功能性近紅外光檔案格式
fNIRS Data Format

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本週課程內容

- Data format
- fNIRS analysis package: HOMER2
  - http://www.nmr.mgh.harvard.edu/PMI/resources/homer2/home.htm

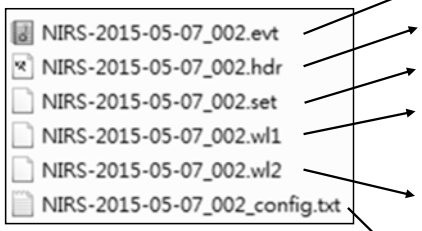
Please download the materials_L11.zip from
http://www.ym.edu.tw/~cflu/CFLu_course_fnirs.html

資料格式
fNIRS Data Format

Acquired Raw Data

- Automatically save data in a directory of the date
  C:\NIRx\Data\[date]\[date_number]

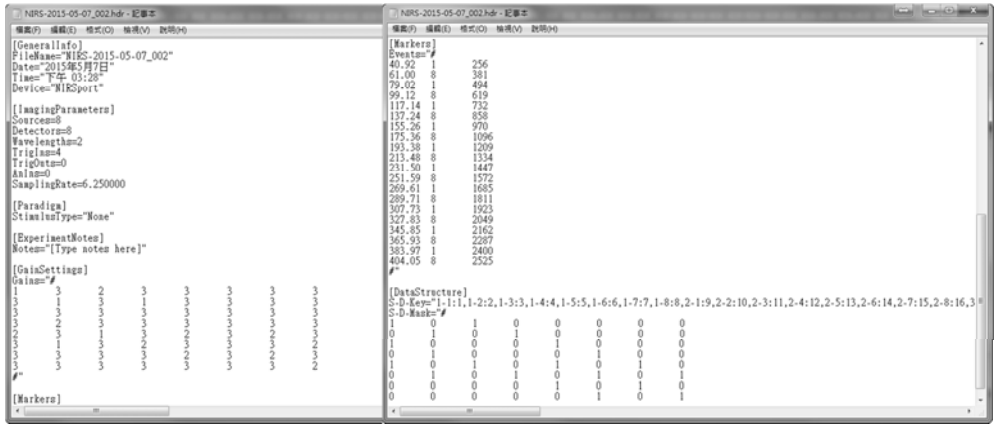
Acquired Raw Data



- Event time points
- Header: overall information
- Channel Gain Map
- Raw signals at wavelength 760 nm
  - Time x channels matrix
- Raw signals at wavelength 850 nm
  - Time x channels matrix
- Hardware configuration

Can be loaded by notepad (text editor).

Header file (*.hdr)



Event Logfile (*.evt)

(381-256)/6.25Hz = 20s

NIRS-2015-05-07_002.evt - 記事本

檔案(F) 編輯(E) 格式(O) 檢視(V) 說明(H)

256	1	0	0	0	0	0	0	0
381	0	0	1	0	0	0	0	0
494	1	0	0	0	0	0	0	0
619	0	0	1	0	0	0	0	0
732	1	0	0	0	0	0	0	0
858	0	0	1	0	0	0	0	0
970	1	0	0	0	0	0	0	0
1096	0	0	1	0	0	0	0	0
1209	1	0	0	0	0	0	0	0
1334	0	0	1	0	0	0	0	0
1447	1	0	0	0	0	0	0	0
1572	0	0	1	0	0	0	0	0
1685	1	0	0	0	0	0	0	0
1811	0	0	1	0	0	0	0	0
1923	1	0	0	0	0	0	0	0
2049	0	0	1	0	0	0	0	0
2162	1	0	0	0	0	0	0	0
2287	0	0	1	0	0	0	0	0
2400	1	0	0	0	0	0	0	0
2525	0	0	1	0	0	0	0	0

frames 2^0 2^1 2^2 2^3

Modify Event Logfile (*.evt)

2015-05-07_002 (bimotor)

1. Back up (copy) the *.evt file
2. Delete non-target events

NIRS-2015-05-07_002.evt - 記事本

檔案(F) 編輯(E) 格式(O) 檢視(V) 說明(H)

