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Read Header Information of Datafile

Command: *ft_read_header*

Task:
- Determine the sampling rate of the datafile of subject01
- Determine whether the recording was continuous
- Find out which channel is the first MEG-channel (name starts with 'M')
- Plot sensorpositions with matlab-function plot3

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Recording

- Optimally continuous recording
  - Filtering with minimal ringing
  - Segmentation can be altered offline
- Synchronizing MEG recording with stimulation by triggers
  - Delays between stimulation computer and stimulus appearance
    - delays in the computer,
    - delays between computer and stimulator
      → derive trigger from stimulus
- Sampling rate high enough to capture highest frequencies
- Antialias filter: lowpass $f_{Lowpass} < f_{Sampling}$
- Intertrial intervals long enough in order to avoid trial overlap
- Warning cues can create considerable activity.

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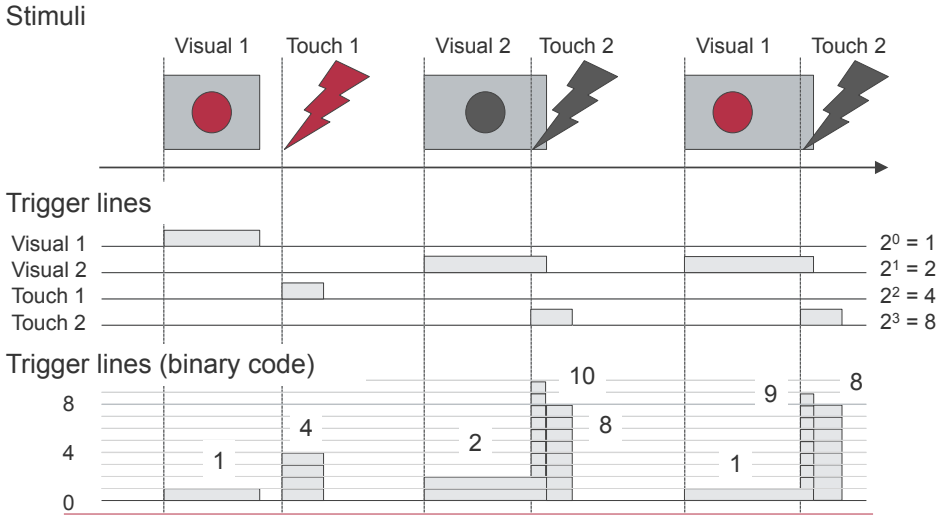
Recording



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Segmentation

Create table that defines trials

Trial	Sample Begin Trial	Sample End Trial	Sample Offset Zero	Condition A	Condition B
1	3247	6247	-1000	1	0
2	8421	11421	-1000	5	1
3	12188	15188	-1000	3	1
4	16034	19034	-1000	4	0
...	...	...	...	...	...
n	62148	65148	-1000	4	1

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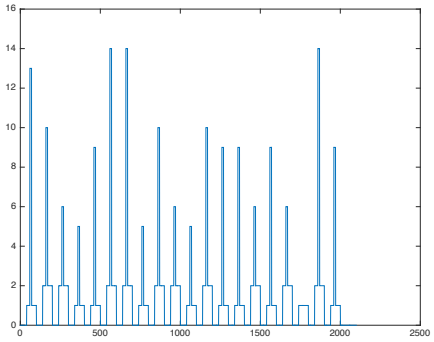
Individualize events

- Approach 1: decimal to binary conversion

```
n_bin=8
trig_pat=dec2bin(s,n_bin)
```




```
...
00000001
00000001
00001001
00001001
00001001
00001001
00001001
00001001
00001001
00001001
00001001
00001001
00001001
00000001
00000001
...
```

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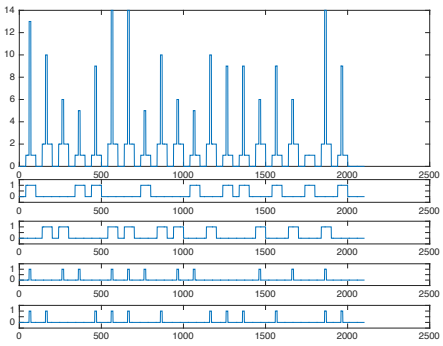
Individualize events

