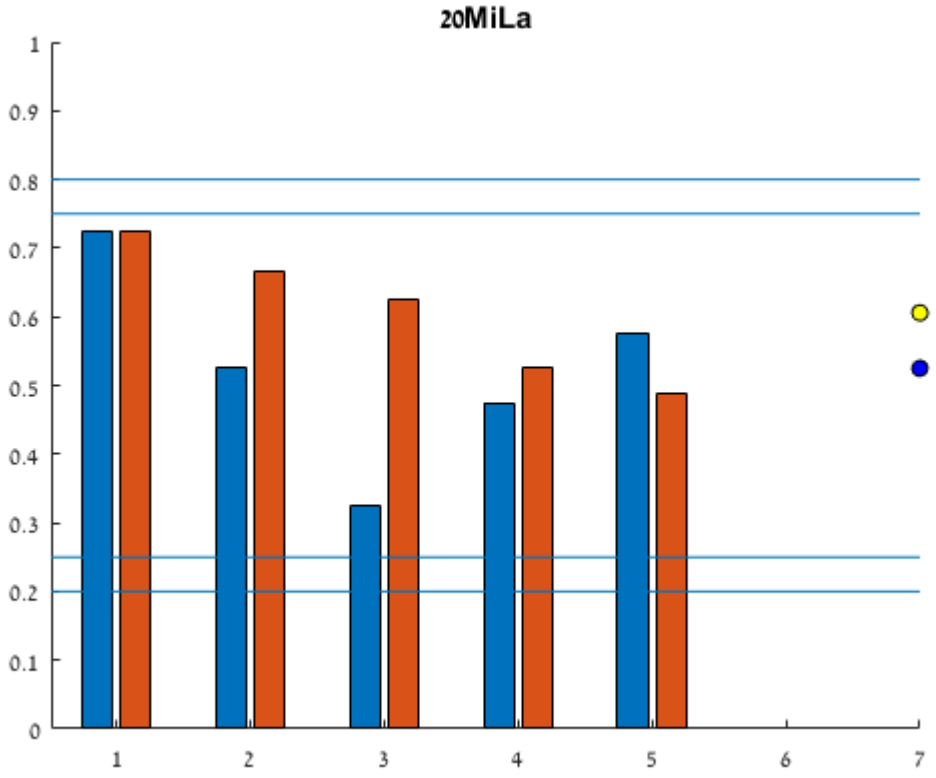
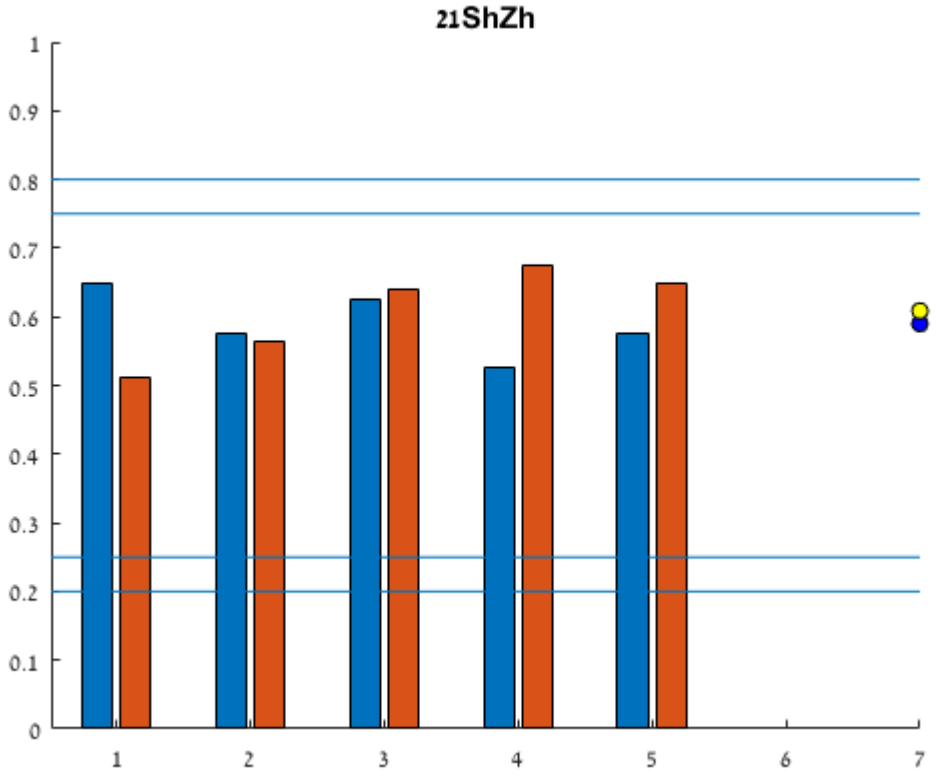




4. Confidence

For confidence related analyses, we exclude runs in which a particular answer was accompanied by the same confidence rating in 95% of the trials.

I couldn't think of a good way to represent confidence ratings, so I went with a stacked bar plot.

```
totalConfidenceExclusions = [0,0];

for s = 1:length(subjects)


    subject = data_struct(subjects{s});


    for run_num = 1:length(subject.DisRT)/40

%         figure;
%         title(sprintf('%s: run number %d', subjects{s}, run_num))
%         hold on;
        range = (run_num-1)*40+1:run_num*40;
        conf_matrix = [hist(subject.DetConf(subject.DetResp(range)==1),1:6);... %yes responses
                       hist(subject.DetConf(subject.DetResp(range)==0),1:6);... %no responses
                       hist(subject.DisConf(subject.DisResp(range)==1),1:6);... %CW responses
                       hist(subject.DisConf(subject.DisResp(range)==0),1:6)];    %CCW respons

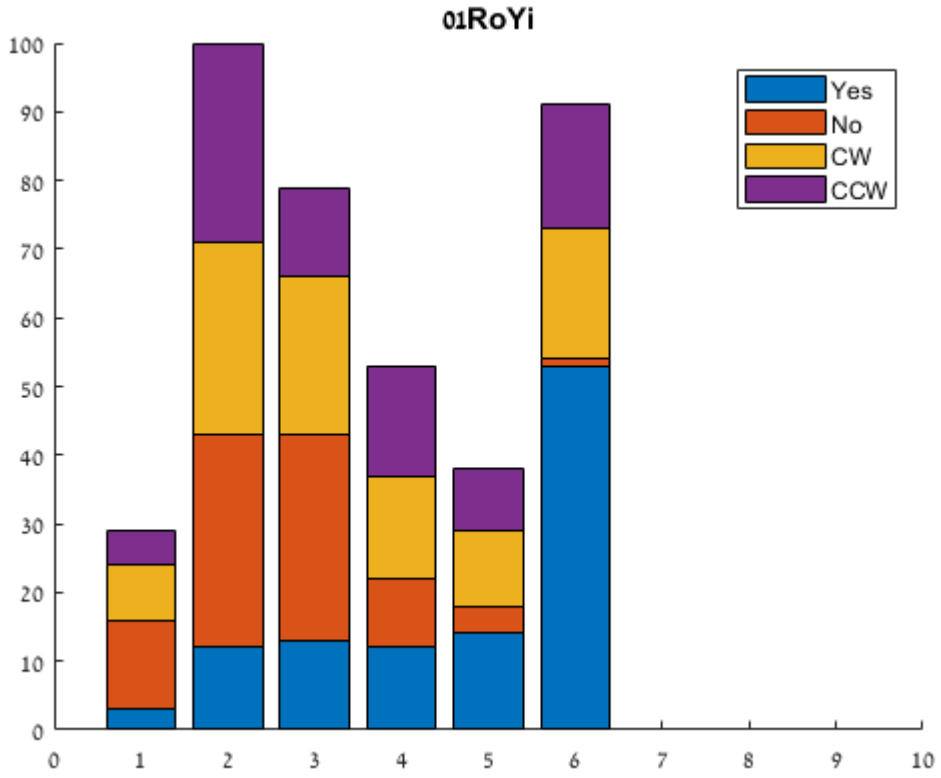
%         bar(conf_matrix','stacked');
%         xlim([0,10]);
%         legend('Yes','No','CW','CCW')

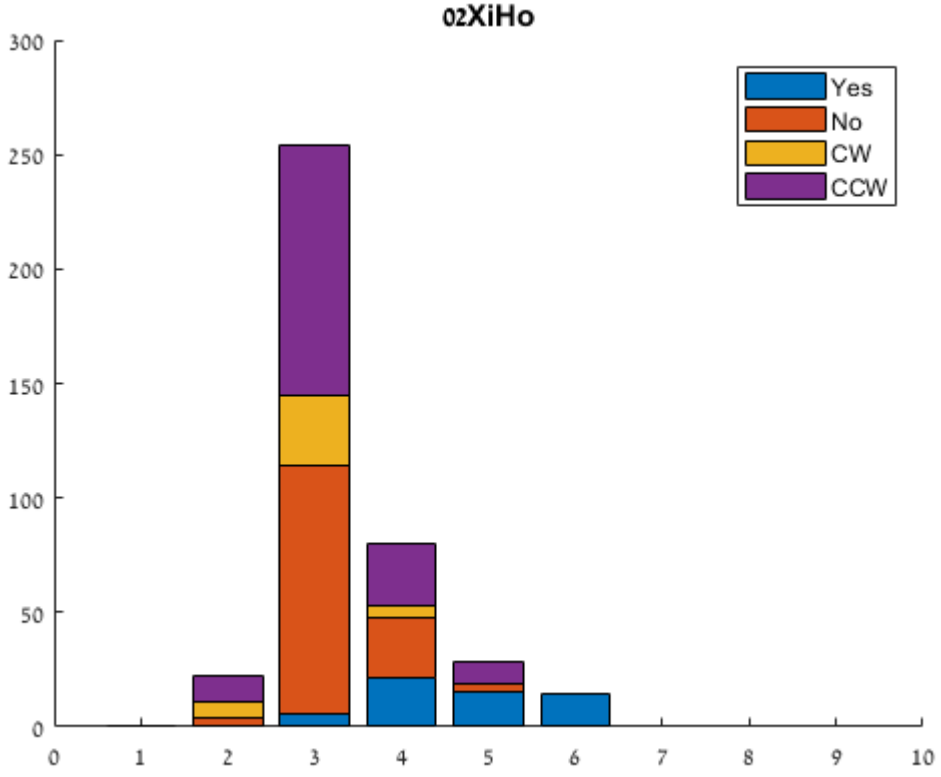
        %check if confidence ratings meet the exclusion criterion
        normalized_conf_matrix = conf_matrix./(repmat(sum(conf_matrix,2),1,6));
        if any(normalized_conf_matrix(:)>0.95) && toExclude(s,run_num)==0
            toExclude(s,run_num)=0.5;
            disp(sprintf('Run %d of participant %s was excluded from confidence analysis \n',r
            disp(repmat('=',1,60))
            totalConfidenceExclusions(2) = totalConfidenceExclusions(2)+1;
        end
    end

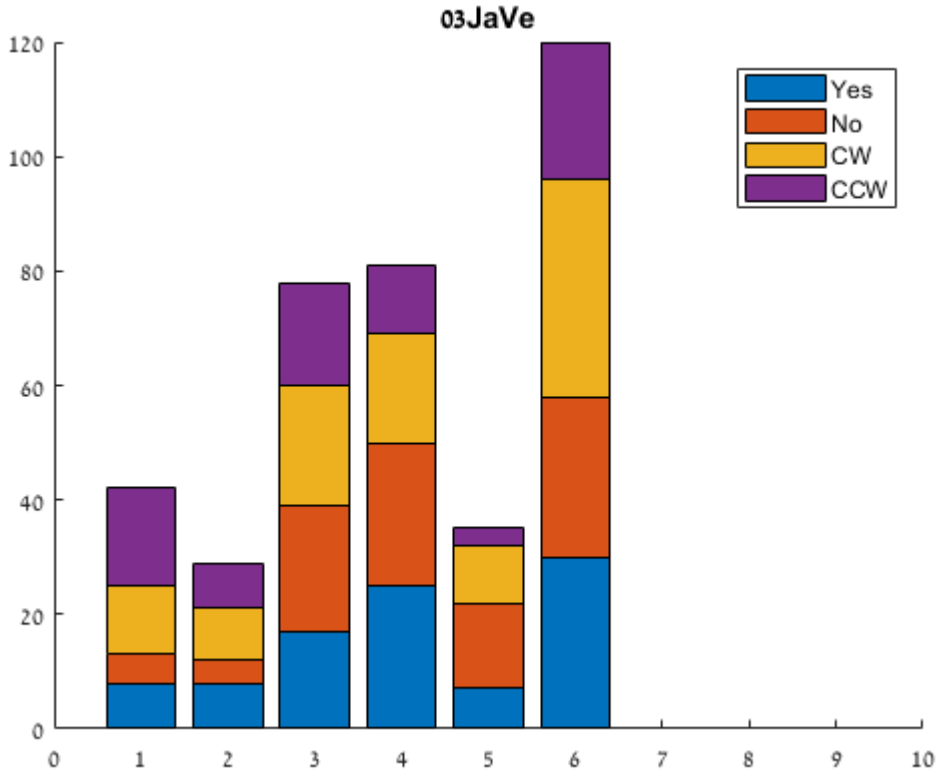
    %plot global confidence distribution
    conf_matrix = [hist(subject.DetConf(subject.DetResp==1),1:6);... %yes responses
                       hist(subject.DetConf(subject.DetResp==0),1:6);... %no responses
                       hist(subject.DisConf(subject.DisResp==1),1:6);... %CW responses
                       hist(subject.DisConf(subject.DisResp==0),1:6)];    %CCW responses
    figure;
    hold on
    title(subjects{s})
    bar(conf_matrix','stacked');
    xlim([0,10]);
    legend('Yes','No','CW','CCW')

end
```

```
Run 3 of participant 11YaSi was excluded from confidence analysis
============================================================
```






