Electroencephalographic (EEG) Data Analysis Script
(Using EEGLAB)

1) Import the Biosemi raw data file (.bdf): File->Import Data->From Biosemi BDF and EDF files (BDF plugin). Use reference channel 48 (Cz) upon import.

2) Remove *real* channel mean:

```
for numChans = 1:size(EEG.data,1);
     EEG.data(numChans,:)=single(double(EEG.data(numChans,:))-
mean(double(EEG.data(numChans, :))));
end
```

3) Tools->Filter the data->Basic FIR filter. Input [0.1] for 'Lower edge of the frequency pass band'. Leave everything else blank and unchecked.

4) Edit->Channel locations->OK.

   File->Save current dataset as->choose a meaningful name and location.

5) Tools->Filter the data->Basic FIR filter. Input [40] for 'Higher edge of the frequency pass band'. Leave everything else blank and unchecked.

   File->Save current dataset as->choose a meaningful name and location.

6) Tools->Extract epochs. Choose 'Time-locking event types': [15, 25, 35, 45, 55, 65, 75, 85] (target stimuli). Input 'Epoch limits': [-0.1, 0.5]. Click 'OK'.

7) Click 'OK' on the 'Epoch baseline removal window': [-100, 0].

   File->Save current dataset as->choose a meaningful name and location. Check 'Overwrite it in memory'.

8) Plot->Channel data (scroll). Skim through the data by eye to find any consistently 'bad' electrode channels. OR
   Tools->Reject data epochs->(all methods). Under 'Find abnormal values', input [50] and [-50] for the Upper and Lower limits. Click 'Calc/Plot'. On plot window, click 'Cancel'.

   Set any bad electrode channel activity to 0:

   ```
   EEG.data(XX,:)=0;
   ```

   If there are bad channels: File->Save current dataset as->choose a meaningful name and location.

9) Tools->Re-reference. Check 'Compute average reference'. 'Exclude channel indices': [65-72] (ocular and mastoid electrodes). 'Add current reference channel back to the data': 48 (Cz).

File->Save current dataset as->choose a meaningful name and location.

10) Tools->Reject data epochs->(all methods). Under 'Find abnormal values', input [75] and [-75] for the Upper and Lower limits. Click 'Calc/Plot'. On plot window, click 'Update Marks'. Click 'Reject marked trials'.

    File->Save current dataset as->choose a meaningful name and location.

11) Tools->Extract epochs. Choose 'Time-locking event types': [15] (one condition's target stimuli). Input 'Epoch limits': [-0.1, 0.5]. Click 'OK'.

    Choose a meaningful name and location to save the new file. Do not check 'Overwrite it in memory'.

    Click 'Cancel' on the 'Epoch baseline removal window'.

12) Datasets->reselect the last dataset (which has all 8 target types). Redo the previous step (11) for each of the remaining 7 conditions.

13) Plot->Sum/Compare ERPs. Create ERP plots which compare the cued vs. uncued conditions for both retinotopic and spatiotopic targets.

14) Combine all 5 subjects in the plots.

EVENT CODE LIST:

```
list = [ ['TL_TL',   TL, TL, 500, 500, 1, 11, 12, 13, 14, 15]  # L Spatio Cued
        ,['TL_TR',   TL, TR, 500, 500, 2, 21, 22, 23, 24, 25]  # R Spatio Uncued
        ,['TL_BL',   TL, BL, 500, 500, 3, 31, 32, 33, 34, 35]  # L Retino Cued
        ,['TL_BR',   TL, BR, 500, 500, 4, 41, 42, 43, 44, 45]  # R Retino Uncued
        ,['TR_TL',   TR, TL, 500, 500, 5, 51, 52, 53, 54, 55]  # L Spatio Uncued
        ,['TR_TR',   TR, TR, 500, 500, 6, 61, 62, 63, 64, 65]  # R Spatio Cued
        ,['TR_BL',   TR, BL, 500, 500, 7, 71, 72, 73, 74, 75]  # L Retino Uncued
        ,['TR_BR',   TR, BR, 500, 500, 8, 81, 82, 83, 84, 85]] # R Retino Cued
```