256	1	0	0	0
494	1	0	0	0
732	1	0	0	0
970	1	0	0	0
1209	1	0	0	0
1447	1	0	0	0
1685	1	0	0	0
1923	1	0	0	0
2162	1	0	0	0
2400	1	0	0	0

frames 2^0 2^1 2^2 2^3

3. Re-label the events (1 for right, 2 for left)

NIRS-2015-05-07_002.evt - 記事本

檔案(F) 編輯(E) 格式(O) 檢視(V) 說明(H)

256	0	1	0	0
~~494~~	~~0~~	~~1~~	~~0~~	~~0~~
732	1	0	0	0
970	0	1	0	0
1209	0	1	0	0
1447	1	0	0	0
1685	0	1	0	0
1923	1	0	0	0
2162	1	0	0	0
2400	0	1	0	0

frames 2^0 2^1 2^2 2^3

Modify Event Logfile (*.evt)

2015-05-07_004 (oddball)

1. Back up (copy) the *.evt file
2. Delete non-target events

NIRS-2015-05-07_004.evt - 記事本

檔案(F) 編輯(E) 格式(O) 檢視(V) 說明(H)

140	0	1	0	0
271	0	1	0	0
402	0	1	0	0
533	0	1	0	0
674	0	1	0	0
796	0	1	0	0
917	0	1	0	0
1038	0	1	0	0
1159	0	1	0	0
1280	0	1	0	0
1401	0	1	0	0
1522	0	1	0	0
frames	2^0	2^1	2^2	2^3

Load signal data

- Load *.wl1 or *.wl2 using MATLAB

  >> **load('NIRS-2015-05-07_002.wl1')**

NIRS_2015_05_07_002 <2655x64 double>

	1	2	3	4	5	6	7	8	9
1	0.1267	0.0055	0.2760	0.0043	0.0069	1.8160e-04	0.0051	0.0085	0.0
2	0.1269	0.0025	0.2770	0.0032	0.0019	6.1700e-05	0.0027	0.0029	0.0
3	0.1269	0.0048	0.2781	0.0042	0.0031	1.6680e-04	0.0023	0.0064	0.0
4	0.1281	0.0031	0.2847	0.0024	0.0030	1.2100e-04	0.0028	0.0041	0.0
5	0.1270	0.0046	0.2760	0.0060	0.0032	1.5530e-04	0.0041	0.0053	0.0
6	0.1255	0.0047	0.2720	0.0046	0.0063	1.4910e-04	0.0046	0.0062	0.0
7	0.1259	0.0021	0.2751	0.0020	0.0032	1.0410e-04	0.0027	0.0056	0.0
8	0.1265	0.0036	0.2804	0.0052	0.0066	1.2870e-04	0.0053	0.0051	0.0
9	0.1271	0.0037	0.2789	0.0031	0.0029	1.2490e-04	0.0031	0.0040	0.0
10	0.1246	0.0036	0.2724	0.0036	0.0043	1.0390e-04	0.0025	0.0046	0.0
11	0.1246	0.0037	0.2727	0.0029	0.0052	1.5860e-04	0.0024	0.0047	0.0
12	0.1250	0.0019	0.2749	1.5430e-04	0.0016	6.3900e-05	0.0014	0.0031	0.0

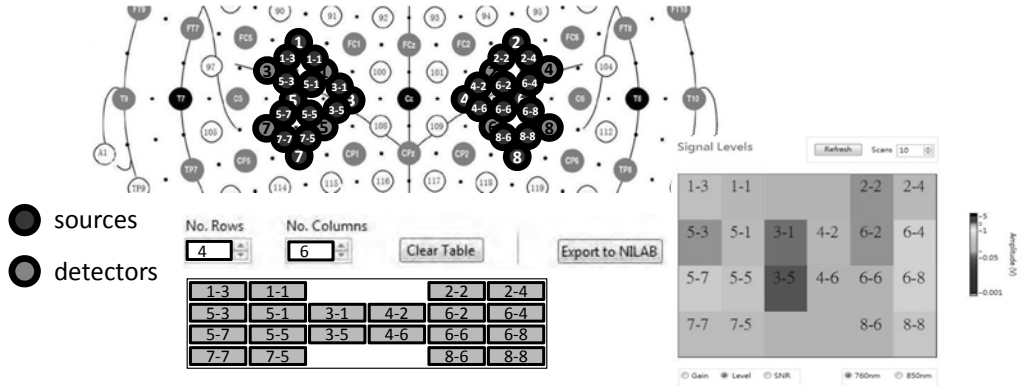
Create HOMER2 data (*.nirs)