03JaVe
Yes
No
CW
CCW
0
20
40
60
80
100
120
0
1
2
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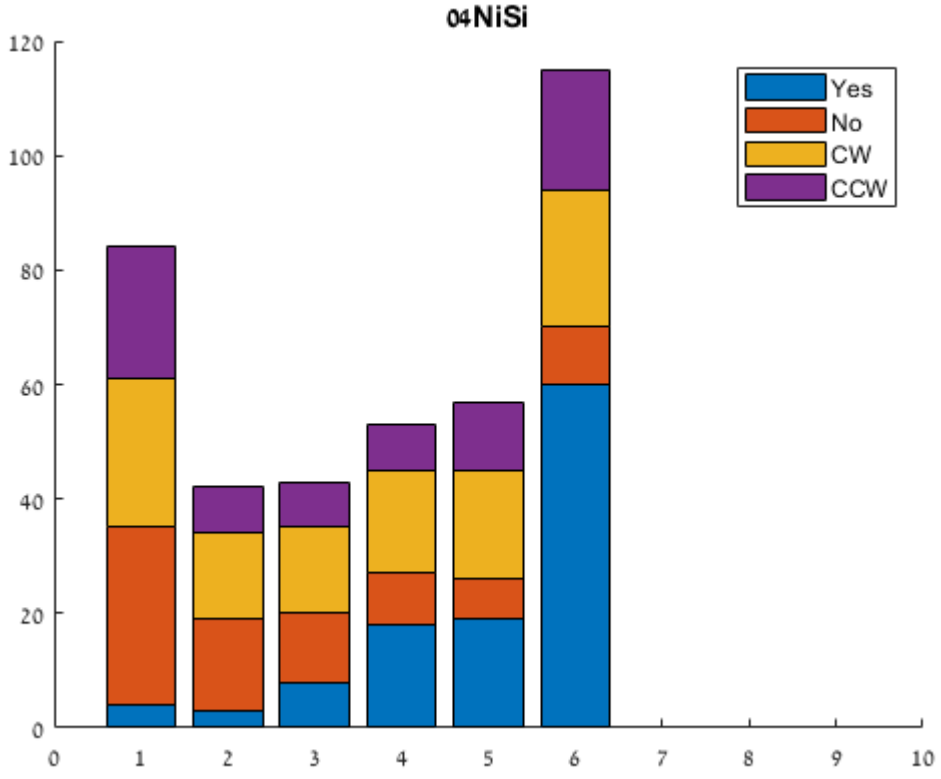
04NiSi
Yes
No
CW
CCW
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20
40
60
80
100
120
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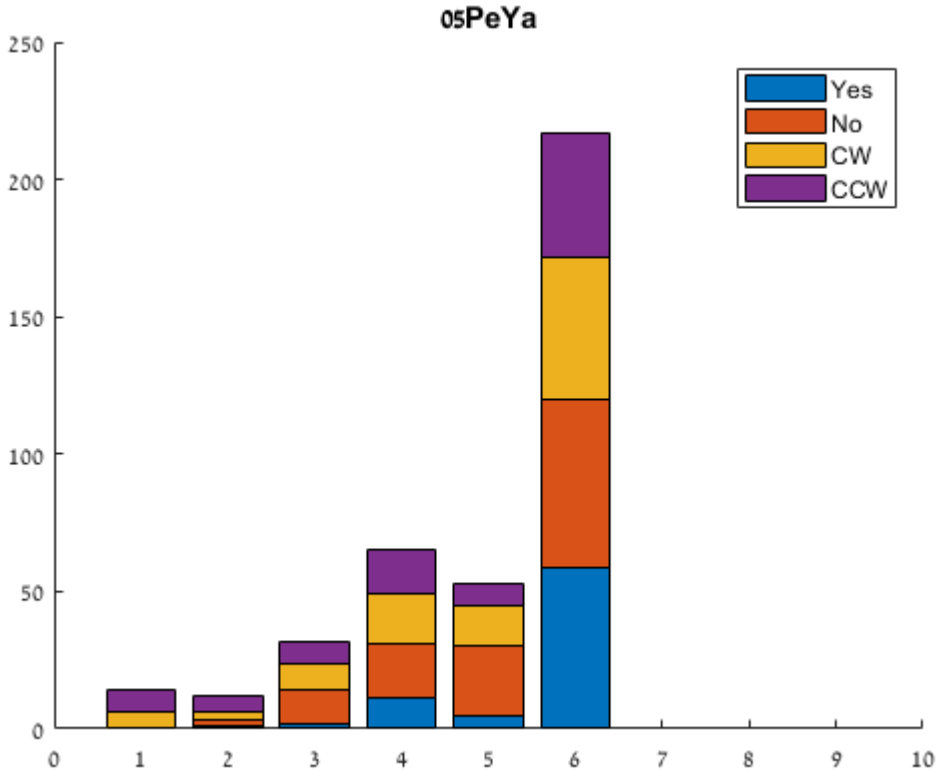
05PeYa
Yes
No
CW
CCW
250
200
150
100
50
0
0
1
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3
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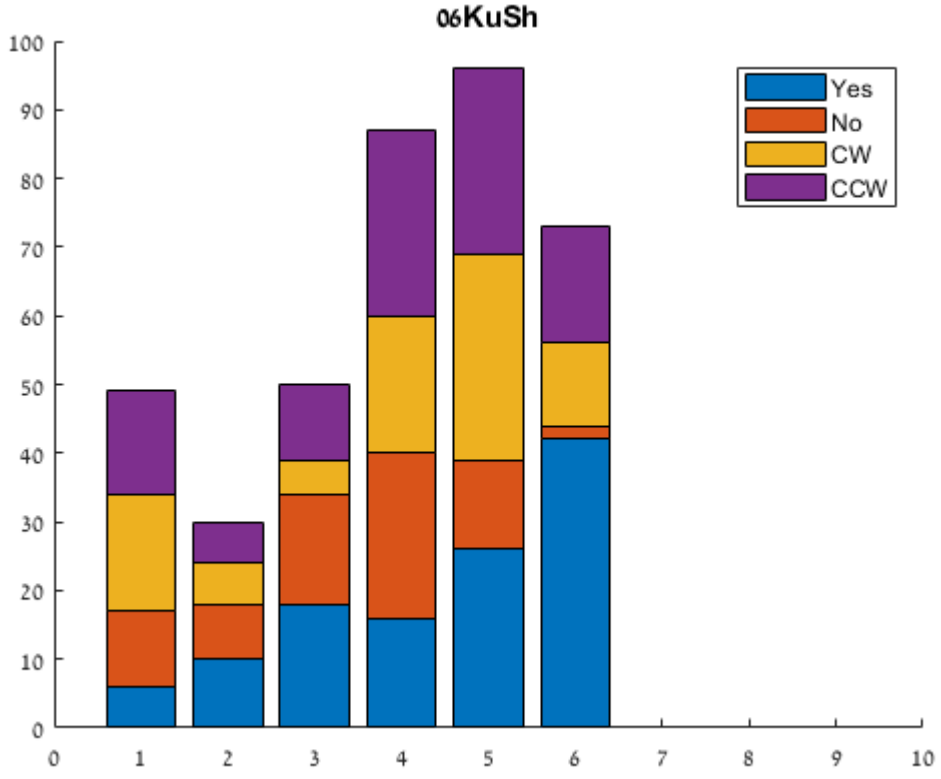
06KuSh
Yes
No
CW
CCW
100
90
80
70
60
50
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30
20
10
0
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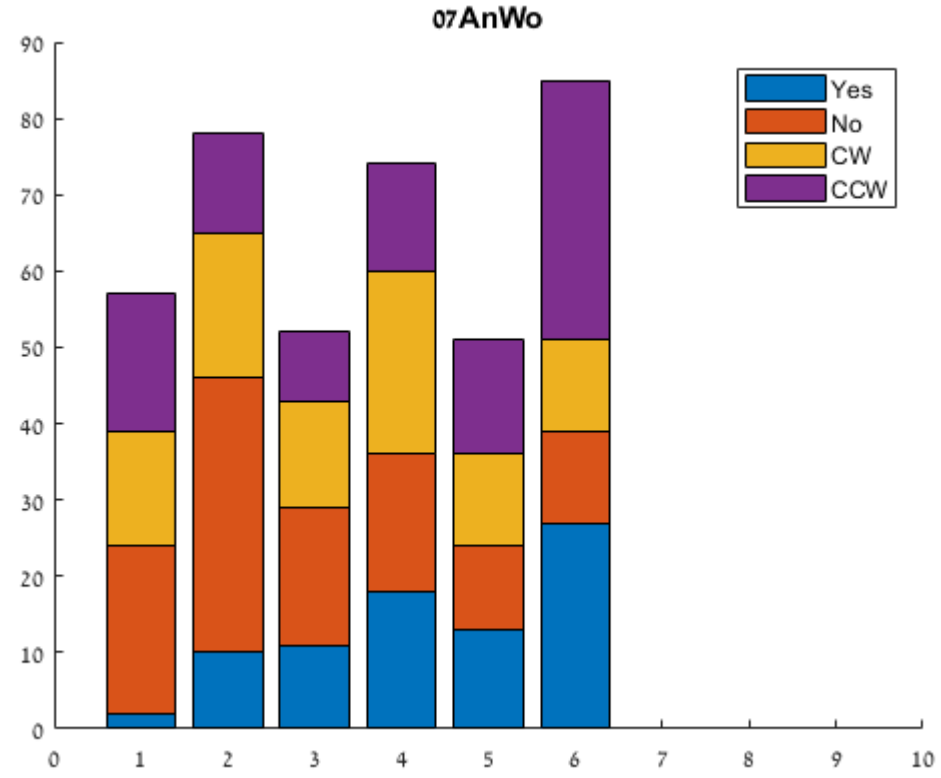
07AnWo
Yes
No
CW
CCW
0
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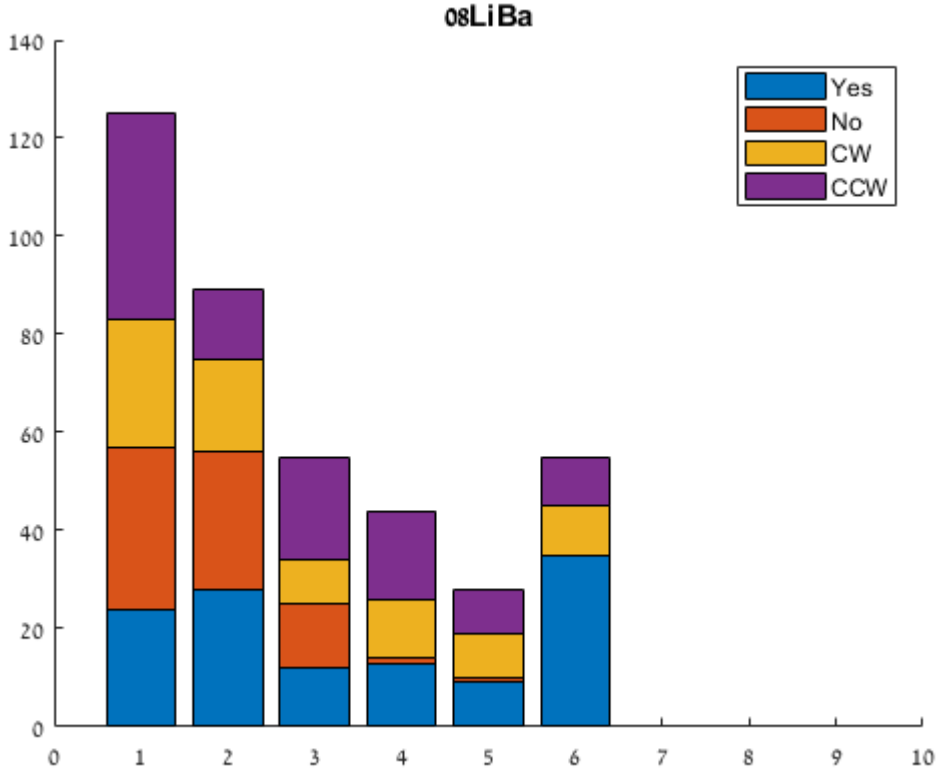
08LiBa
Yes
No
CW
CCW
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140
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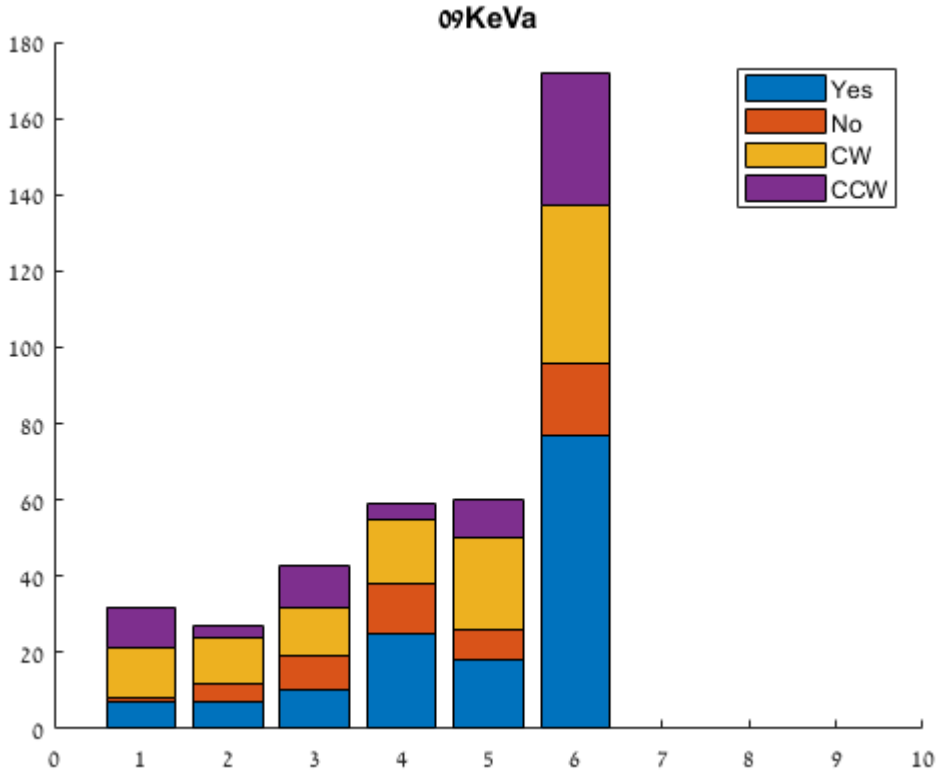
09KeVa
Yes
No
CW
CCW
180
160
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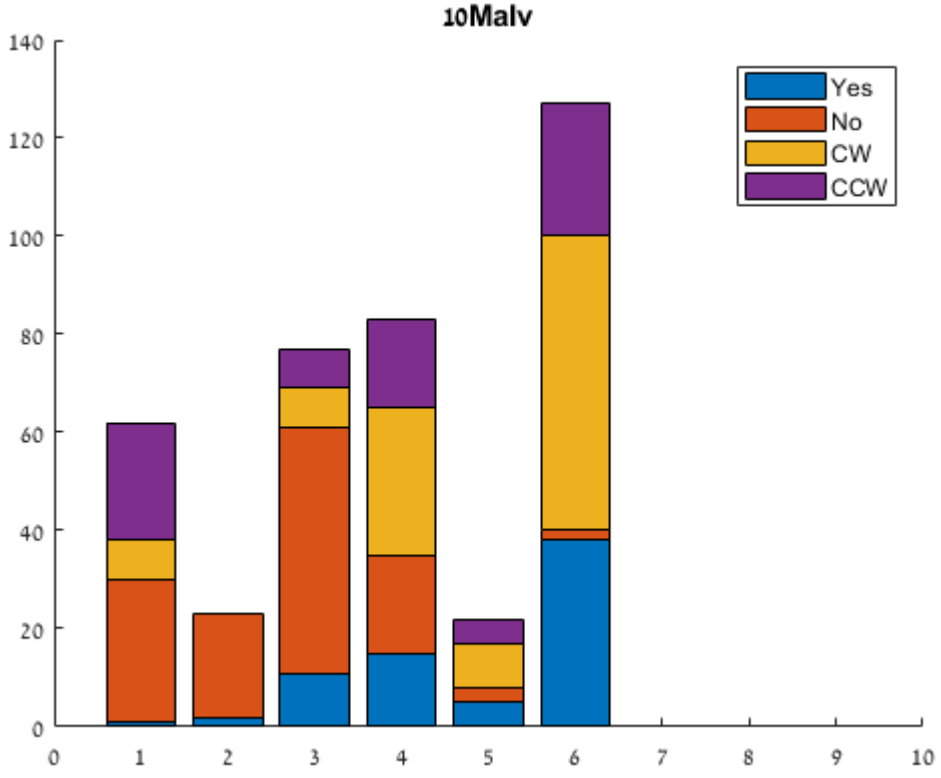
10Malv
Yes
No
CW
CCW
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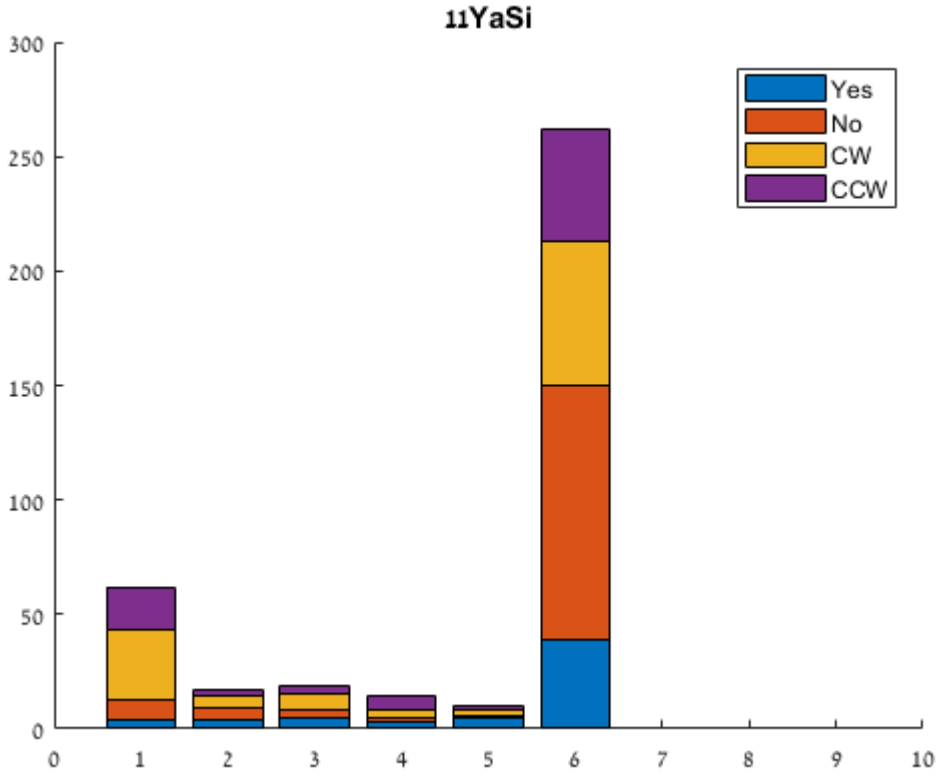
11YaSi
Yes
No
CW
CCW
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250
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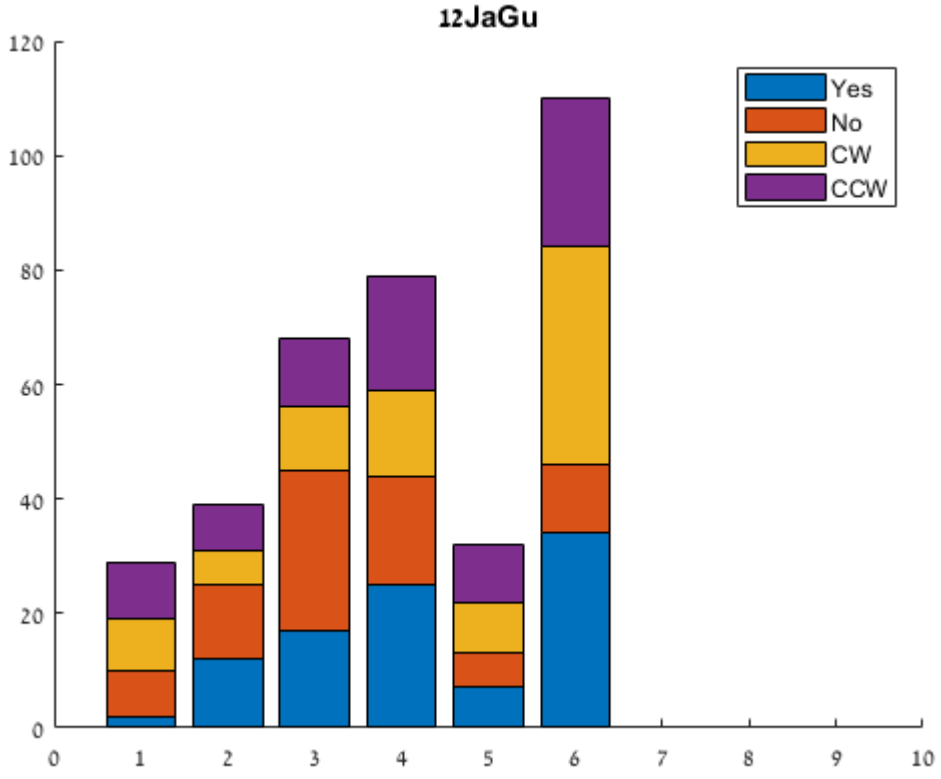
12JaGu
Yes
No
CW
CCW
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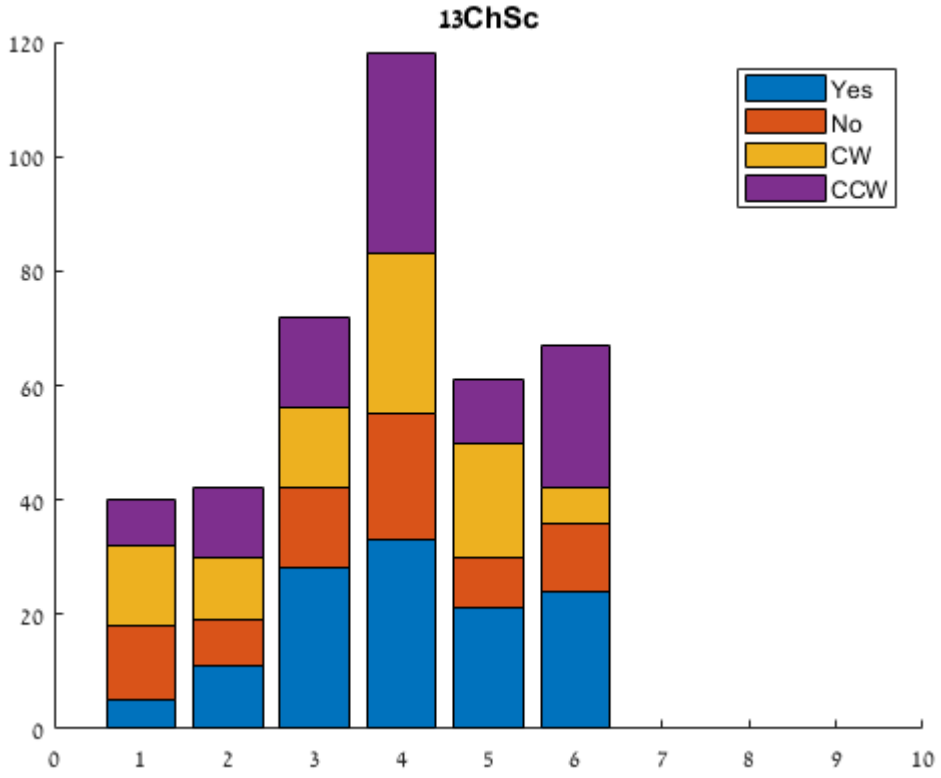
13ChSc
120
100
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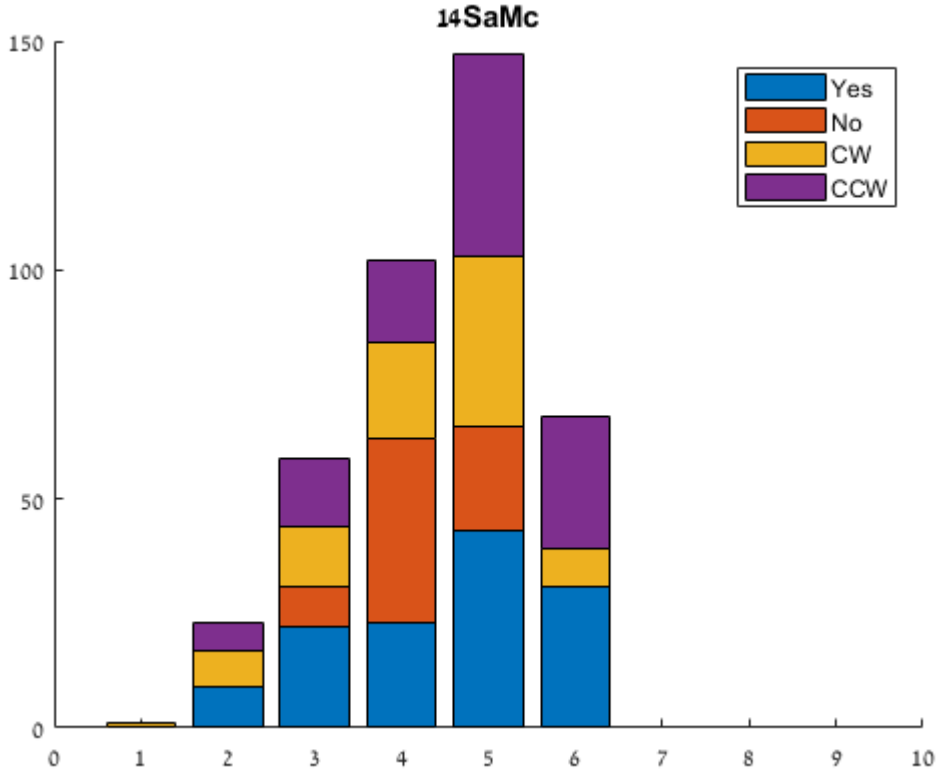
Yes
No
CW
CCW


