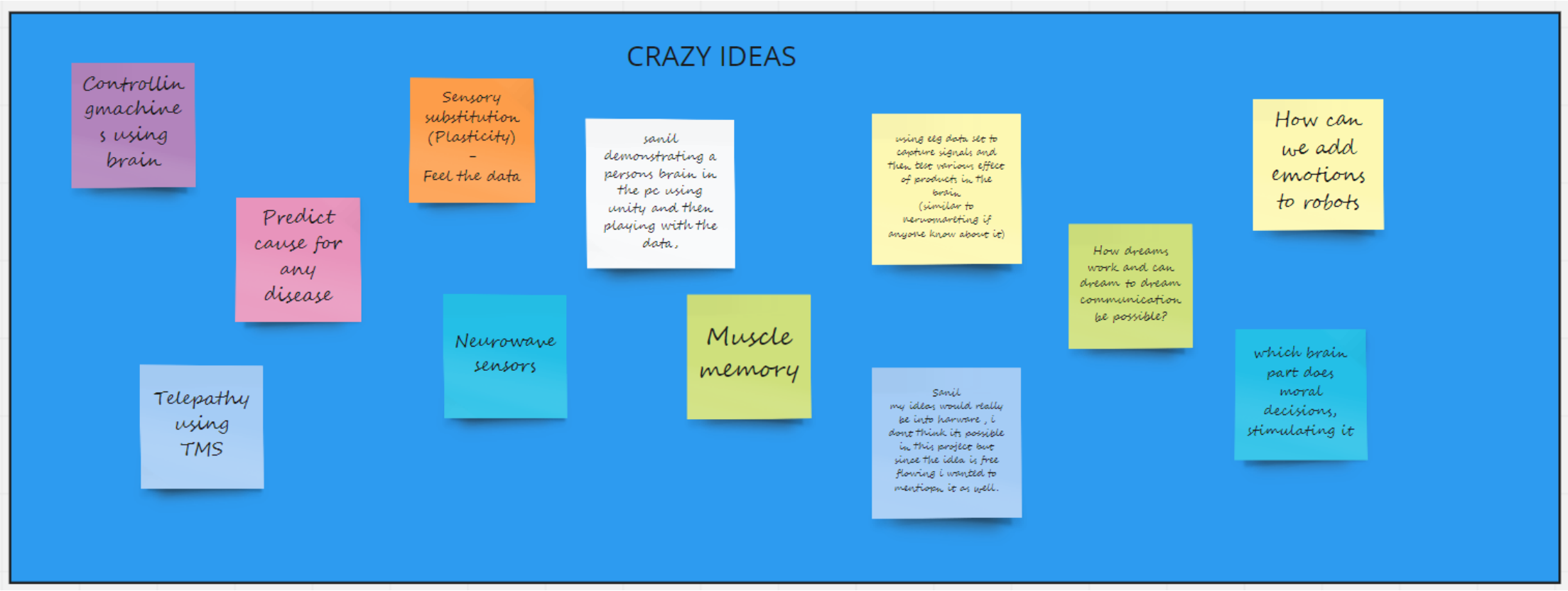
Can mentalizing shapes lead to Empathy in humans?

Minaxi Goel
Sanil Shrestha
Suraj Joshi
Varad Srivastava

Mentored by:
Dr. Laura Mikula
Dr. Marlene Cohen

Teaching Assistant:
Mehul Rastogi

Baby Steps : Crazy Ideas



What did we study?

- Do people empathize with socially interacting shapes?
- Which networks in the brain are associated with empathy?
- Is there any kind of correlation among the regions involved in social cognition which leads to empathy?
- Is absence of a task or experimental stimuli (resting state), a good control for such tasks?

Drowning in dataset! – A Journey

- First time with fMRI, a week went in understanding the dataset!

