Neuroscience in the everyday world: Brain correlates of naturalistic discourse in individuals with aphasia

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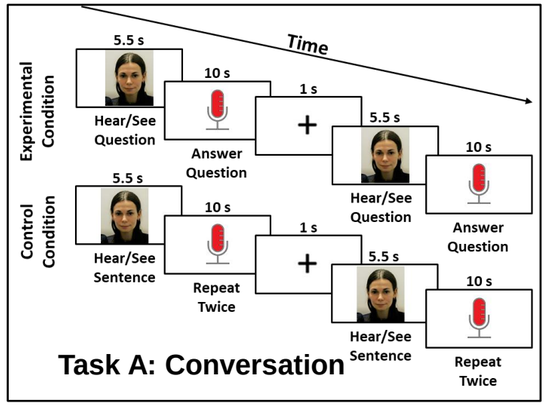
Introduction

- Need for ecologically-valid investigation of conversation and discourse in individuals with aphasia
- **Aims of current study:**
  - Pilot a computer-based conversation task with fNIRS in people with aphasia (PWA)
  - Report preliminary cortical activation data isolating language formulation from speech production

Methods



Task A: Conversation

Experimental: language formulation + speech production

Control: speech production

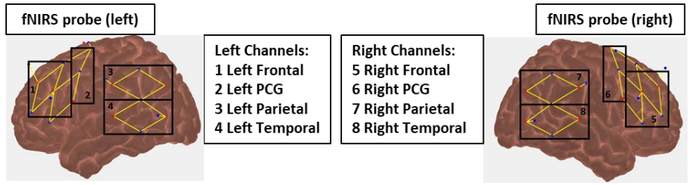
Participant Group	Mean age
Young healthy (N = 15)	24 yrs. (SD = 4)
People with post-stroke aphasia* (N = 4)	61 yrs. (SD = 7)

*Mean Western Aphasia Battery Quotient (WAB-R AQ) = 93.2 (SD = 4)

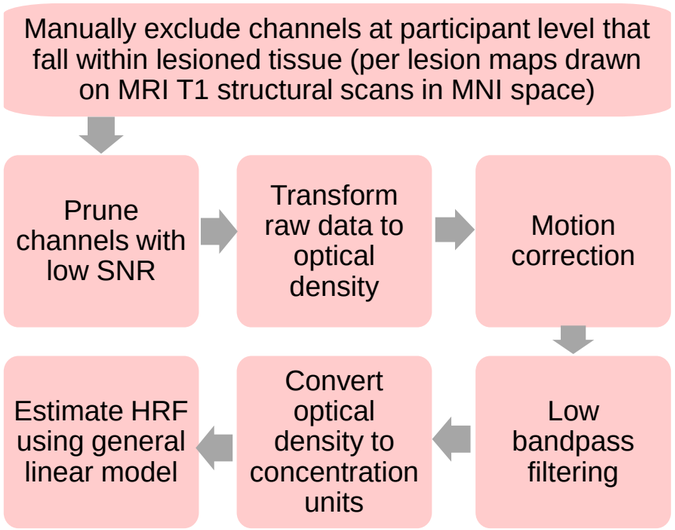
fNIRS hardware: NIRx NIRSport2[1]

fNIRS probe: Designed in AtlasViewer[2]

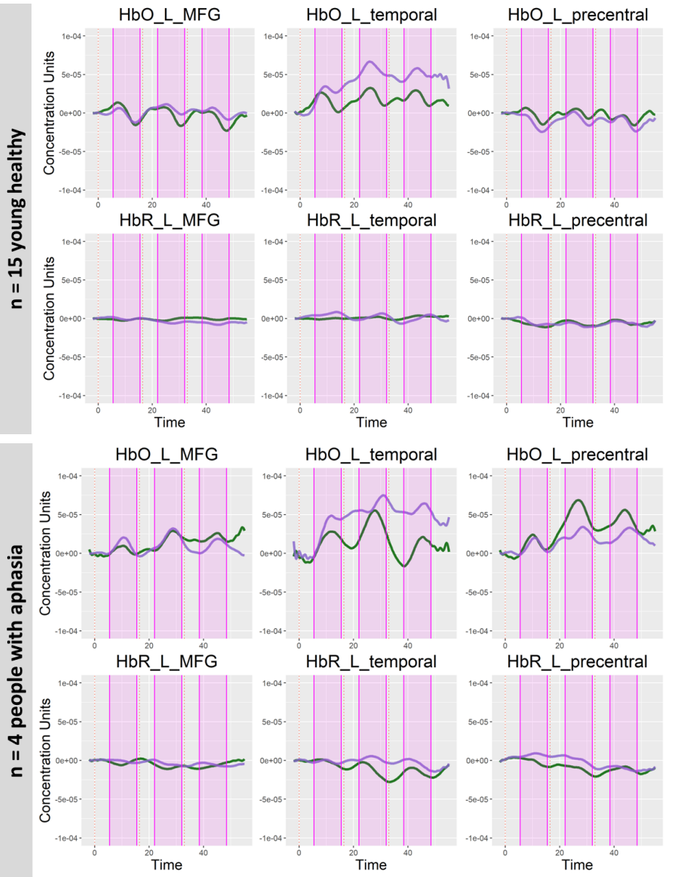
- 37 long-separation + 8 short-separation channels



fNIRS processing stream (Completed in Homer3[3]):



Preliminary Results



- Modeled HRF for changes in HbO and HbR for experimental vs. control conditions in 3 ROIs
- Pink panels correspond to participant response periods within a 3-question block
- Regions of interest:
  - MFG (middle frontal gyrus)
  - IFG (inferior frontal gyrus; not pictured due to limited data as a result of stroke lesion)
  - posterior temporal lobe
  - precentral gyrus (control region)

Discussion

- **Task development:** Task feasible for PWA (mild)
- **Preliminary results for PWA:**
  - greater HbO in left temporal ROI for experimental vs. control condition (expected)
  - greater HbO in left precentral gyrus for control vs. experimental condition (unexpected)

References

[1]https://nirx.net/nirsport; [2]Aasted et al. (2015). Anatomical guidance for functional near-infrared spectroscopy: AtlasViewer tutorial. *Neurophotonics*, *2*(2), 020801; [3]Huppert et al. (2009). HomER: A review of time-series analysis methods for near-infrared spectroscopy of the brain. *Applied Optics*, *48*(10), D280.