14SaMc
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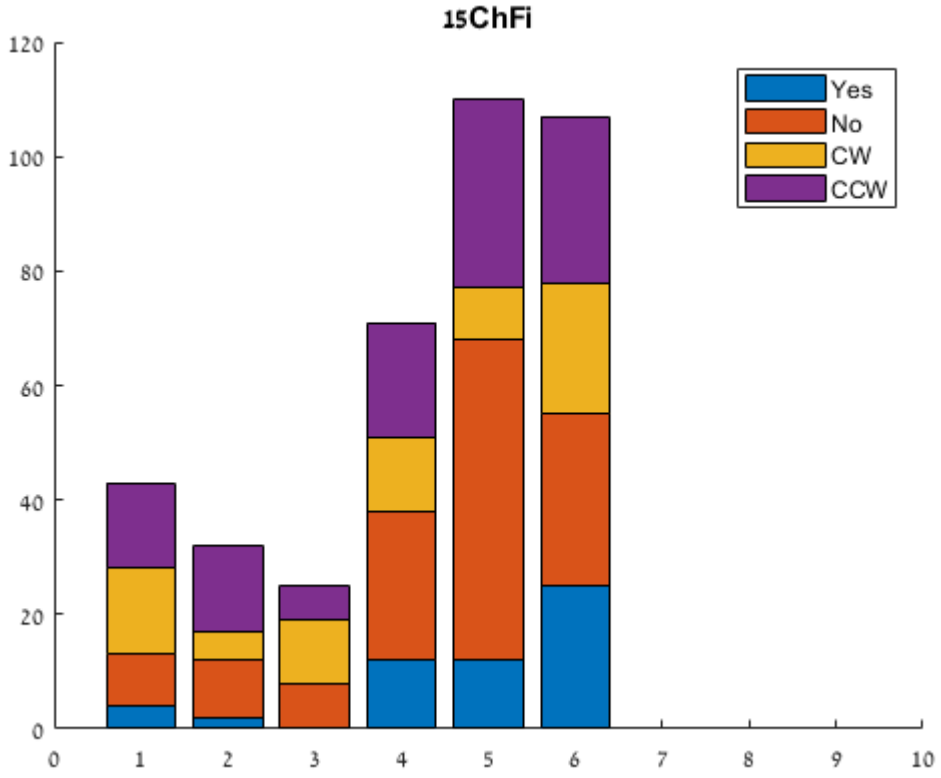
Yes
No
CW
CCW


15ChFi
Yes
No
CW
CCW
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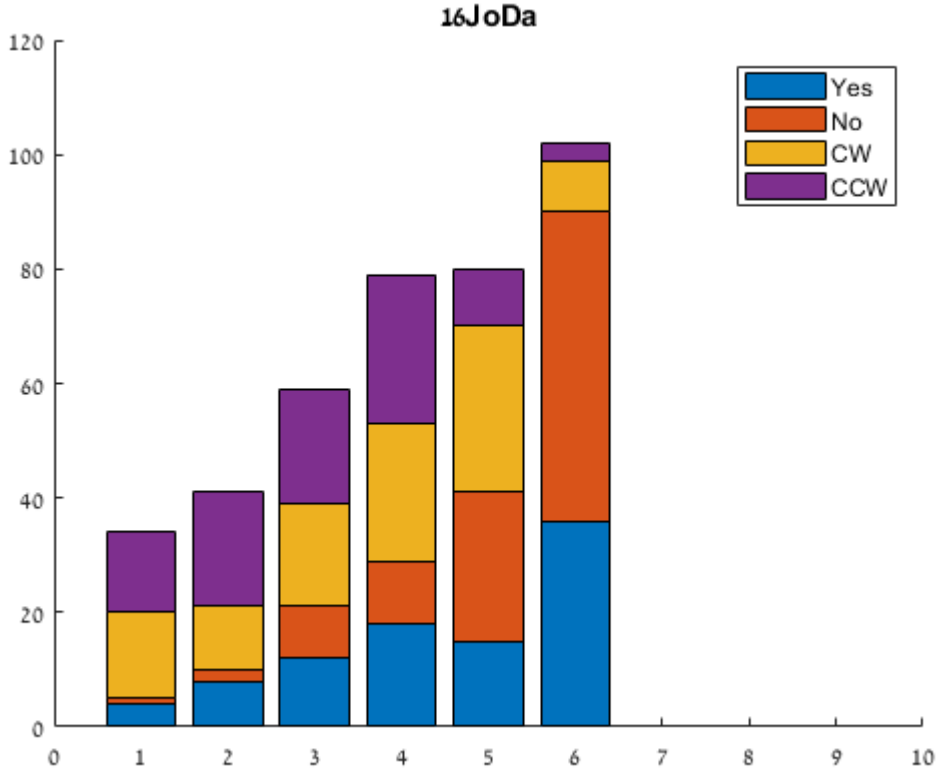
16JoDa
Yes
No
CW
CCW
120
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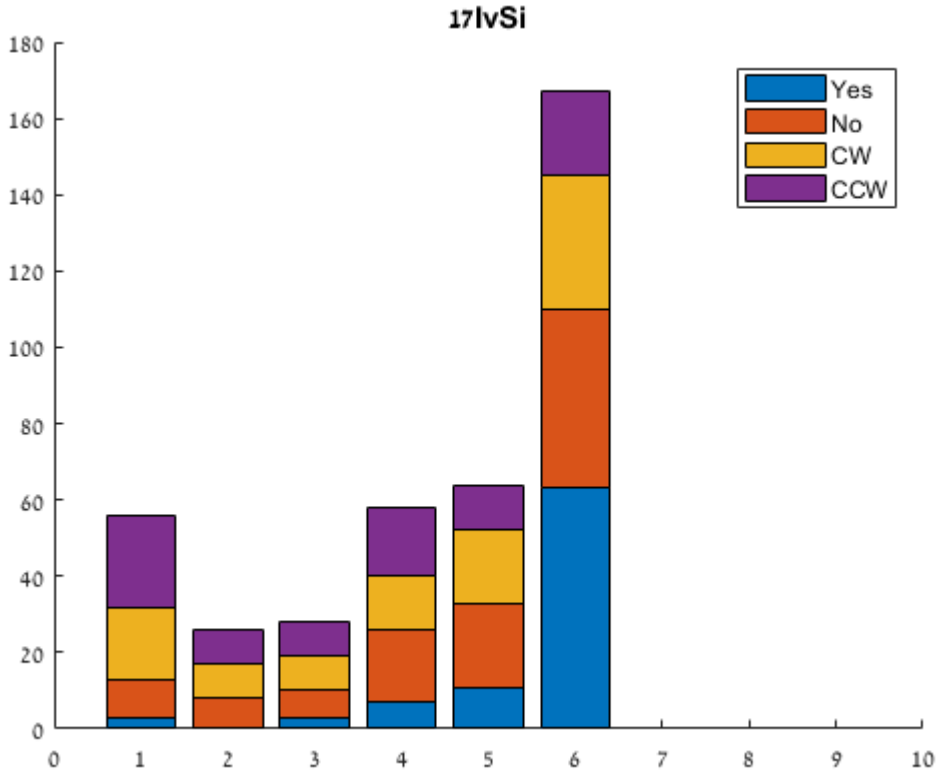
17IvSi
Yes
No
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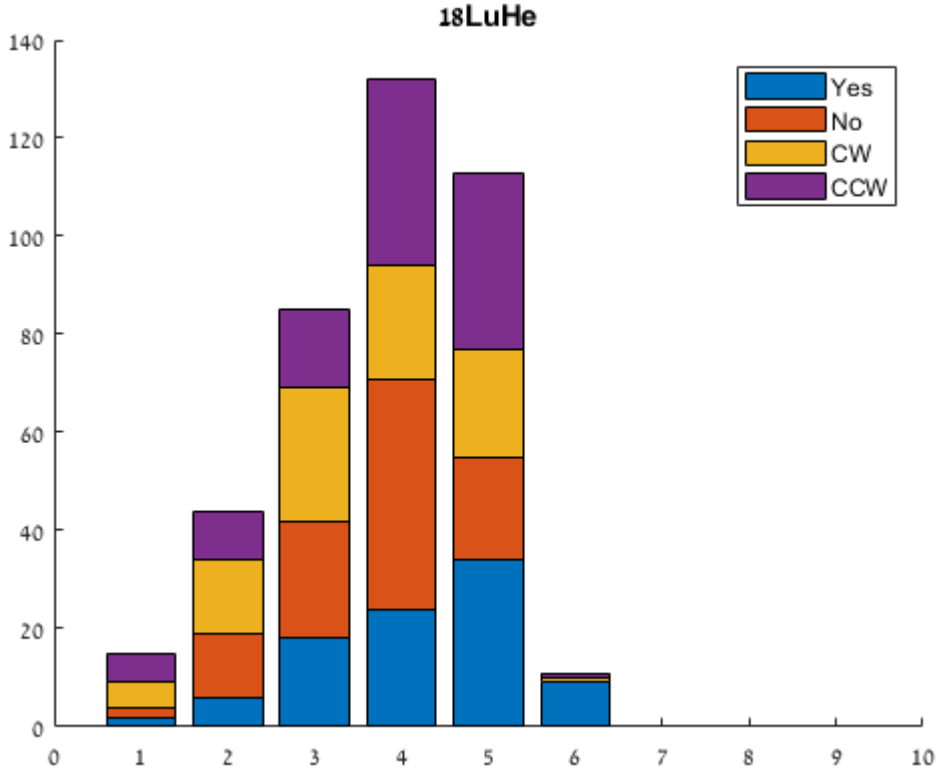
18LuHe
Yes
No
CW
CCW
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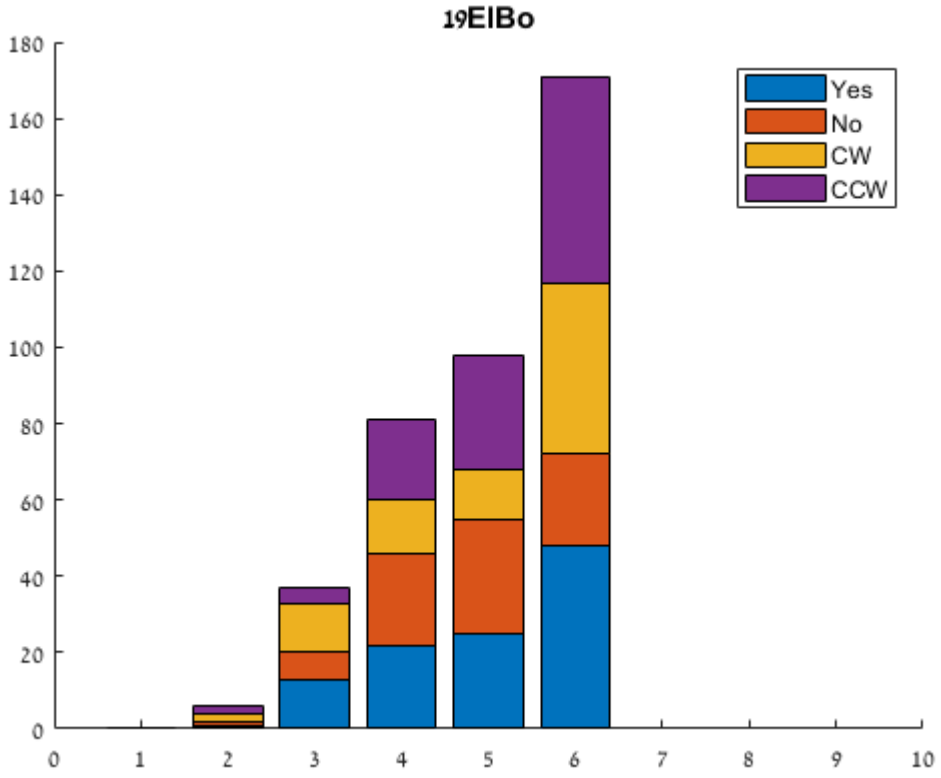
19ElBo
Yes
No
CW
CCW
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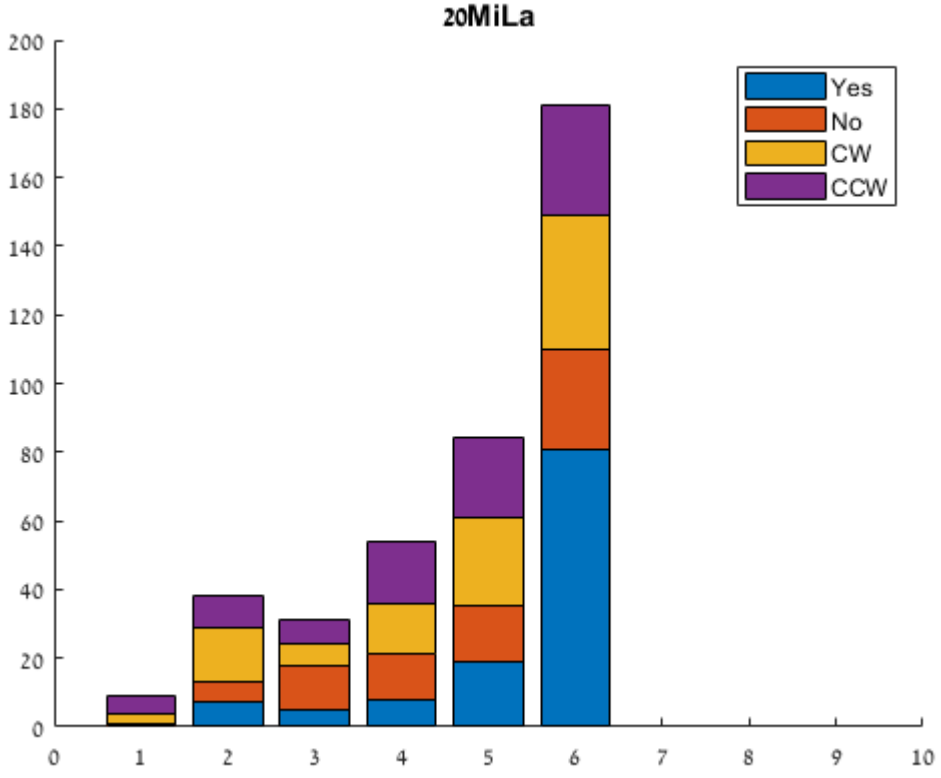
20MiLa
Yes
No
CW
CCW
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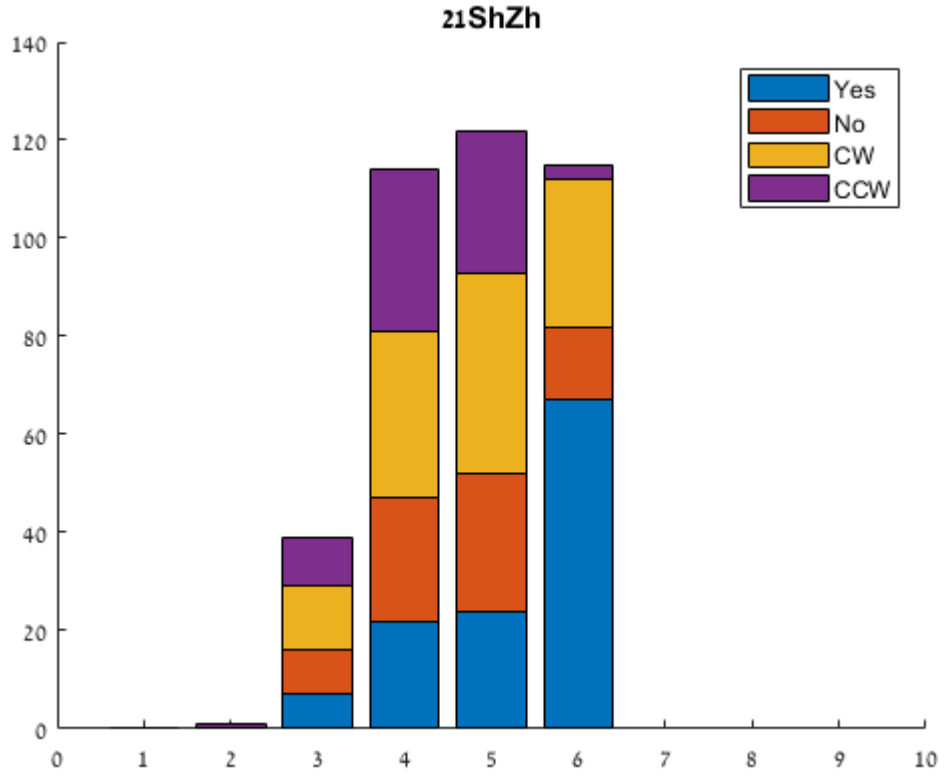


