

fNIRS探頭擺放設計與確認

近紅外腦功能資料處理工作坊

http://www.ym.edu.tw/~cflu/CFLu_course_fnirsWorkshop.html

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講習內容安排

- 09:10~11:00 fNIRS原理簡介
- 10:10~11:00 fNIRS實驗設計
- 11:10~12:00 fNIRS探頭擺放設計與位置確認
- 12:00~13:30 用餐與休息**
- 13:30~14:20 fNIRS實驗操作技巧
- 14:30~15:20 fNIRS標準訊號處理流程
- 15:30~16:20 fNIRS數據結果呈現與相關性分析

Design Steps

Participants' tolerance

- Age, disease ...

Study aims

- Target Locations
- Number of conditions
- Anticipated signals

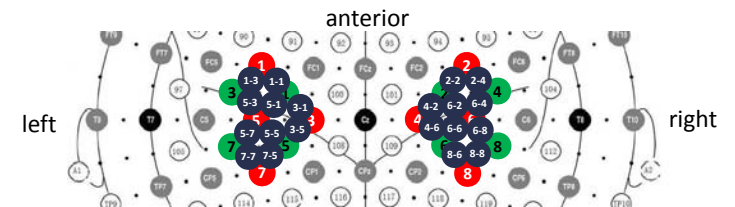
Experiment paradigm

- S-D arrangement, number of channel**
- Block design or event-related design
- Task instruction & stimulation delivery

Log sheet

- Name, gender, age, history number/ID, habitual hand, study group
- Experiment paradigm and notation

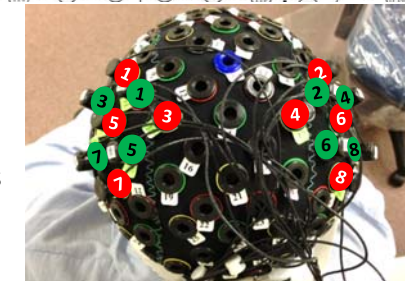
S-D Arrangement



Bilateral arm lifting:
Sensorimotor area

→ FC, C, CP locations
(EEG 10-5 systems)

→ 8S-8D, total 20 channels
separation ~3 cm

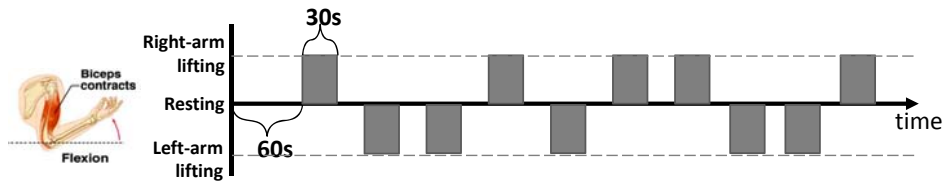


● sources
● detectors

Block design diagram

- Baseline** Relax and sit on an armchair (~1 min)
- Experiment I** Right-arm lifting (~30 s)
- Rest interval** Relax and sit on an armchair (~30 s) **(Overall ~11 mins)**
- Experiment II** Left-arm lifting (~30 s)

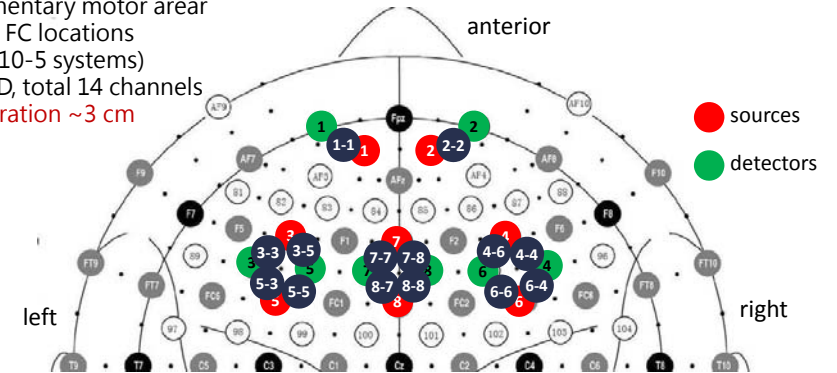
※ Experiment States were marked by "F1" and Rest intervals were marked by "F3"



