
Script to plot Figure 2c,d

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Winawer, Kay, Foster, Parvizi, Wandell **Asynchronous broadband signals are the principal source of the BOLD response in human visual cortex** *Current Biology*, 2013

This figure shows the Asynchronous Broadband (panel c) and Stimulus-Locked (panel d) time series in response to wide and narrow bar stimuli. The data is from subject 2, channel 65 (V1/V2 periphery).

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Set up paths and parameters

```
savepth = fullfile(ecogPRFrootPath, 'scratch');
datafile = fullfile(ecogPRFrootPath, 'data', 'figure2Data');
fmax = 150; % spectral maximum (Hz) for fitting broadband time series
useHann = true; % apply a Hanning window before computing spectrum
```

Load the data

```
% This includes
% t: time vector (seconds), 1x3 cell for 3 runs
% ts: raw time series (microvolts), 1x3 cell for 3 runs
% onsets: sample numbers indicating epoch onsets, 1x3 cell
% sampleRate: ECoG sampling rate, in Hz
% T: epoch length (in seconds)
% subjnum: subject number (corresponds with numbering in paper)
% runType: indicates the type of stimuli
% dataType: indicates that data was referenced to common average

load(datafile);
```

Compute asynchronous broadband (ab) and stimulus-locked (sl) time series

```
% Convert the time series to spectra (384 epochs x 151 frequencies)
spectra = ecogGetSpectra(ts, onsets, T, fmax, useHann);

% Summarize spectra as broadband and stimulus-locked timeseries (384x1 each)
spectralSummary = ecogSummarizeSpectra(spectra, [], T, fmax);
```

```
% Reshape the time series into a matrix of time points (96) by runs (4)
ab.all = reshape(spectralSummary.ab, 96,4);
sl.all = reshape(spectralSummary.sl, 96,4);

% Average across runs of the same type
ab.average = [mean(ab.all(:,1:2),2) mean(ab.all(:,3:4),2)];
sl.average = [mean(sl.all(:,1:2),2) mean(sl.all(:,3:4),2)];

% normalize so that the mean response during stimulus blanks is zero
ab.normalized = ecogSubtractBlanks(ab.average, runType);
sl.normalized = ecogSubtractBlanks(sl.average, runType);
```

Plot

```
fH = figure; pos = get(fH, 'pos');
set(fH, 'Color', 'w', 'position', [pos(1) pos(2) 600 800]);

% Plot the broadband time series
subplot(2,1,1)
set(gca, 'ColorOrder', [0 0 0; 1 0 0], 'FontSize', 16, ...
    'XTick', 0:12:96, 'XLim', [0 96], 'XGrid', 'on'); hold on
xlabel('Time (s)'); ylabel('Power ( $\mu V^2$ )')

plot(1:96, ab.normalized, 'LineWidth', 2)

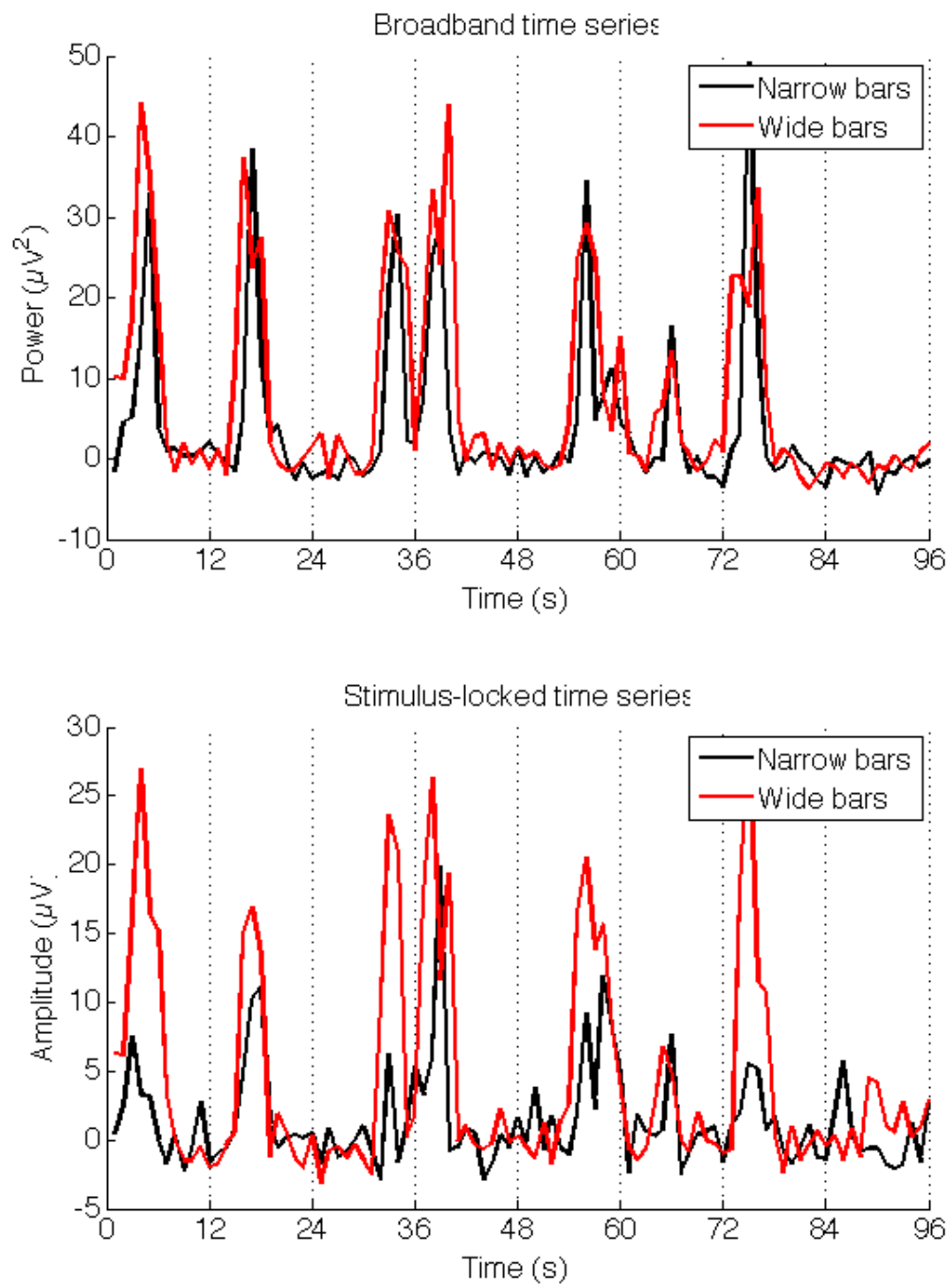
title('Broadband time series')
legend('Narrow bars', 'Wide bars')

subplot(2,1,2)
set(gca, 'ColorOrder', [0 0 0; 1 0 0], 'FontSize', 16, ...
    'XTick', 0:12:96, 'XLim', [0 96], 'XGrid', 'on'); hold on
xlabel('Time (s)'); ylabel('Amplitude ( $\mu V$ )')

plot(1:96, sl.normalized, 'LineWidth', 2)

title('Stimulus-locked time series')
legend('Narrow bars', 'Wide bars')

% %% SAVE
%
% hgexport(fH, fullfile(savepth, 'Figure2cd_AB_and_SL_timeSeries.eps'));
%
% return
```



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