5. Response Conditional ROCs

```
[ACGroup, CCGroup,CAGroup, AAGroup] = deal([]);
[SignalYesGroup, SignalNoGroup, NoiseYesGroup, NoiseNoGroup] = deal([]);

for s=1:length(subjects)

    subject = data_struct([subjects{s}]);


    %break into taskXresponseXsignal
    DisCC = histc(subject.DisConf(subject.DisSignal==1 & subject.DisResp==1),1:6);
    DisCA = histc(subject.DisConf(subject.DisSignal==1 & subject.DisResp==0),1:6);
    DisAC = histc(subject.DisConf(subject.DisSignal==0 & subject.DisResp==1),1:6);
    DisAA = histc(subject.DisConf(subject.DisSignal==0 & subject.DisResp==0),1:6);
    DetSignalYes = histc(subject.DetConf(subject.DetSignal==1 & subject.DetResp==1),1:6);
    DetSignalNo = histc(subject.DetConf(subject.DetSignal==1 & subject.DetResp==0),1:6);
    DetNoiseYes = histc(subject.DetConf(subject.DetSignal==0 & subject.DetResp==1),1:6);
    DetNoiseNo = histc(subject.DetConf(subject.DetSignal==0 & subject.DetResp==0),1:6);


    %% plot discrimination
    figure;
    subplot(1,2,1);
    hold on;
    axis equal
```

```
    %up responses
    plot([0; cumsum(DisAC(end:-1:1))/sum(DisAC)],...
        [0; cumsum(DisCC(end:-1:1))/sum(DisCC)], '-*r');

    ACGroup = [ACGroup [0; cumsum(DisAC(end:-1:1))/sum(DisAC)]];
    CCGroup = [CCGroup [0; cumsum(DisCC(end:-1:1))/sum(DisCC)]];

    %down responses
    plot([0; cumsum(DisCA(end:-1:1))/sum(DisCA)],...
        [0; cumsum(DisAA(end:-1:1))/sum(DisAA)], '-ok');

    AAGroup = [AAGroup [0; cumsum(DisAA(end:-1:1))/sum(DisAA)]];
    CAGroup = [CAGroup [0; cumsum(DisCA(end:-1:1))/sum(DisCA)]];

    xlabel('p(conf|false positive)');
    ylabel('p(conf|hit)');
    title([subjects{s}, ': discrimination']);
    xticks(0:0.2:1); xlim([0,1]);
    yticks(0:0.2:1); ylim([0,1]);
    refline(1,0);
    legend('clockwise', 'anticlockwise', 'Location', 'southeast')

    %% plot detection
    if sum(subject.DetSignal==0 & subject.DetResp==1)>1
        subplot(1,2,2);
        hold on;
        axis equal

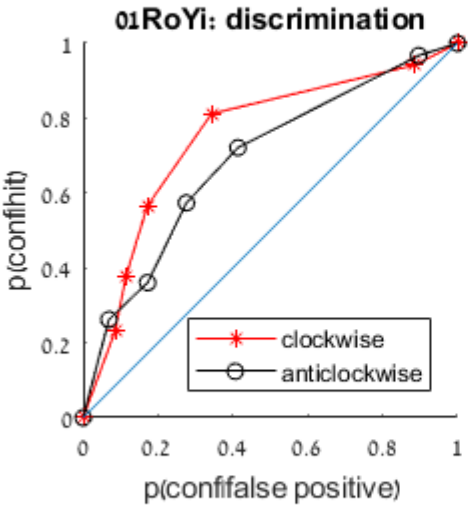
        %yes responses
        plot([0; cumsum(DetNoiseYes(end:-1:1))/sum(DetNoiseYes)],...
            [0; cumsum(DetSignalYes(end:-1:1))/sum(DetSignalYes)], '-*r');

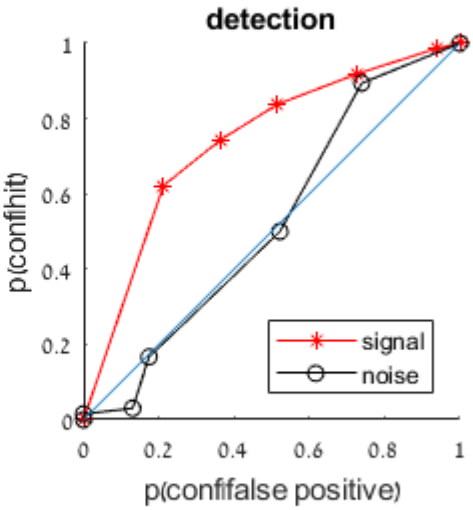
        NoiseYesGroup = [NoiseYesGroup [0; cumsum(DetNoiseYes(end:-1:1))/sum(DetNoiseYes)]];
        SignalYesGroup = [SignalYesGroup [0; cumsum(DetSignalYes(end:-1:1))/sum(DetSignalYes)]

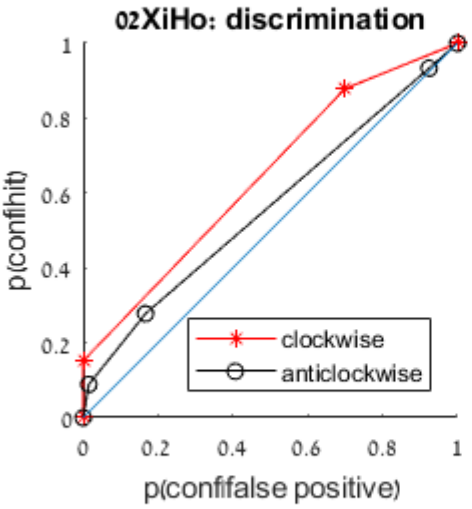
        %no responses
        plot([0; cumsum(DetSignalNo(end:-1:1))/sum(DetSignalNo)],...
            [0; cumsum(DetNoiseNo(end:-1:1))/sum(DetNoiseNo)],'-ok');

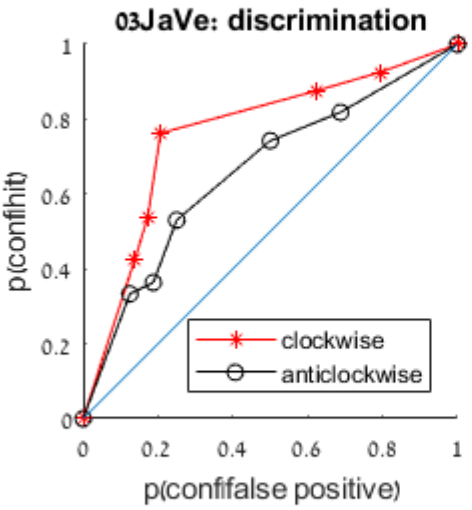
        NoiseNoGroup = [NoiseNoGroup [0; cumsum(DetNoiseNo(end:-1:1))/sum(DetNoiseNo)]];
        SignalNoGroup = [SignalNoGroup [0;
            cumsum(DetSignalNo(end:-1:1))/sum(DetSignalNo)]];

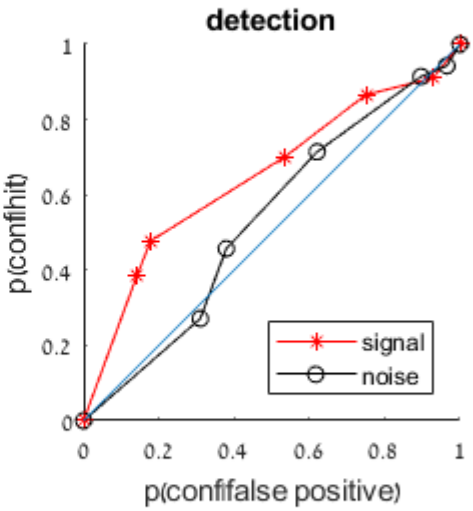
        xlabel('p(conf|false positive)');
        ylabel('p(conf|hit)');
        title('detection');
        xticks(0:0.2:1); xlim([0,1]);
        yticks(0:0.2:1); ylim([0,1]);
        refline(1,0);
        legend('signal', 'noise', 'Location', 'southeast')
    end
end
```

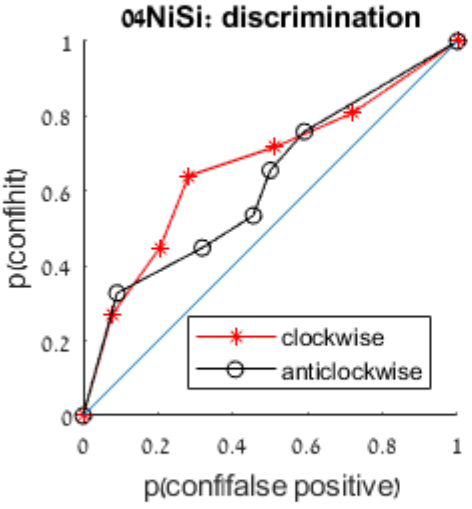

01RoYi: discrimination
p(confihit)
p(confifalse positive)
clockwise
anticlockwise
0
0.2
0.4
0.6
0.8
1

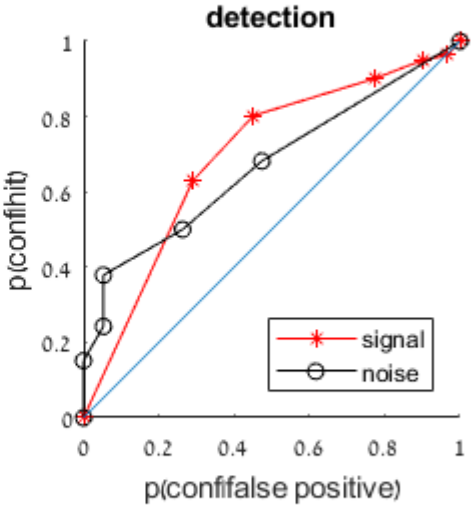

detection
p(confihit)
p(confifalse positive)
signal
noise
0
0.2
0.4
0.6
0.8
1

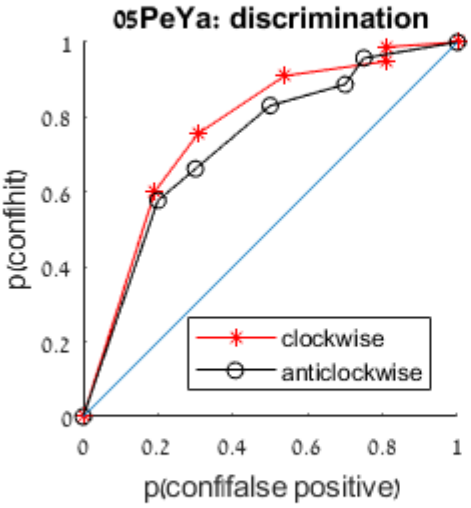

02XiHo: discrimination
p(confihit)
p(confifalse positive)
clockwise
anticlockwise
0
0.2
0.4
0.6
0.8
1

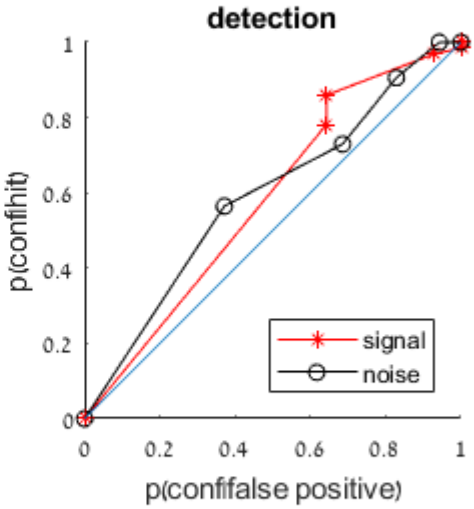

03JaVe: discrimination
p(confihit)
p(confifalse positive)
clockwise
anticlockwise
0
0.2
0.4
0.6
0.8
1

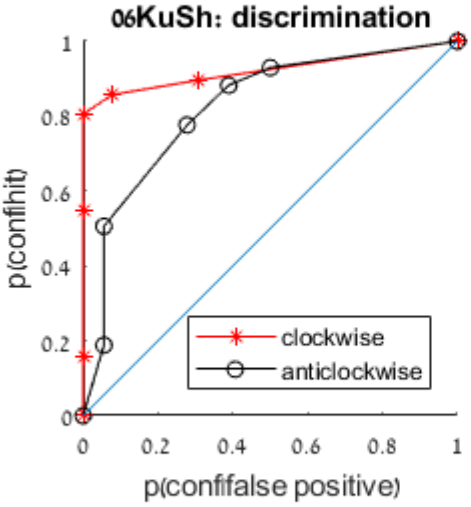

detection
p(confihit)
p(confifalse positive)
signal
noise
0
0.2
0.4
0.6
0.8
1

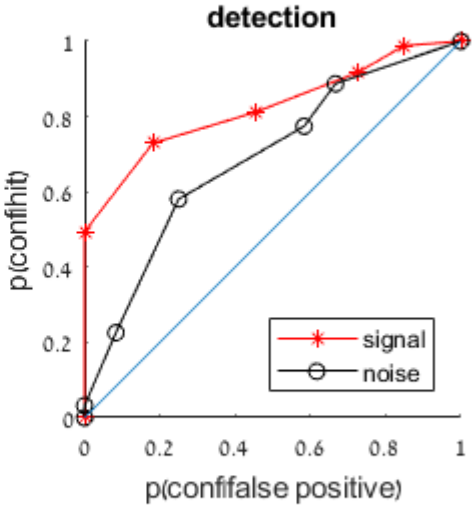

04NiSi: discrimination
p(confihit)
p(confifalse positive)
clockwise
anticlockwise
0
0.2
0.4
0.6
0.8
1

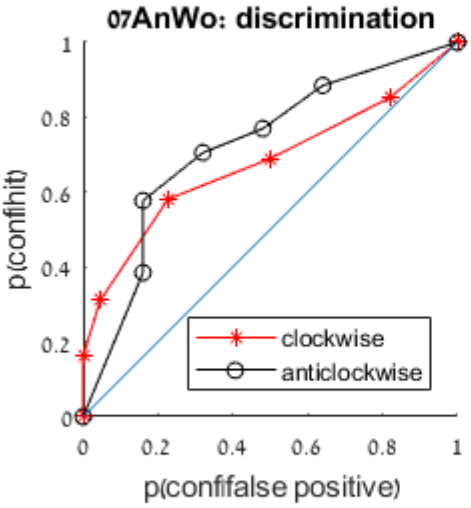

detection
p(confihit)
p(confifalse positive)
signal
noise
0
0.2
0.4
0.6
0.8
1

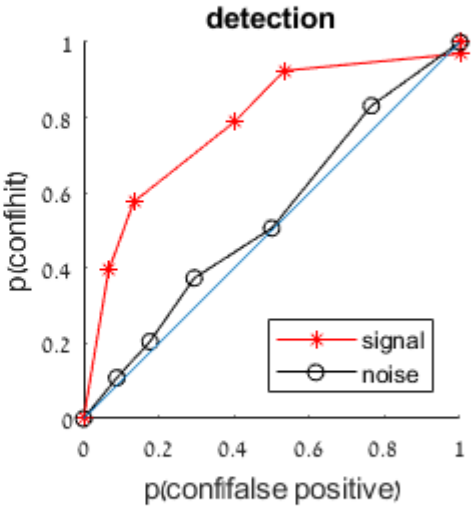

05PeYa: discrimination
p(confihit)
p(confifalse positive)
clockwise
anticlockwise