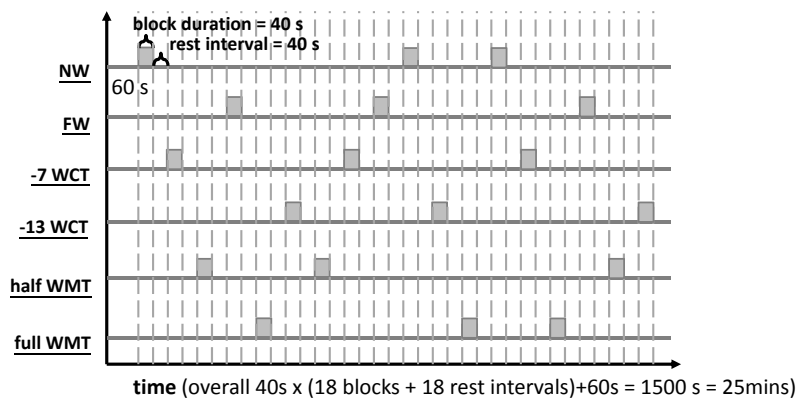
S-D Arrangement

Gait control: Prefrontal, premotor, supplementary motor area

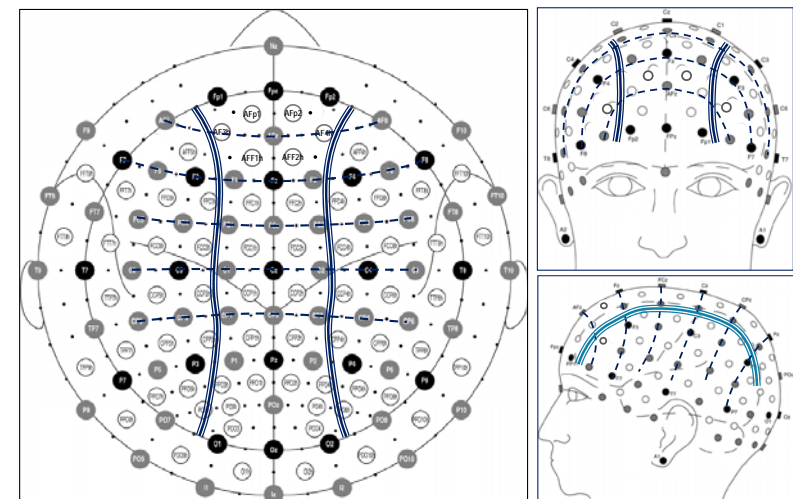
- Fp, F, FC locations (EEG 10-5 systems)
- 8S-8D, total 14 channels separation ~3 cm