- **MATLAB mat-file format**
- **SD**: source/detector geometry
- **d**: dual-wavelength raw signals for all channels
- **s**: event time points
- **t**: time axis in second
- **ml**: lists of source-detector channels
- **aux**: auxiliary signal

Workspace

Name	Value
SD	*1x1 struct*
aux	*1655x1 double*
d	*1655x40 double*
ml	*40x4 double*
s	*1655x2 double*
t	*1655x1 double*

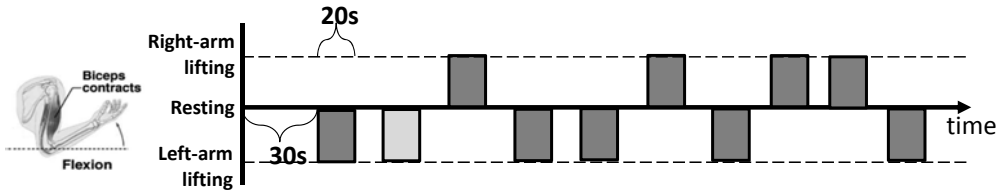
Bilateral Arm lifting



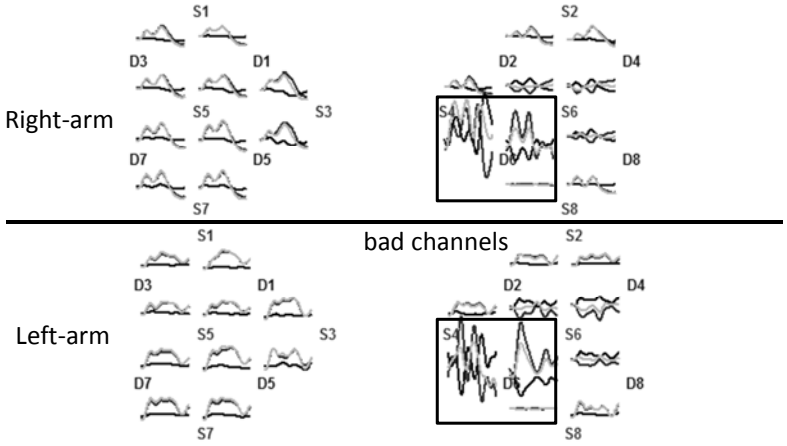
Block design diagram

Baseline	Relax and sit on an armchair (30s)
Experiment I	Right-arm lifting (20 s)
Rest interval	Relax and sit on an armchair (18 s)
Experiment II	Left-arm lifting (20 s)

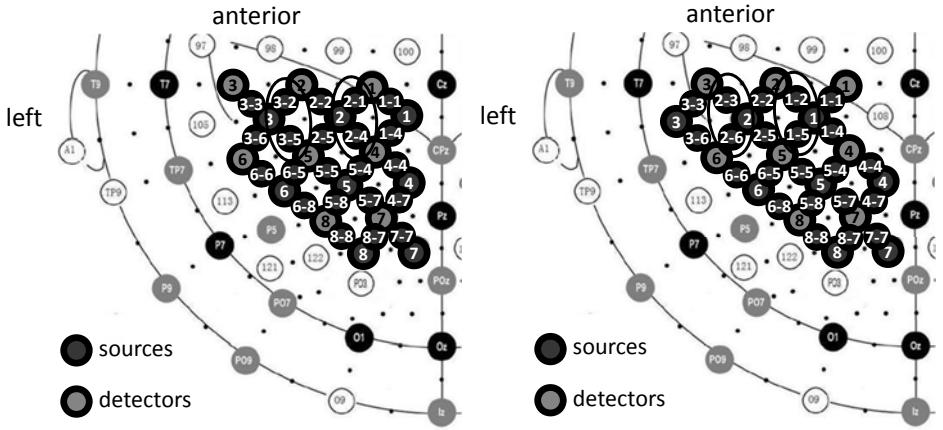
※Experiment States were marked by "**F1**" and Rest intervals were marked by "**F3**"