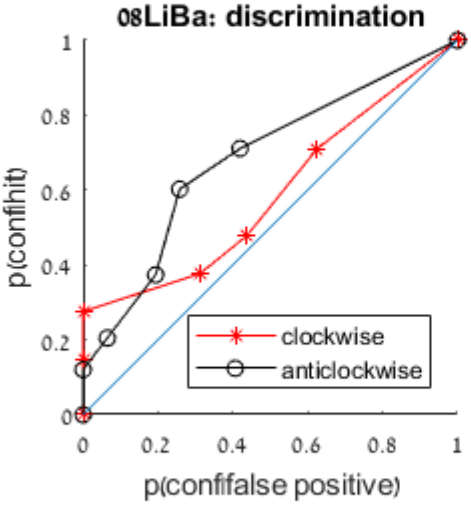

detection
p(confihit)
p(confifalse positive)
signal
noise

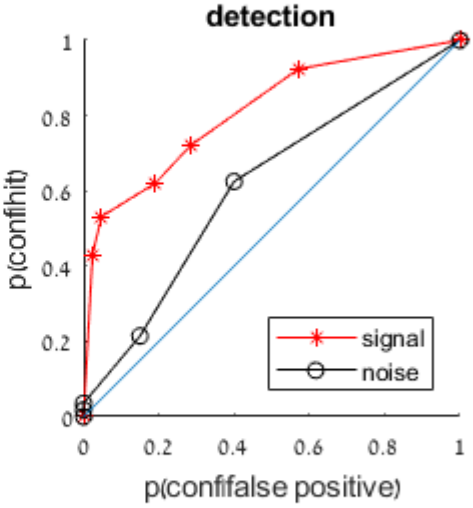

06KuSh: discrimination
p(confihit)
p(confifalse positive)
clockwise
anticlockwise

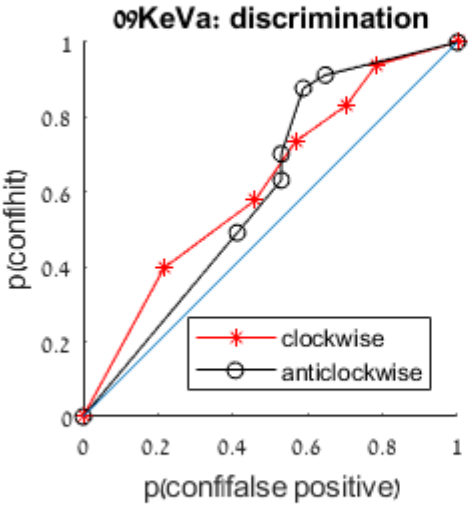

detection
p(confihit)
p(confifalse positive)
signal
noise

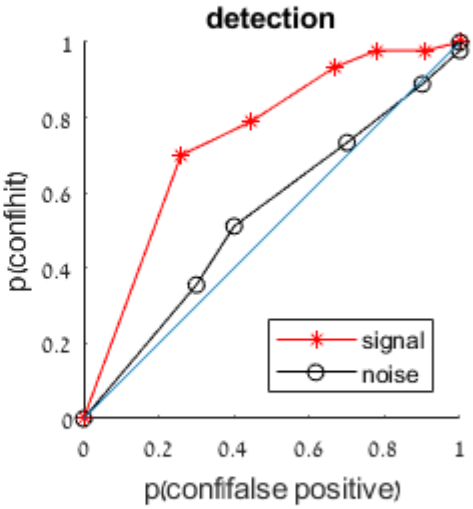

07AnWo: discrimination
p(confihit)
p(confifalse positive)
clockwise
anticlockwise
0
0.2
0.4
0.6
0.8
1

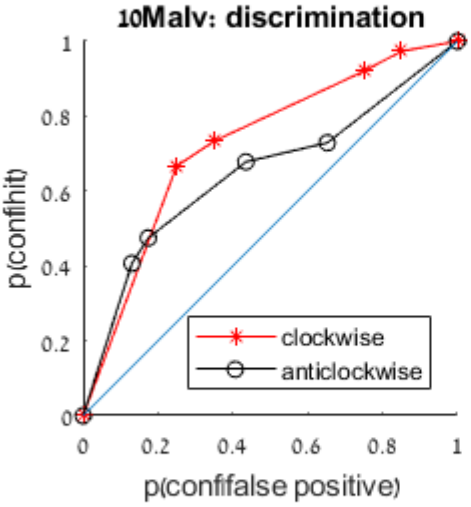

detection
p(confihit)
p(confifalse positive)
signal
noise
0
0.2
0.4
0.6
0.8
1

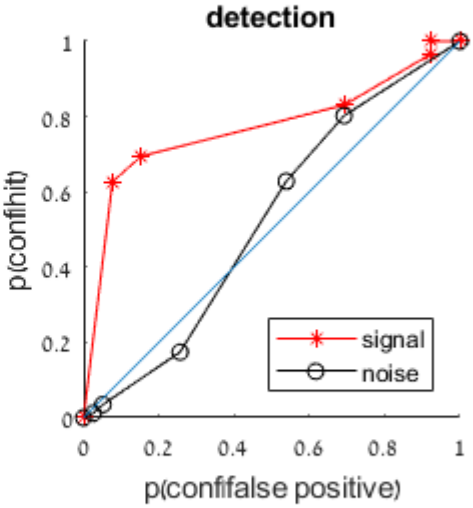

08LiBa: discrimination
p(confihit)
p(confifalse positive)
clockwise
anticlockwise
0
0.2
0.4
0.6
0.8
1

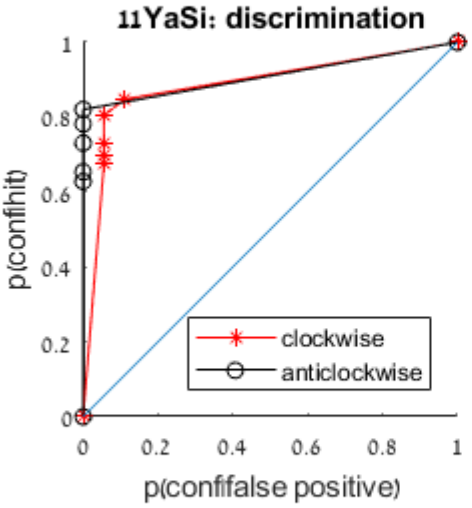

detection
p(confihit)
p(confifalse positive)
signal
noise
0
0.2
0.4
0.6
0.8
1

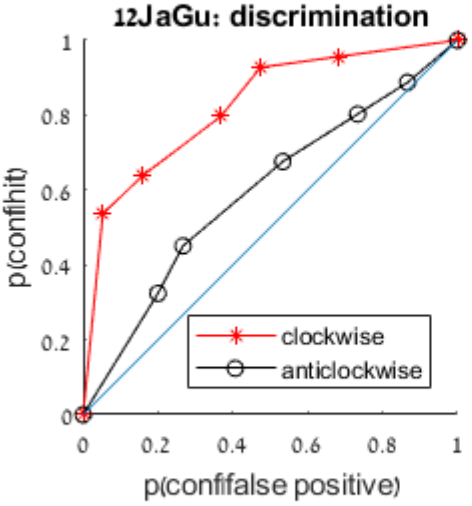

09KeVa: discrimination
p(confihit)
p(confifalse positive)
clockwise
anticlockwise
0
0.2
0.4
0.6
0.8
1

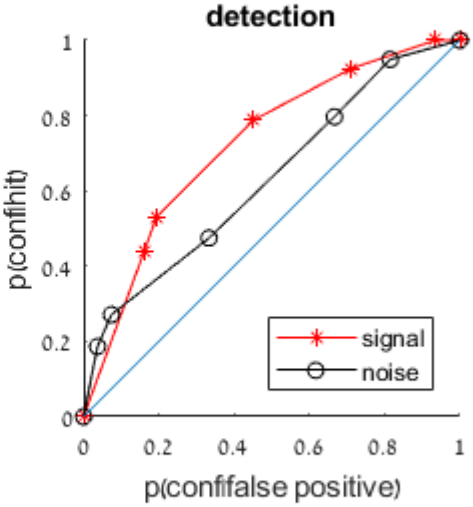

detection
p(confihit)
p(confifalse positive)
signal
noise
0
0.2
0.4
0.6
0.8
1

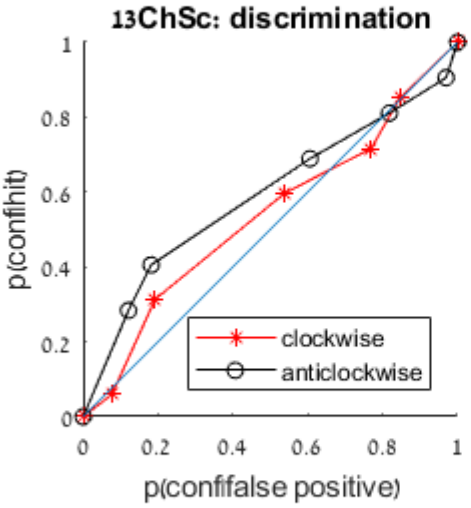

10Malv: discrimination
p(confihit)
p(confifalse positive)
clockwise
anticlockwise
0
0.2
0.4
0.6
0.8
1

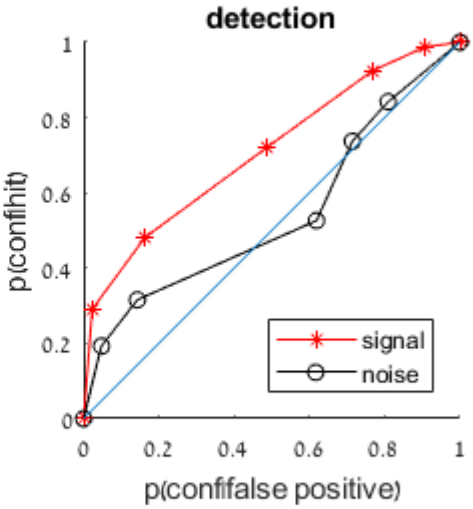

detection
p(confihit)
p(confifalse positive)
signal
noise
0
0.2
0.4
0.6
0.8
1

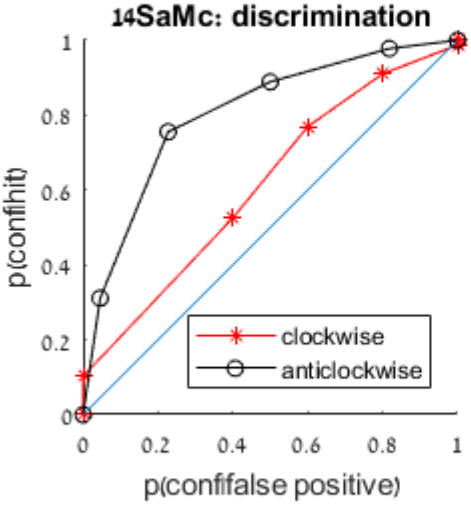

11YaSi: discrimination
p(confihit)
p(confifalse positive)
clockwise
anticlockwise

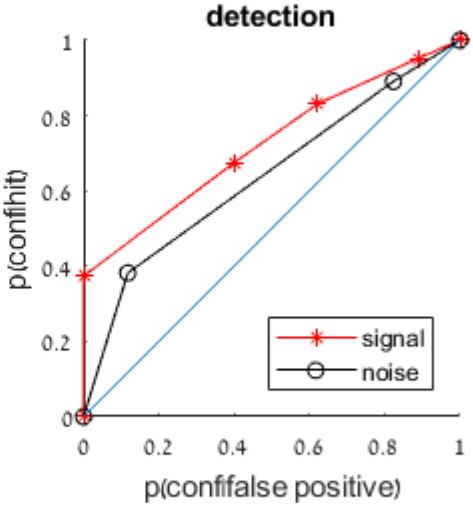

12JaGu: discrimination
p(confihit)
p(confifalse positive)
clockwise
anticlockwise

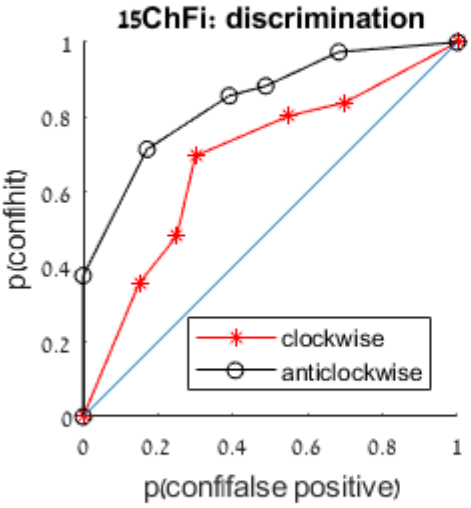

detection
p(confihit)
p(confifalse positive)
signal
noise

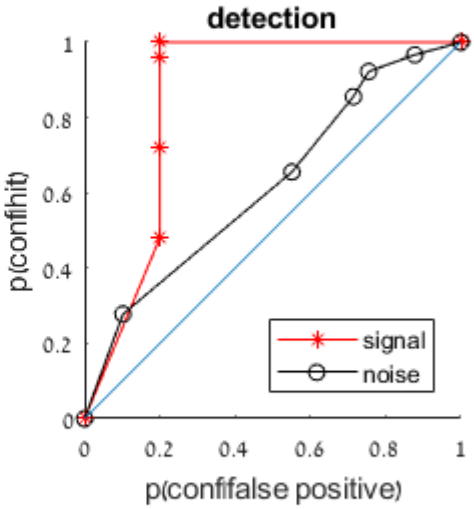

13ChSc: discrimination
p(confihit)
p(confifalse positive)
clockwise
anticlockwise
0
0.2
0.4
0.6
0.8
1

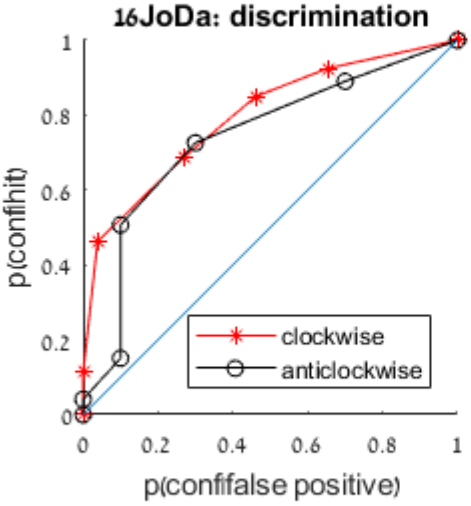

detection
p(confihit)
p(confifalse positive)
signal
noise
0
0.2
0.4
0.6
0.8
1

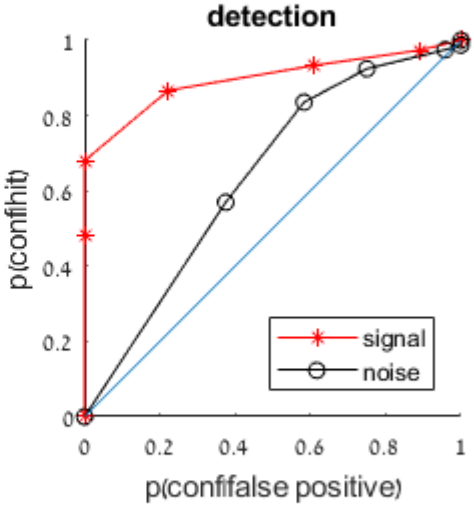

14SaMc: discrimination
p(confihit)
p(confifalse positive)
clockwise
anticlockwise
0
0.2
0.4
0.6
0.8
1

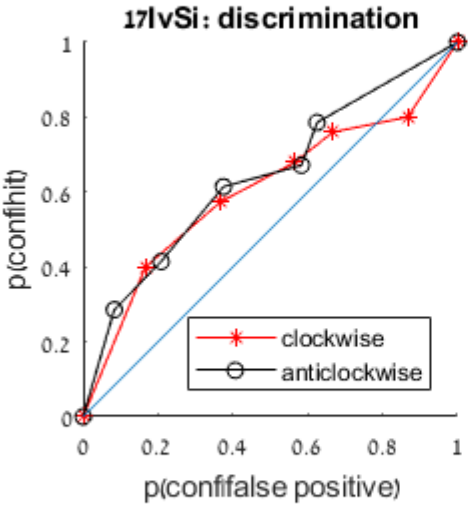

detection
p(confihit)
p(confifalse positive)
signal
noise
0
0.2
0.4
0.6
0.8
1

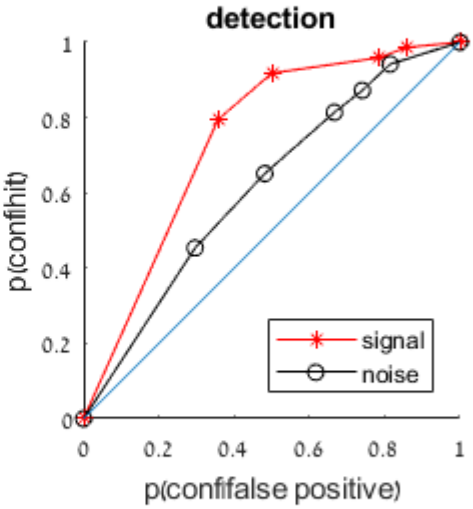

15ChFi: discrimination
p(confihit)
p(confifalse positive)
clockwise
anticlockwise