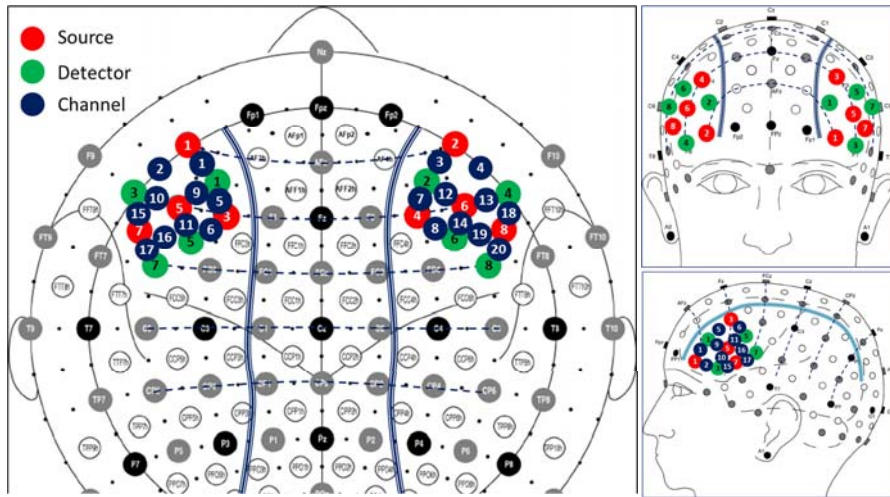
Block design diagram



International 10-5 System Layout

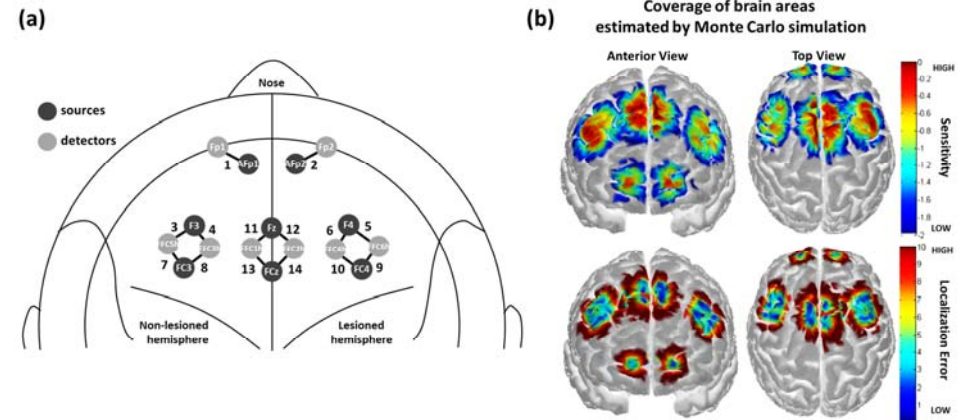


S-D arrangement based on 10-5 sys.

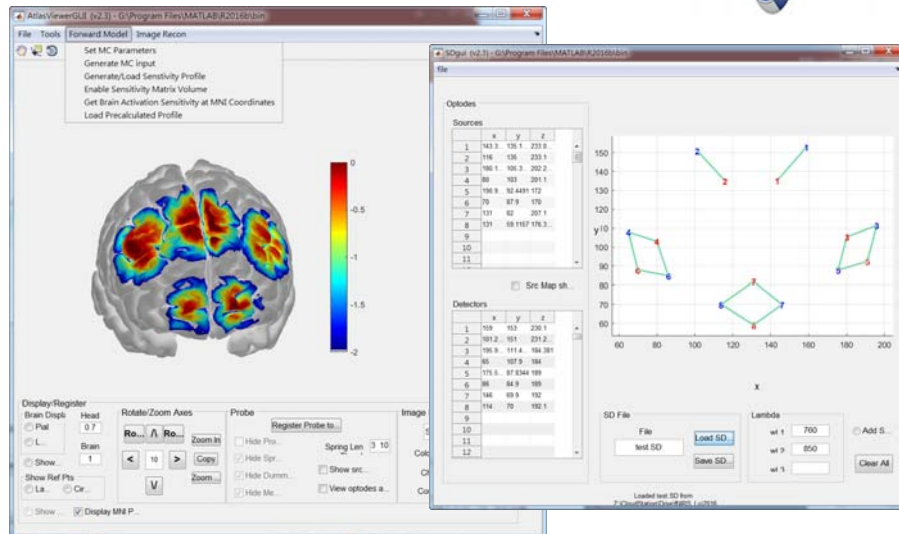


S-D Arrangement & Brain Coverage

Using Monte Carlo simulation to check the coverage of brain areas.



AtlasViewerGUI



Aasted et al. Anatomical guidance for functional near-infrared spectroscopy: AtlasViewer tutorial. Neurophotonics. 2015 Apr 1;2(2):020801.

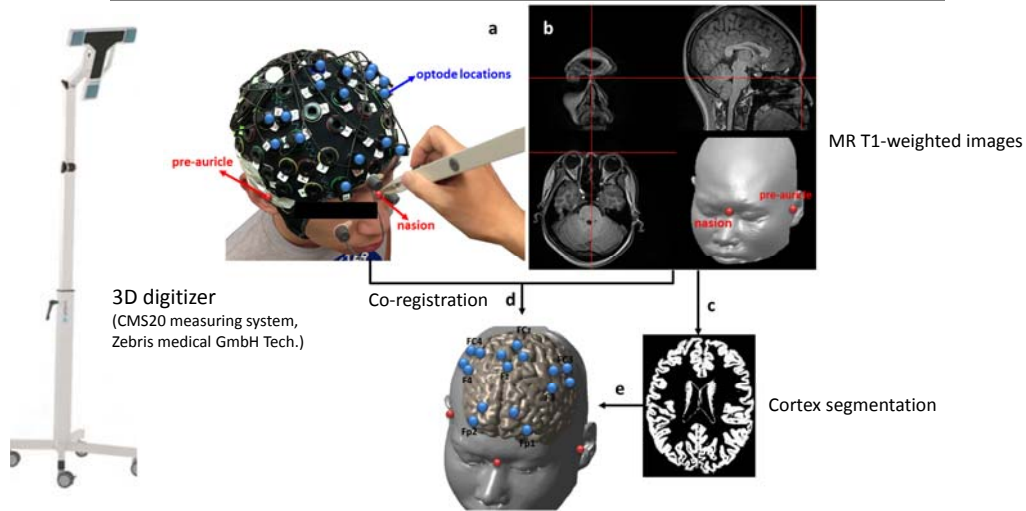
Confirm S-D Locations

Reviewer:

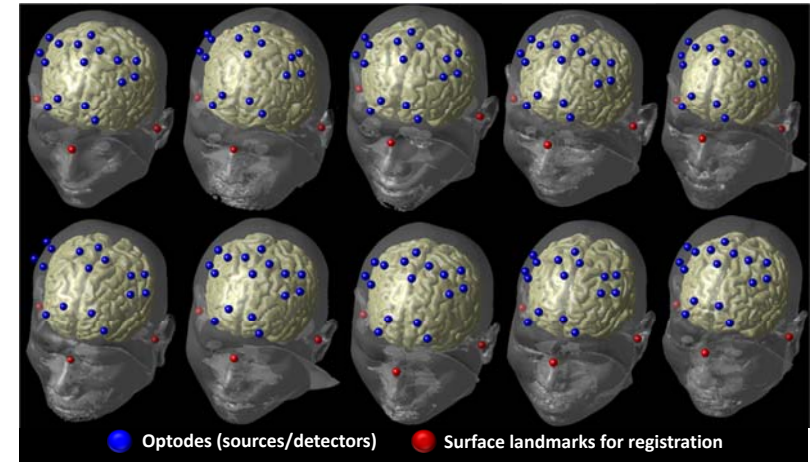
It is unclear which cortical areas were covered by each fNIRS channel. Authors should show clearly how they attach the optodes at the consistent position among subjects.

?
?

Confirm S-D Locations



Confirm S-D Locations



Log sheet

fNIRS cerebral Hb monitoring sheet for dual task

Test date and time : _____

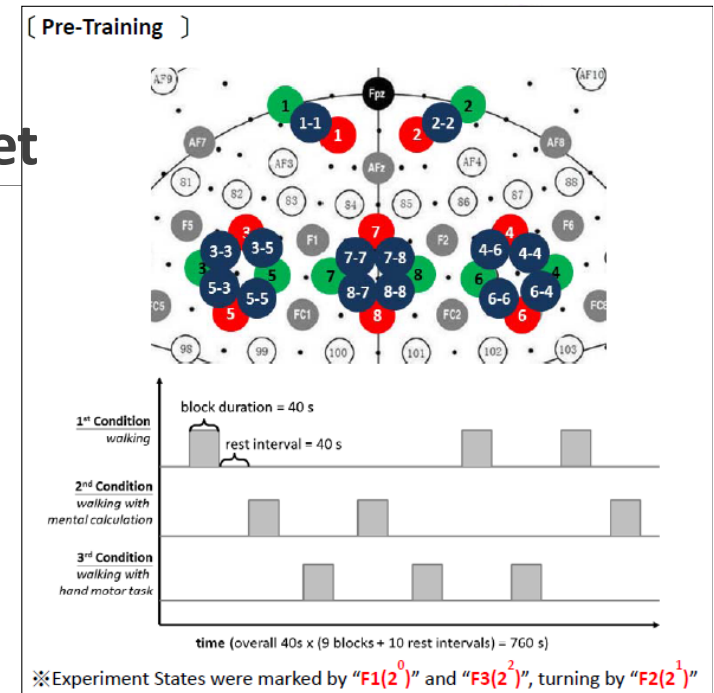
Subject name : _____

Subject ID : _____ Gender : _____

Birthday : _____ Habitual hand : _____

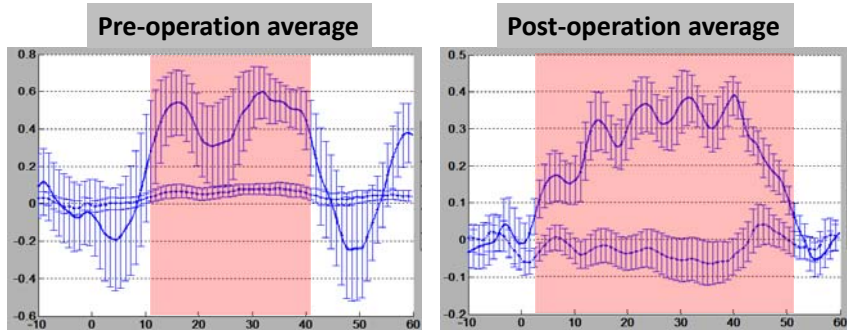
NOTE : _____

Log Sheet



Outcome Evaluation

Δ Hb in percentage, activation interval, area, and rising slope



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Q & A
Thanks for your attention :)