

HST-583

Lab I Outline

Introduction to fMRI data acquisition

Part I: Acquisition

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Lab 1 goals

The goals of this lab include:

- i) familiarizing students with a typical functional MRI scanning environment;
- ii) acquiring and analysing phantom image data to assess issues like image intensity non-uniformities, spatial and temporal noise, signal-to-noise ratio at different spatial resolutions, head versus surface coil image comparisons;
- iii) acquiring and analysing human data to assess temporal noise, signal-to-noise ratio at different spatial resolutions, functional maps for high/low contrast flashing checkerboards and retinotopic mapping.

Phantom Images

- Scout, head coil
- 3D Sagittal, head coil
- EPI high resolution, $2.5 \times 2.5 \times 2.5 \text{ mm}^3$, TR=2000 ms, $\alpha=90^\circ$, 20 slices, 128 images per slice, head coil
- EPI medium resolution, $4 \times 4 \times 4 \text{ mm}^3$, TR=2000 ms, $\alpha=90^\circ$, 20 slices, 128 images per slice, head coil
- EPI low resolution, $5 \times 5 \times 5 \text{ mm}^3$, TR=2000 ms, $\alpha=90^\circ$, 10 slices, 128 images per slice, head coil
- Scout, surface coil
- EPI high resolution, $2.5 \times 2.5 \times 2.5 \text{ mm}^3$, TR=2000 ms, $\alpha=90^\circ$, 20 slices, 128 images per slice, surface coil

Human Images (head coil)

- Scout
- 3D Sagittal
- EPI high resolution, $2.5 \times 2.5 \times 2.5 \text{ mm}^3$, TR=2000 ms, $\alpha=90^\circ$, 20 slices, 128 images per slice, no stim.
- EPI medium resolution, $4 \times 4 \times 4 \text{ mm}^3$, TR=2000 ms, $\alpha=90^\circ$, 20 slices, 128 images per slice, no stim.
- EPI low resolution, $5 \times 5 \times 5 \text{ mm}^3$, TR=2000 ms, $\alpha=90^\circ$, 10 slices, 128 images per slice, no stim.
- EPI fast, $4 \times 4 \times 4 \text{ mm}^3$, TR=500 ms, $\alpha=51^\circ$, 5 slices, 512 images per slice, no stim.
- Functional MRI: Low Contrast Flashing Checkerboard (EPI medium resolution)
- Functional MRI: High Contrast Flashing Checkerboard (EPI medium resolution)
- Functional MRI: Retinotopic Mapping (EPI medium resolution)