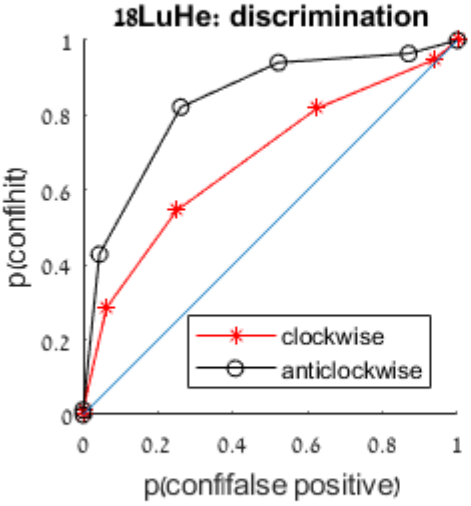

detection
p(confihit)
p(confifalse positive)
signal
noise

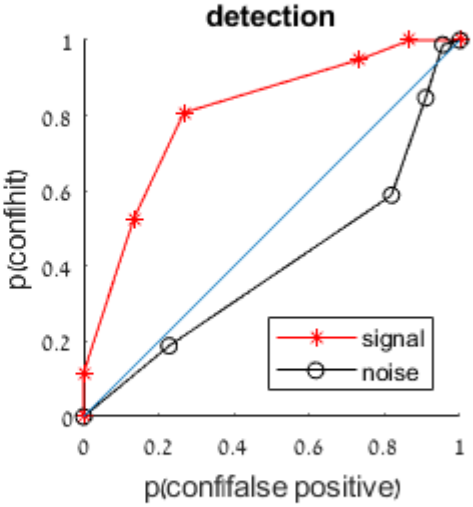

16JoDa: discrimination
p(confihit)
p(confifalse positive)
clockwise
anticlockwise

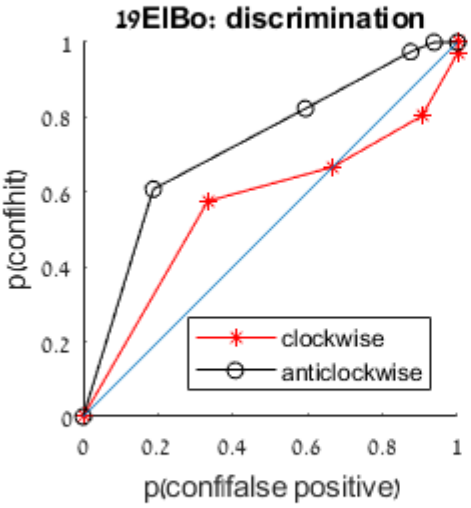

detection
p(confihit)
p(confifalse positive)
signal
noise

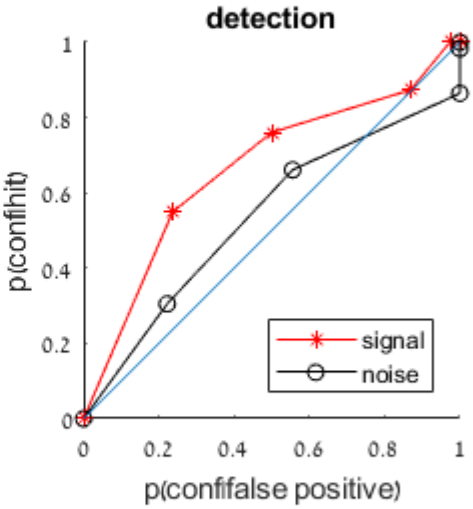

17lvSi: discrimination
p(confihit)
p(confifalse positive)
clockwise
anticlockwise
0
0.2
0.4
0.6
0.8
1

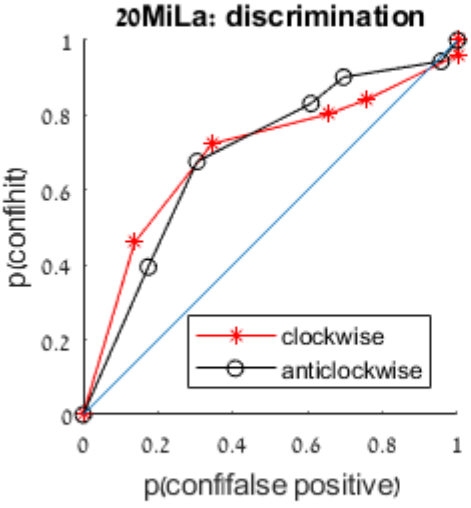

detection
p(confihit)
p(confifalse positive)
signal
noise
0
0.2
0.4
0.6
0.8
1

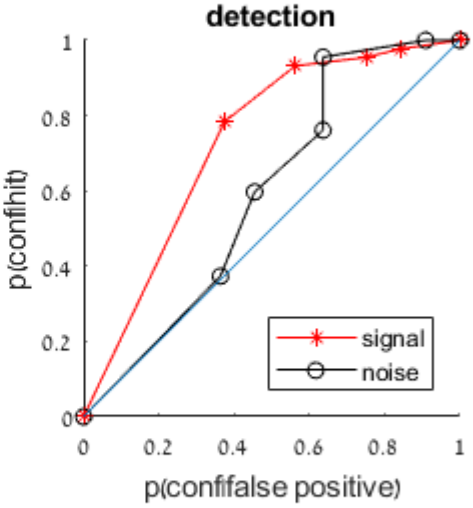

18LuHe: discrimination
p(confihit)
p(confifalse positive)
clockwise
anticlockwise
0
0.2
0.4
0.6
0.8
1

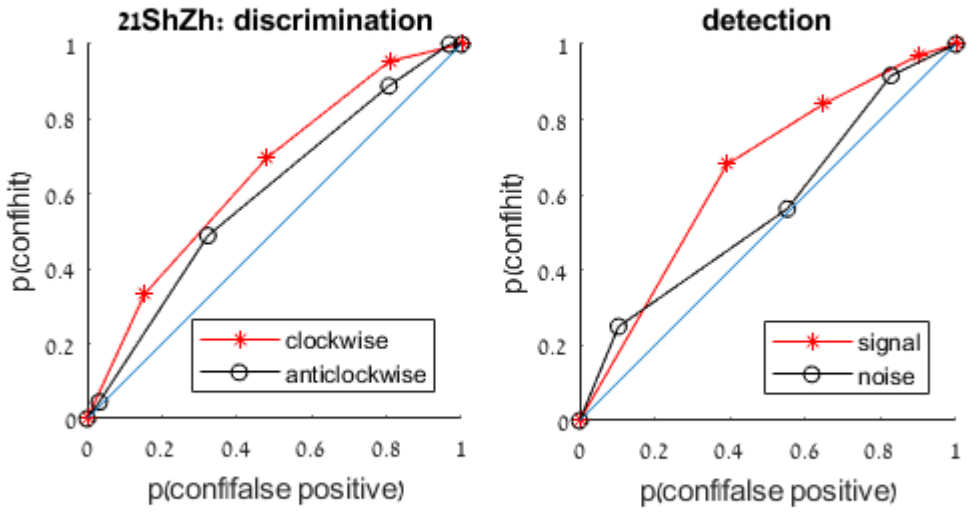

detection
p(confihit)
p(confifalse positive)
signal
noise
0
0.2
0.4
0.6
0.8
1


19ElBo: discrimination
p(confihit)
p(confifalse positive)
clockwise
anticlockwise
0
0.2
0.4
0.6
0.8
1


detection
p(confihit)
p(confifalse positive)
signal
noise
0
0.2
0.4
0.6
0.8
1


20MiLa: discrimination
p(confihit)
p(confifalse positive)
clockwise
anticlockwise
0
0.2
0.4
0.6
0.8
1


detection
p(confihit)
p(confifalse positive)
signal
noise
0
0.2
0.4
0.6
0.8
1



Association between confidence and response times

Here are the correlations between RT and confidence, as a function of task and response. It seems like the negative correlation between RT and confidence is indeed weaker for 'no' responses.

```
for s=1:length(subjects)

    subject = data_struct(subjects{s});

    yesConf = subject.DetConf(subject.DetResp==1);
    yesRT = log(subject.DetRT(subject.DetResp==1));

    noConf = subject.DetConf(subject.DetResp==0);
    noRT = log(subject.DetRT(subject.DetResp==0));

    upConf = subject.DisConf(subject.DisResp==1);
    upRT = log(subject.DisRT(subject.DisResp==1));

    downConf = subject.DisConf(subject.DisResp==0);
    downRT = log(subject.DisRT(subject.DisResp==0));

meanYesRT = [];
meanNoRT = [];
meanDownRT = [];
meanUpRT = [];

for rating = 1:6
```

```
    meanYesRT = [meanYesRT mean(yesRT(yesConf==rating))];
    meanNoRT = [meanNoRT mean(noRT(noConf==rating))];
    meanDownRT = [meanDownRT mean(downRT(downConf==rating))];
    meanUpRT = [meanUpRT mean(upRT(upConf==rating))];
end

figure;
subplot(1,2,1);
hold on;
pbaspect([1 1 1])

plot(1:6, meanUpRT, 'r*')
scatter(1:6, meanDownRT, 'ko')
lsline()
xlabel('confidence rating');
ylabel('log RT');
title([subjects{s}, ': discrimination']);
legend('clockwise', 'anticlockwise', 'Location', 'southwest')

subplot(1,2,2);
hold on;
pbaspect([1 1 1])

plot(1:6, meanYesRT, 'r*')
scatter(1:6, meanNoRT, 'ko')
lsline()
xlabel('confidence rating');
ylabel('log RT');
title('detection');
legend('yes', 'no', 'Location', 'southwest')

   disp(sprintf('%s ------------ YES RESPONSES ------------ %.2f',...
       subjects{s}, corr(yesConf,yesRT)))

   disp(sprintf('%s ------------- NO RESPONSES ------------ %.2f',...
       subjects{s}, corr(noConf,noRT)))

   disp(sprintf('%s --------- UP/RIGHT RESPONSES ---------- %.2f',...
       subjects{s}, corr(upConf,upRT)))

  disp(sprintf('%s --------- DOWN/LEFT RESPONSES --------- %.2f',...
       subjects{s}, corr(downConf,downRT)))
  disp('-----------------------------------------------------')
  endn
```

```
01RoYi ------------ YES RESPONSES ------------ -0.52
01RoYi ------------- NO RESPONSES ------------ -0.12
01RoYi --------- UP/RIGHT RESPONSES ---------- -0.58
01RoYi --------- DOWN/LEFT RESPONSES --------- -0.46
-----------------------------------------------------
02XiHo ------------ YES RESPONSES ------------ -0.67
02XiHo ------------- NO RESPONSES ------------ 0.04
02XiHo --------- UP/RIGHT RESPONSES ---------- -0.14
```

```
02XiHo --------- DOWN/LEFT RESPONSES --------- -0.24
--------------------------------------------------
03JaVe ------------ YES RESPONSES ------------ -0.53
03JaVe ------------- NO RESPONSES ------------ -0.46
03JaVe --------- UP/RIGHT RESPONSES ---------- -0.48
03JaVe --------- DOWN/LEFT RESPONSES --------- -0.58
--------------------------------------------------
04NiSi ------------ YES RESPONSES ------------ -0.47
04NiSi ------------- NO RESPONSES ------------ -0.45
04NiSi --------- UP/RIGHT RESPONSES ---------- -0.51
04NiSi --------- DOWN/LEFT RESPONSES --------- -0.70
--------------------------------------------------
05PeYa ------------ YES RESPONSES ------------ -0.45
05PeYa ------------- NO RESPONSES ------------ -0.31
05PeYa --------- UP/RIGHT RESPONSES ---------- -0.34
05PeYa --------- DOWN/LEFT RESPONSES --------- -0.32
--------------------------------------------------
06KuSh ------------ YES RESPONSES ------------ -0.28
06KuSh ------------- NO RESPONSES ------------ -0.32
06KuSh --------- UP/RIGHT RESPONSES ---------- -0.36
06KuSh --------- DOWN/LEFT RESPONSES --------- -0.30
--------------------------------------------------
07AnWo ------------ YES RESPONSES ------------ -0.68
07AnWo ------------- NO RESPONSES ------------ -0.27
07AnWo --------- UP/RIGHT RESPONSES ---------- -0.59
07AnWo --------- DOWN/LEFT RESPONSES --------- -0.59
--------------------------------------------------
08LiBa ------------ YES RESPONSES ------------ -0.65
08LiBa ------------- NO RESPONSES ------------ -0.43
08LiBa --------- UP/RIGHT RESPONSES ---------- -0.54
08LiBa --------- DOWN/LEFT RESPONSES --------- -0.55
--------------------------------------------------
09KeVa ------------ YES RESPONSES ------------ -0.50
09KeVa ------------- NO RESPONSES ------------ -0.31
09KeVa --------- UP/RIGHT RESPONSES ---------- -0.45
09KeVa --------- DOWN/LEFT RESPONSES --------- -0.58
--------------------------------------------------
10MaIv ------------ YES RESPONSES ------------ -0.63
10MaIv ------------- NO RESPONSES ------------ -0.33
10MaIv --------- UP/RIGHT RESPONSES ---------- -0.34
10MaIv --------- DOWN/LEFT RESPONSES --------- -0.52
--------------------------------------------------
11YaSi ------------ YES RESPONSES ------------ -0.24
11YaSi ------------- NO RESPONSES ------------ -0.36
11YaSi --------- UP/RIGHT RESPONSES ---------- -0.21
11YaSi --------- DOWN/LEFT RESPONSES --------- -0.51
--------------------------------------------------
12JaGu ------------ YES RESPONSES ------------ -0.23
12JaGu ------------- NO RESPONSES ------------ -0.16
12JaGu --------- UP/RIGHT RESPONSES ---------- -0.46
12JaGu --------- DOWN/LEFT RESPONSES --------- -0.30
```