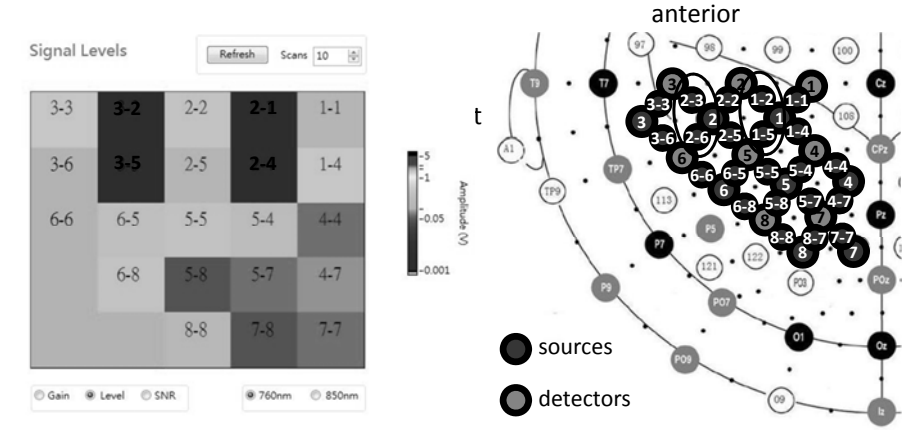
2015-05-07_002: bilateral motor



Oddball task

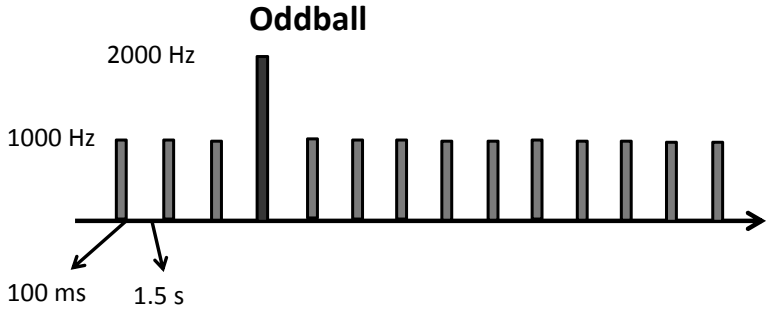


Oddball task



Event-Related design

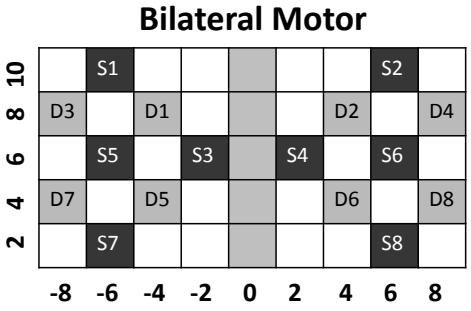
- 12 oddball events (8% of total number)
- 3~6 regular tones before, and 10 after oddball

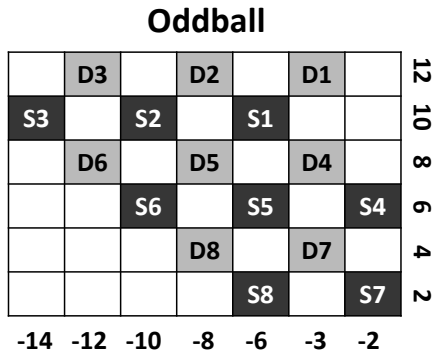


Codes for data reformat

- **HomerforNIRx_BiMotor.m**
  - Select 2015-05-07\2015-05-07_002 folder
- **HomerforNIRx_Oddball.m**
  - Select 2015-05-07\2015-05-07_004 folder
- Generate a *.nirs with the selected folder

Source-Detector Geometry





THE END

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