- Approach 1: decimal to binary conversion




```
figure
subplot(8,1,[1:4])
plot(s)

for i=1:4
    subplot(8,1,4+i)
    plot(str2num(trig_pat(:,n_bin-(i-1))))
    ylim([-.5 1.5])
end
```

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Individualize events

- Approach 2: shift and mask

Decimal	Binary
0	0000
1	0001
2	0010
3	0011
4	0100
5	0101
6	0110
7	0111
8	1000
9	1001

Shift binary digits to the right: dividing by 2

17	10001	17/2=8.5	1000.1
17	10001	floor(17/2)=8	1000
12	01100	12/2=6.0	0110.0
12	01100	floor(12/2)=6	110

Masking all positions but the last: mod(x,2)

23	010111	mod(23,2)=1
26	011010	mod(26,2)=0

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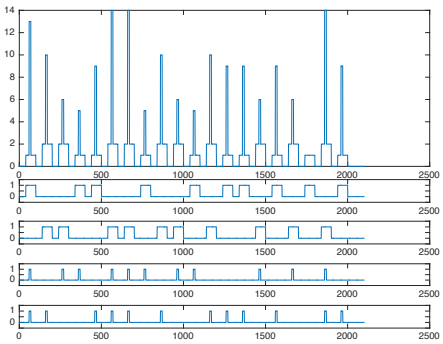
Individualize events

- Approach 2: shift and mask



```
figure
subplot(8,1,[1:4])
plot(s)

for i=1:4
    tmp=floor(s/2.^(i-1));
    trig_line(:,i)=mod(tmp,2);
    subplot(8,1,4+i)
    plot(trig_line(:,i))
    ylim([-.5 1.5])
end
```

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Open Data File and Select Conditons

Command: *ft_preprocessing*

Task:
- Open data and select condition (ftp://ftp.fieldtriptoolbox.org/pub/fieldtrip/tutorial/Subject01.zip)
- Follow the script and try to understand what is going on. (http://www.fieldtriptoolbox.org/tutorial/preprocessing)
- Have a look at the *ft_definetrial* output

- Read in the STIM channel for all conditions and plot individual trials.

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Select Trials According to Conditions

Experiment Inhibition:

Effects of GABA agonists (Alprazolam, Baclofen, Ethanol and Placebo) are tested in a two stimulus paradigm. The prime stimulus which is either a near-threshold stimulus or a maximal stimulus exerts an inhibitory effect on the second test stimulus. Prime and test stimulus are either separated by a short (30 ms) or long (150 ms) interstimulus interval.

Conditions

1 :	D2 Threshold	Single
2 :	D2 Threshold tot	Double
3 :	D2 Threshold correct	Double
4 :	D2 Threshold incorrect	Double
5 :	D2 Max	Single
6 :	D2 Max	Double
7 :	D3 Threshold	Single
8 :	D3 Threshold tot	Double
9 :	D3 Threshold correct	Double
10 :	D3 Threshold incorrect	Double
11 :	D3 Max	Single
12 :	D3 Max	Double

% Trigger
% T1 Sync (1st stimulus)
% T2 Finger 0:D2 1:D3
% T3 Intensity 0:Level 1:Max
% T4 Type 0:Single 1:Double
% T5-T10 Current level of the stimulated finger in %
% T11 Response 1: no stimulus
% T12 Response 2: 1 stimulus
% T13 Response 3: 2 stimuli

Note: Sync trigger was wrongly programmed use other information

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Segmentation and Trial Selection

Command: *ft_definetrial* and *ft_preprocessing*

Task:
- Read data of subject 04_Inhibition_20150507_14.ds
- Identify trials of condition 'single max d2/d3'
- Create trl array for segmentation of the data
- Segment the continuous data file into segments aligned to the prime pre-stimulus -500 ms, post-stimulus 750 ms

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Trigger information

Command: *ft_read_data, ft_definetrial*

Task:
- Read data of subject 04_Inhibition_20150507_14.ds
- Sort trials according to conditions
- Segment the continuous data file into segments aligned to the prime pre-stimulus -500 ms, post-stimulus 750 ms