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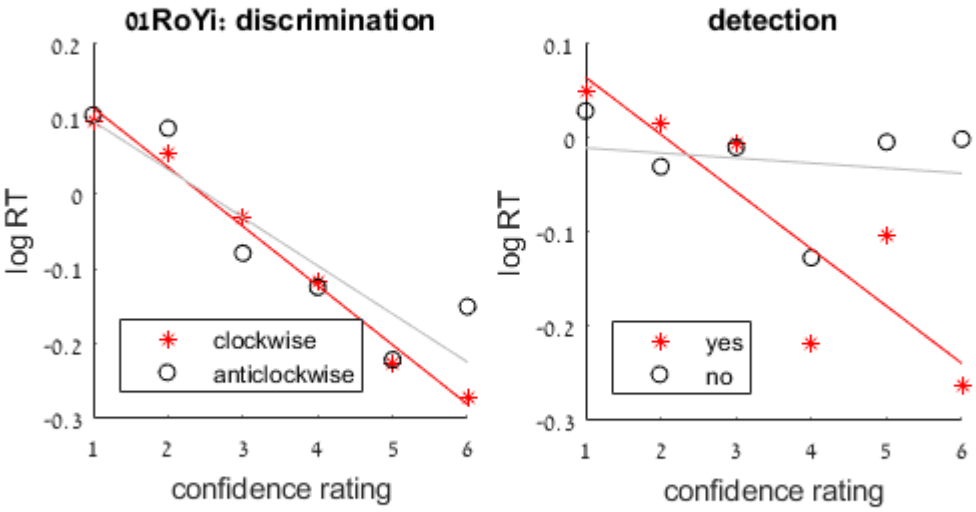
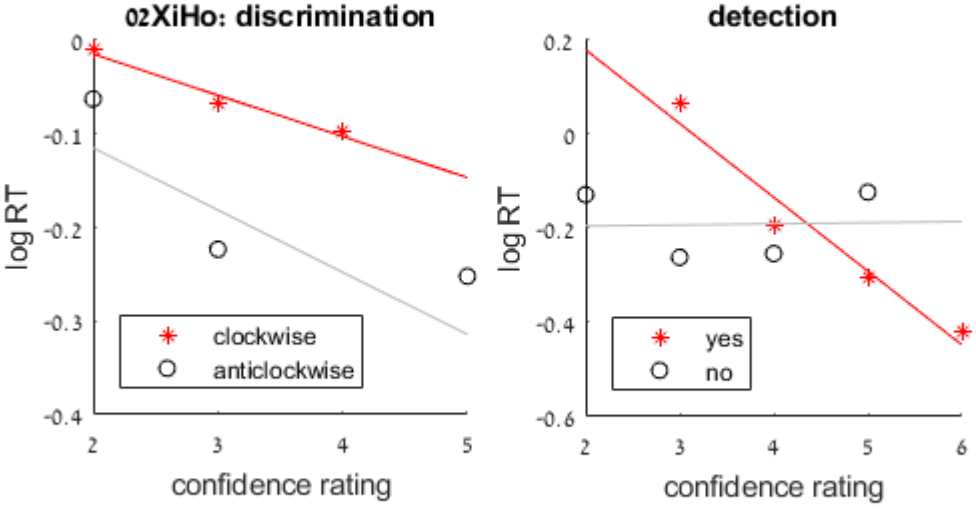
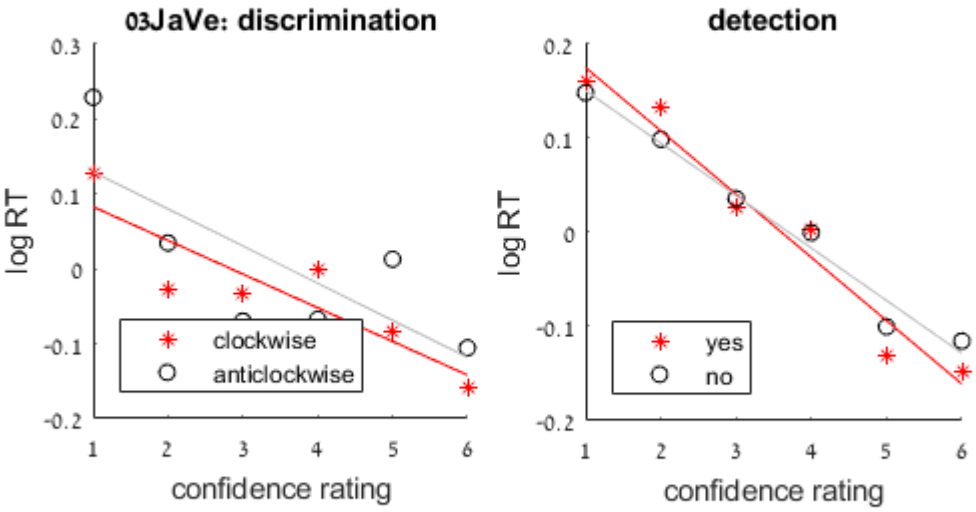
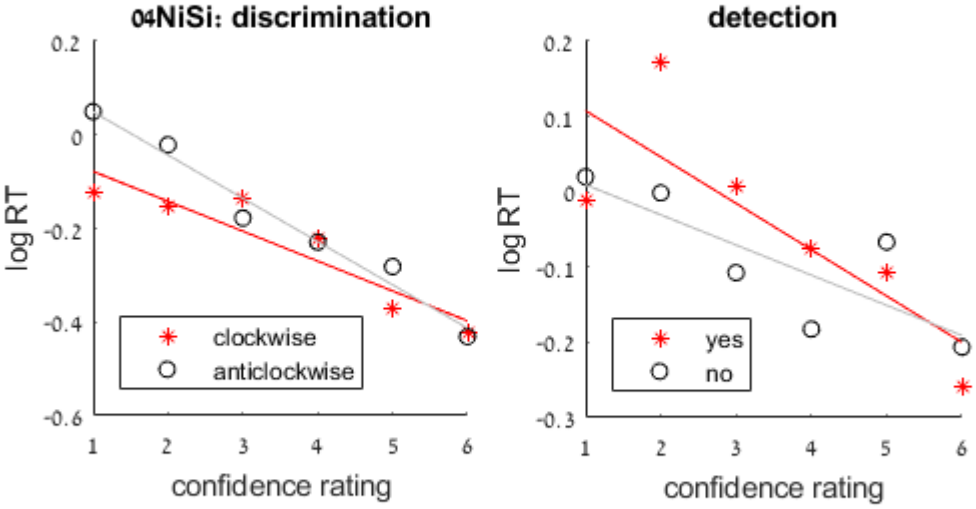
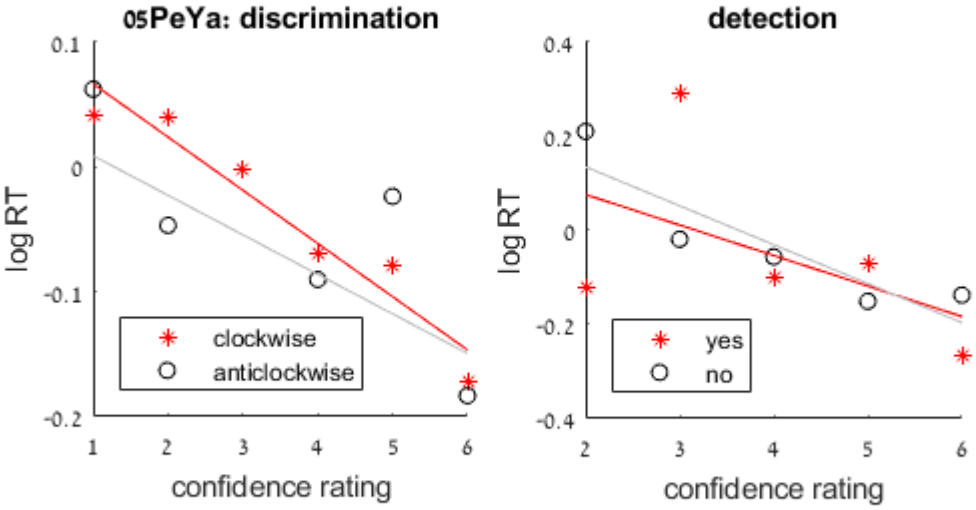
--------------------------------------------------
13ChSc ------------ YES RESPONSES ------------ -0.31
13ChSc ------------- NO RESPONSES ------------ -0.28
13ChSc --------- UP/RIGHT RESPONSES ---------- -0.33
13ChSc --------- DOWN/LEFT RESPONSES --------- -0.36
--------------------------------------------------
14SaMc ------------ YES RESPONSES ------------ -0.59
14SaMc ------------- NO RESPONSES ------------ -0.46
14SaMc --------- UP/RIGHT RESPONSES ---------- -0.35
14SaMc --------- DOWN/LEFT RESPONSES --------- -0.61
--------------------------------------------------
15ChFi ------------ YES RESPONSES ------------ -0.13
15ChFi ------------- NO RESPONSES ------------ -0.40
15ChFi --------- UP/RIGHT RESPONSES ---------- -0.07
15ChFi --------- DOWN/LEFT RESPONSES --------- -0.27
--------------------------------------------------
16JoDa ------------ YES RESPONSES ------------ -0.67
16JoDa ------------- NO RESPONSES ------------ -0.59
16JoDa --------- UP/RIGHT RESPONSES ---------- -0.48
16JoDa --------- DOWN/LEFT RESPONSES --------- -0.40
--------------------------------------------------
17IvSi ------------ YES RESPONSES ------------ -0.61
17IvSi ------------- NO RESPONSES ------------ -0.48
17IvSi --------- UP/RIGHT RESPONSES ---------- -0.31
17IvSi --------- DOWN/LEFT RESPONSES --------- -0.63
--------------------------------------------------
18LuHe ------------ YES RESPONSES ------------ -0.49
18LuHe ------------- NO RESPONSES ------------ -0.23
18LuHe --------- UP/RIGHT RESPONSES ---------- -0.12
18LuHe --------- DOWN/LEFT RESPONSES --------- -0.15
--------------------------------------------------
19ElBo ------------ YES RESPONSES ------------ -0.73
19ElBo ------------- NO RESPONSES ------------ -0.57
19ElBo --------- UP/RIGHT RESPONSES ---------- -0.76
19ElBo --------- DOWN/LEFT RESPONSES --------- -0.76
--------------------------------------------------
20MiLa ------------ YES RESPONSES ------------ -0.66
20MiLa ------------- NO RESPONSES ------------ -0.54
20MiLa --------- UP/RIGHT RESPONSES ---------- -0.40
20MiLa --------- DOWN/LEFT RESPONSES --------- -0.38
--------------------------------------------------
21ShZh ------------ YES RESPONSES ------------ -0.29
21ShZh ------------- NO RESPONSES ------------ -0.31
21ShZh --------- UP/RIGHT RESPONSES ---------- -0.20
21ShZh --------- DOWN/LEFT RESPONSES --------- -0.08
--------------------------------------------------
```

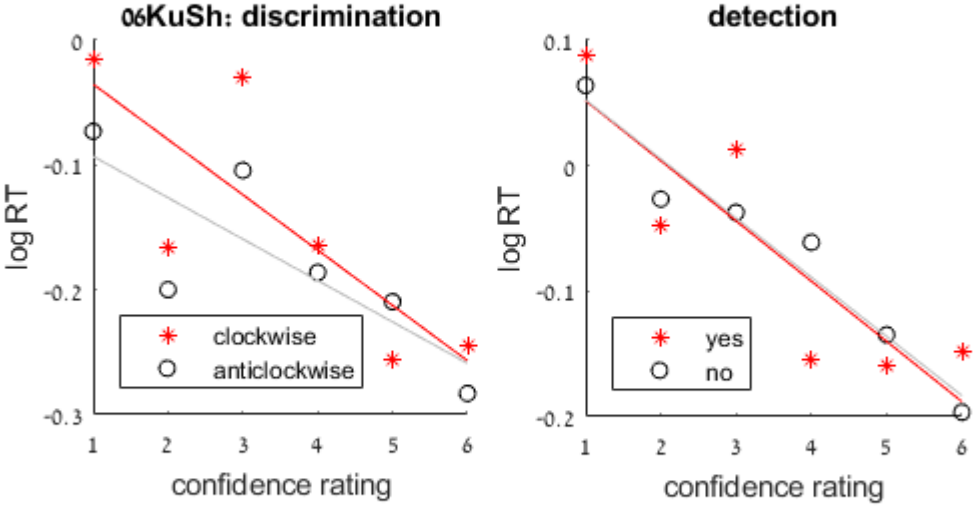

01RoYi: discrimination
log RT
confidence rating
clockwise
anticlockwise
detection
log RT
confidence rating
yes
no

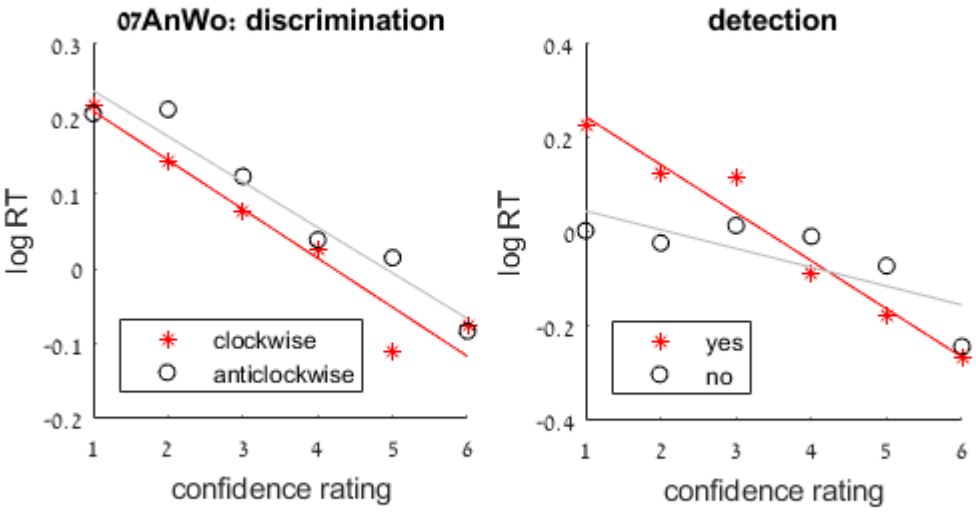

02XiHo: discrimination
log RT
confidence rating
clockwise
anticlockwise
detection
log RT
confidence rating
yes
no

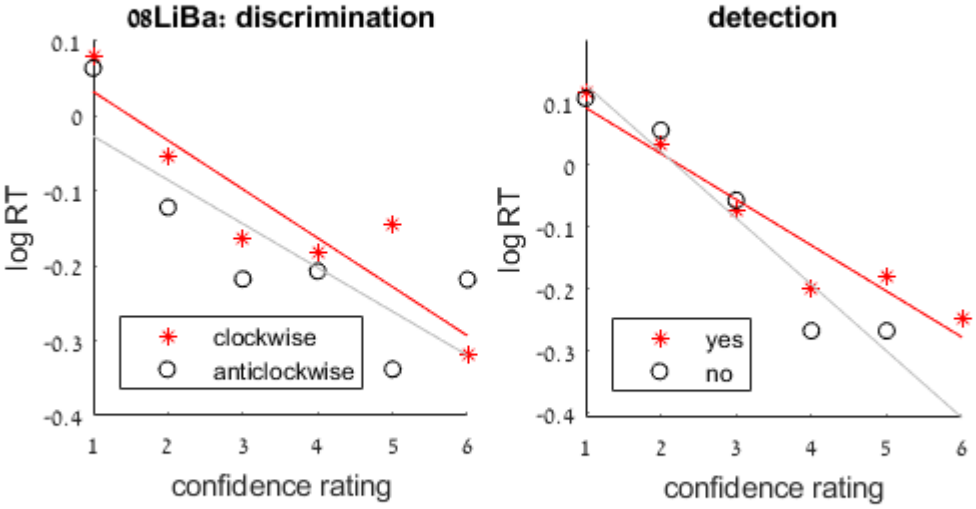

03JaVe: discrimination
log RT
confidence rating
clockwise
anticlockwise
detection
log RT
confidence rating
yes
no

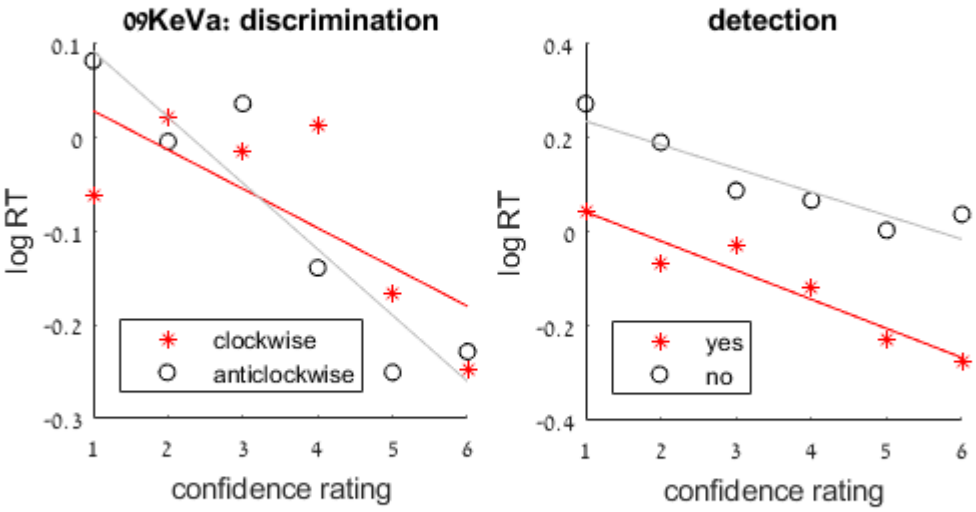

04NiSi: discrimination
log RT
confidence rating
clockwise
anticlockwise
detection
log RT
confidence rating
yes
no

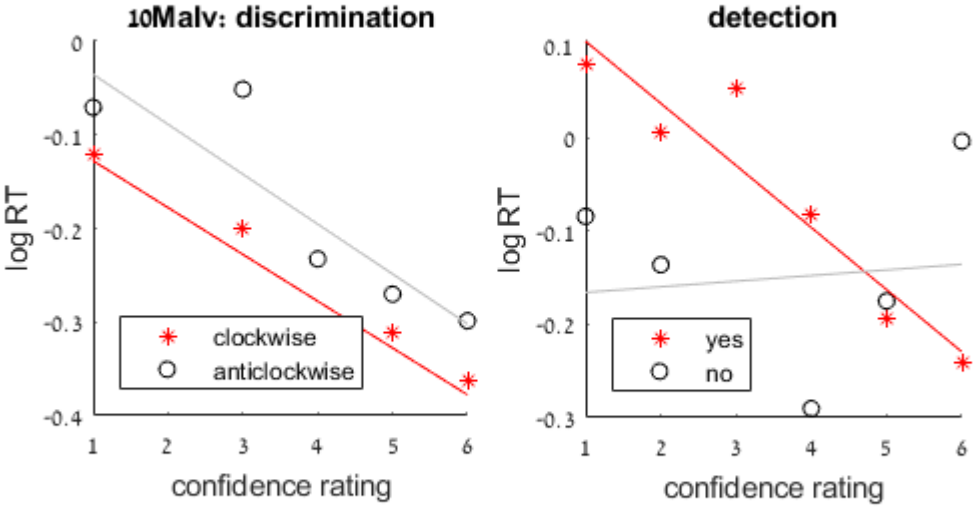

05PeYa: discrimination
log RT
confidence rating
clockwise
anticlockwise
detection
log RT
confidence rating
yes
no

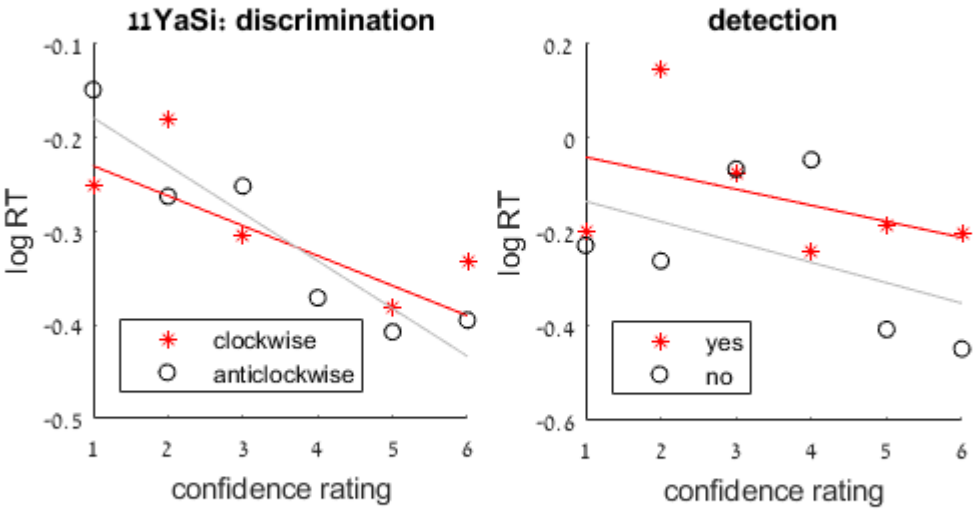

06KuSh: discrimination
log RT
confidence rating
clockwise
anticlockwise
detection
log RT
confidence rating
yes
no

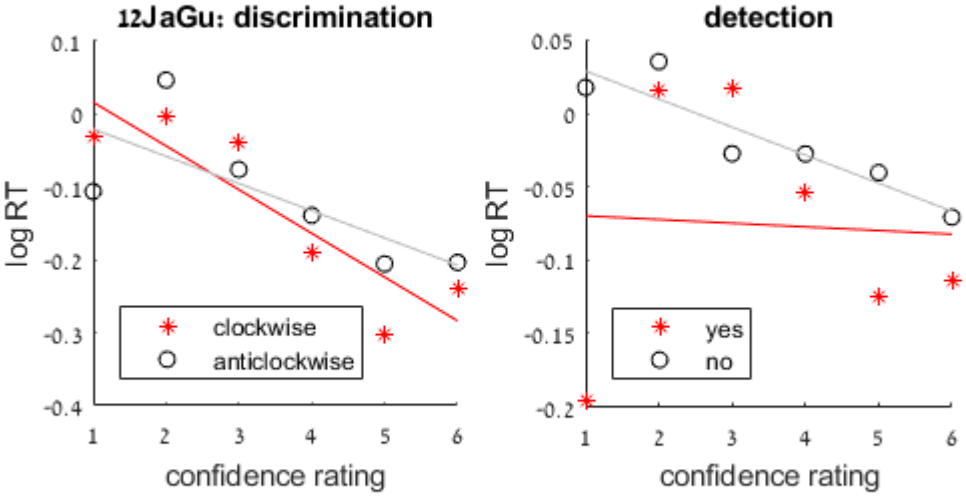

07AnWo: discrimination
log RT
confidence rating
clockwise
anticlockwise
detection
log RT
confidence rating
yes
no

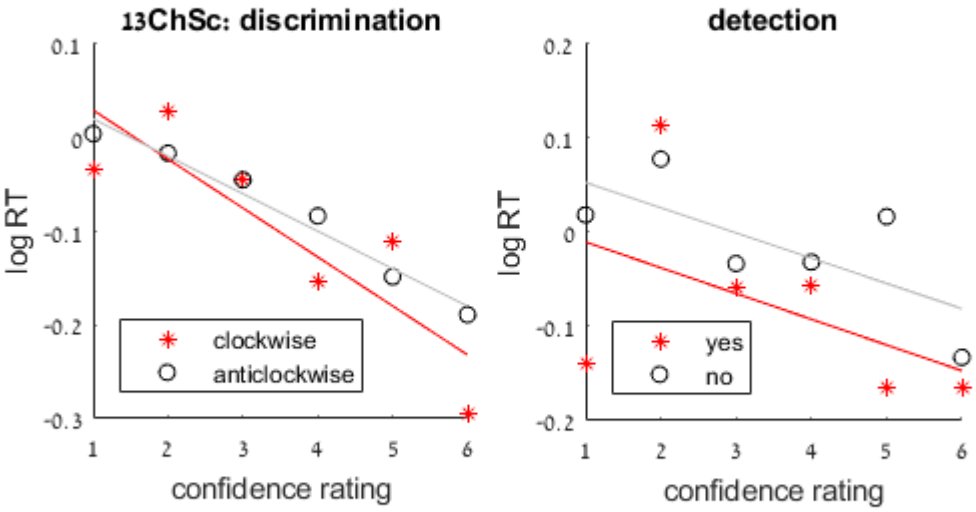

08LiBa: discrimination
log RT
confidence rating
clockwise
anticlockwise
detection
log RT
confidence rating
yes
no

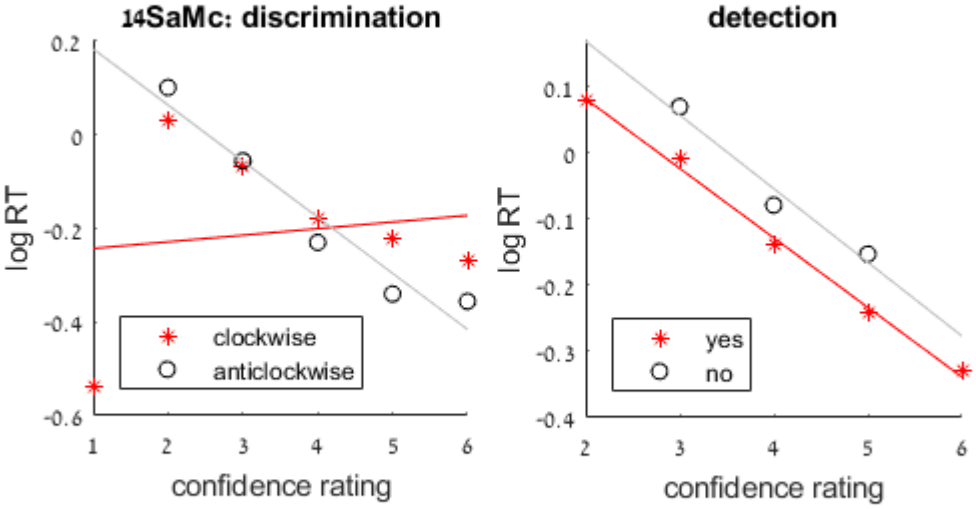

09KeVa: discrimination
log RT
confidence rating
clockwise
anticlockwise
detection
log RT
confidence rating
yes
no

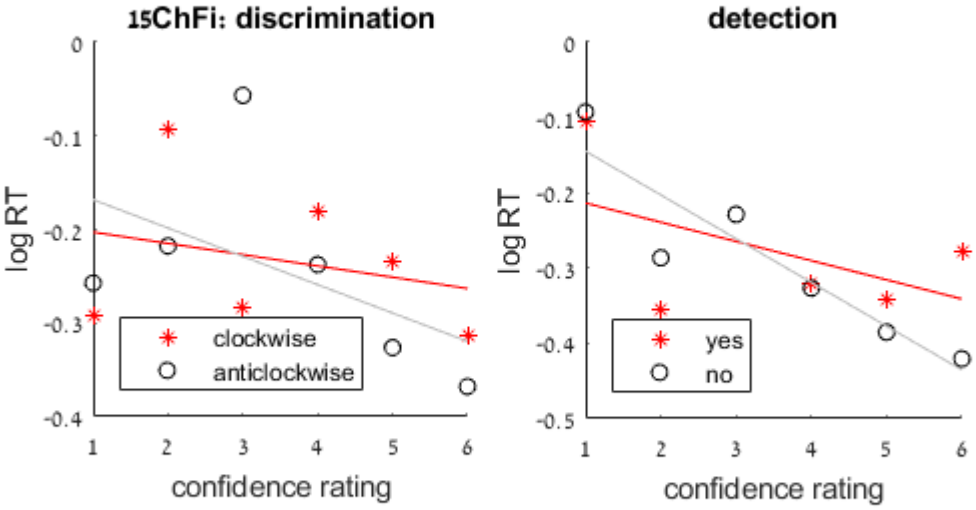

10Malv: discrimination
log RT
confidence rating
clockwise
anticlockwise
detection
log RT
confidence rating
yes
no

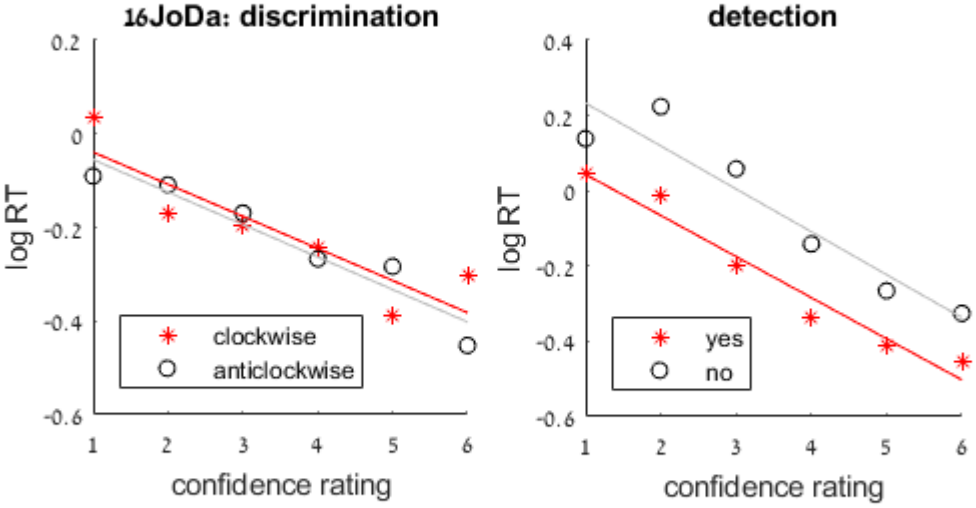

11YaSi: discrimination
log RT
confidence rating
clockwise
anticlockwise
detection
log RT
confidence rating
yes
no

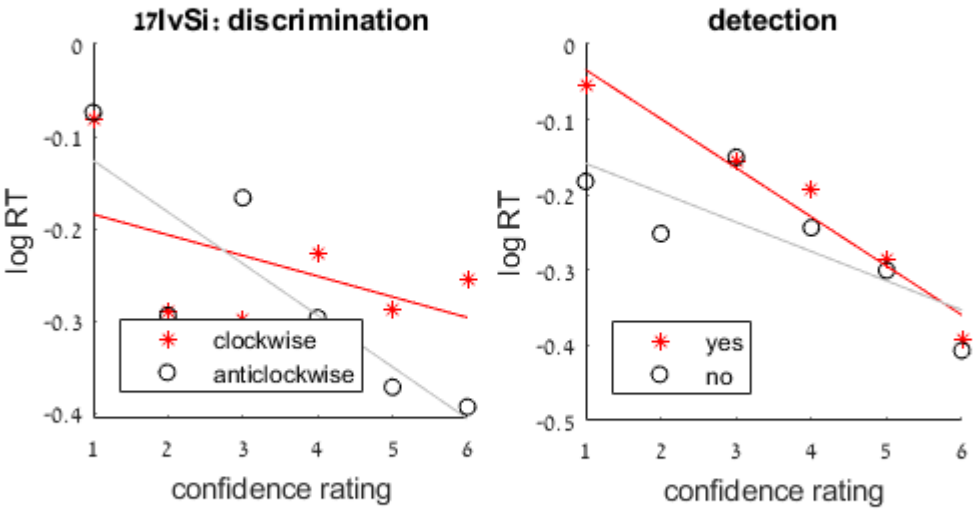

12JaGu: discrimination
log RT
confidence rating
clockwise
anticlockwise
detection
log RT
confidence rating
yes
no

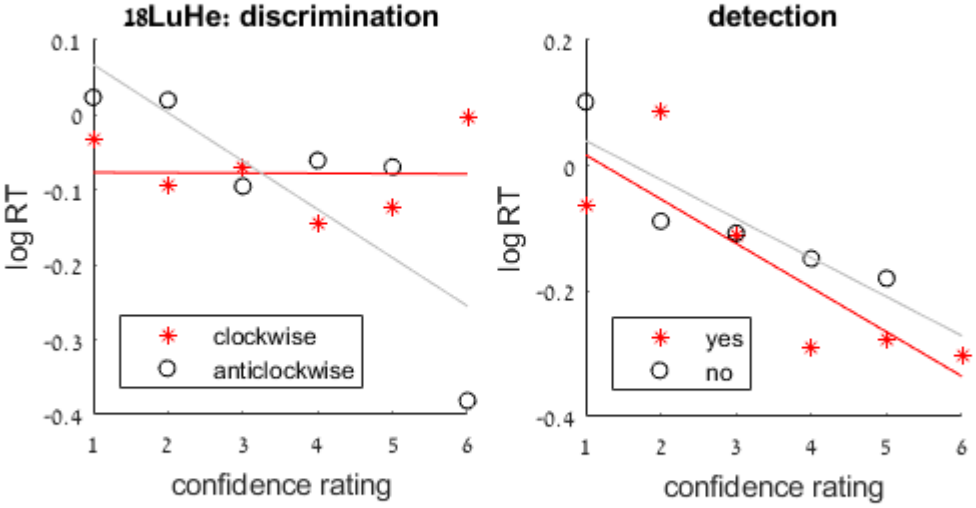

13ChSc: discrimination
log RT
confidence rating
clockwise
anticlockwise
detection
log RT
confidence rating
yes
no

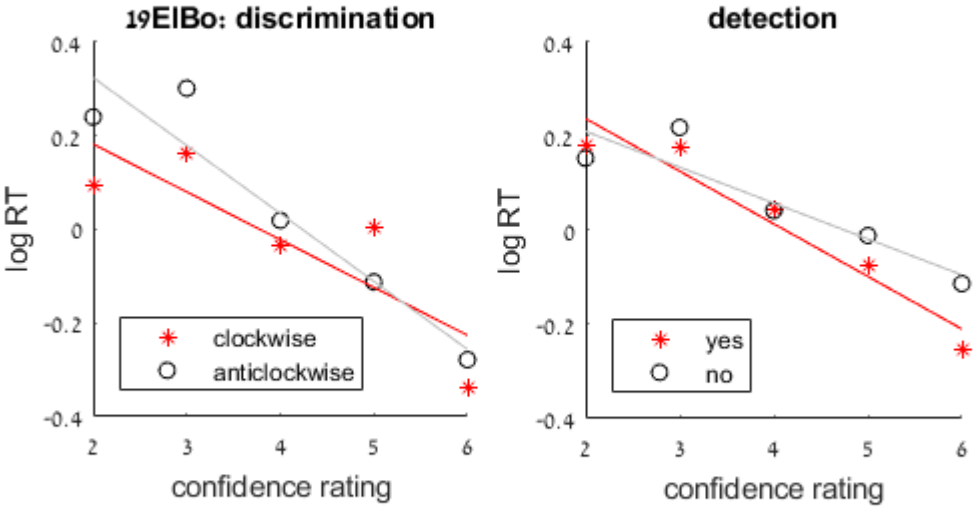

14SaMc: discrimination
log RT
confidence rating
clockwise
anticlockwise
detection
log RT
confidence rating
yes
no

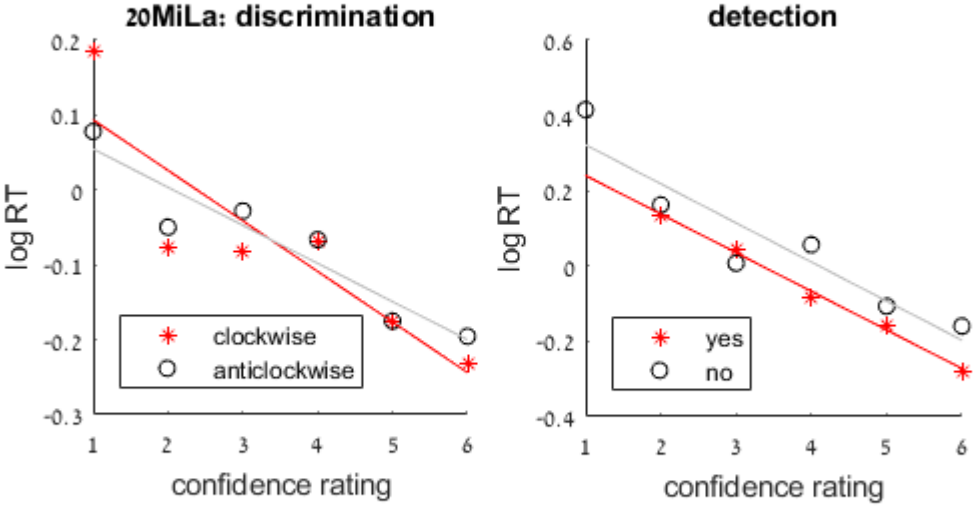

15ChFi: discrimination
detection
log RT
confidence rating
clockwise
anticlockwise
yes
no

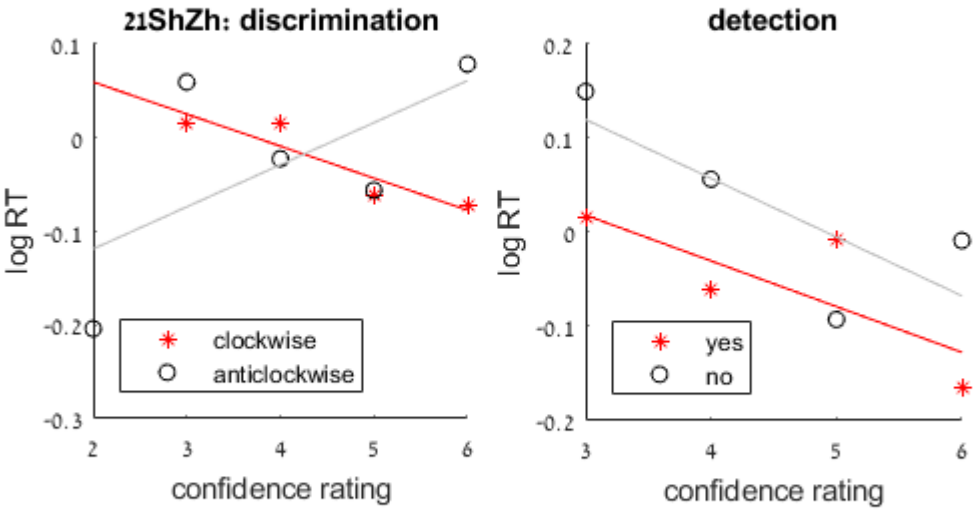

16JoDa: discrimination
detection
log RT
confidence rating
clockwise
anticlockwise
yes
no


17IvSi: discrimination
log RT
confidence rating
clockwise
anticlockwise
detection
log RT
confidence rating
yes
no


18LuHe: discrimination
log RT
confidence rating
clockwise
anticlockwise
detection
log RT
confidence rating
yes
no


19ElBo: discrimination
log RT
confidence rating
clockwise
anticlockwise
detection
log RT
confidence rating
yes
no


20MiLa: discrimination
log RT
confidence rating
clockwise
anticlockwise
detection
log RT
confidence rating
yes
no


21ShZh: discrimination
log RT
confidence rating
clockwise
anticlockwise
detection
log RT
confidence rating
yes
no