- Human Connectome Project Dataset

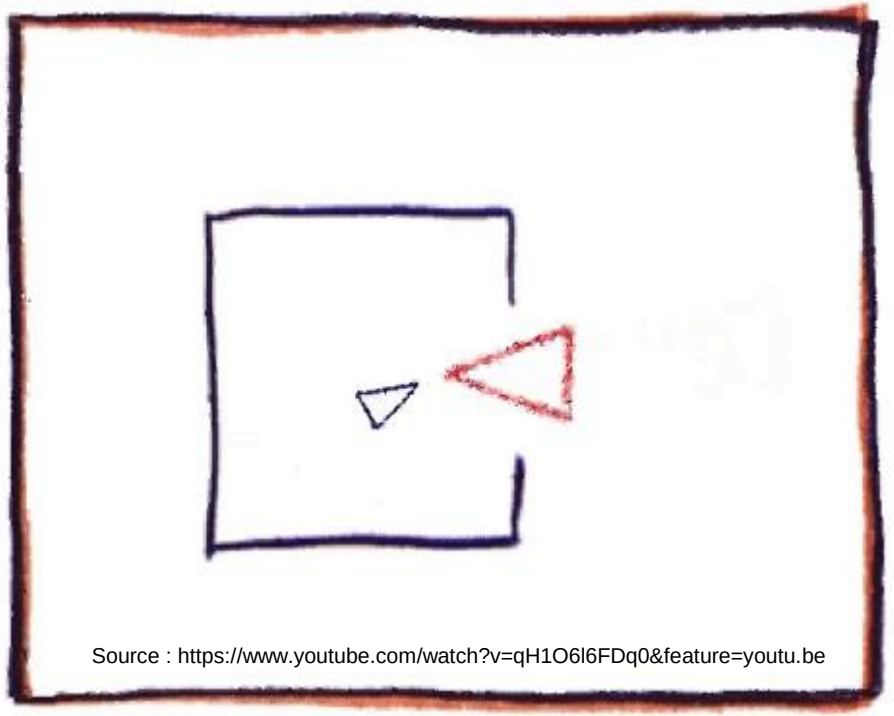
  - Social Cognition

    - Classes of videos : Mental Interaction (M), Random Movement (R)

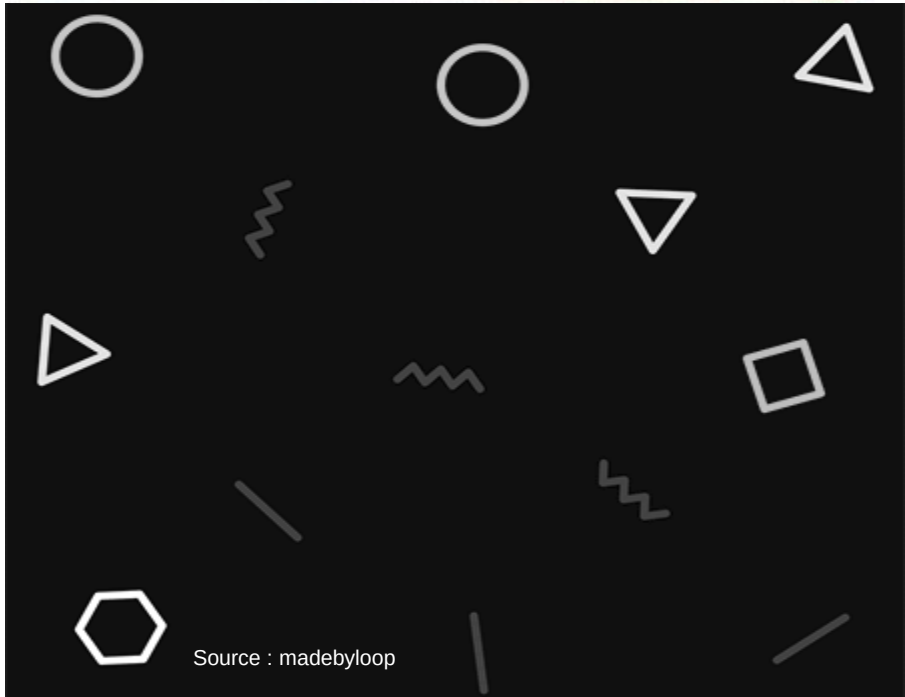
    - Responses Categories : Mental Interaction, Random Movement, Not Sure

    - Design of Events: Two Runs
      - 1st Run (2 M and 3 R Videos)
      - 2nd Run (3 M and 2 R Videos)
      - Videos of 23 s, 15 s fixation time

    - Random Stats : 339 participants, 360 parcels



Source : https://www.youtube.com/watch?v=qH1O6l6FDq0&feature=youtu.be



Source : madebyloop

How did we study?
(~70 hours of work, all nighters, and coffee!)

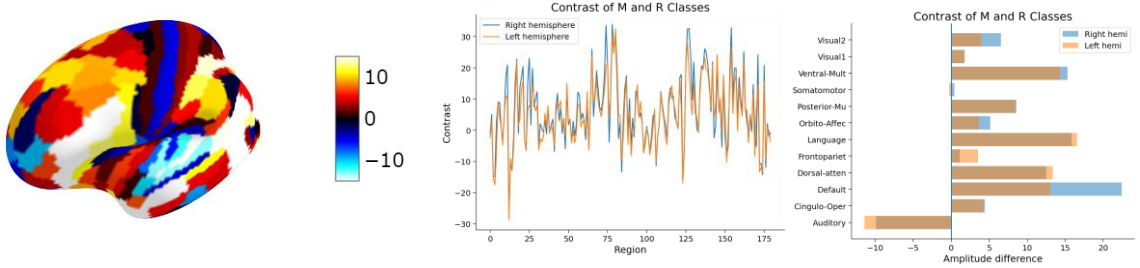


Fig. 1 : Subtraction Analysis Based on Video Classes

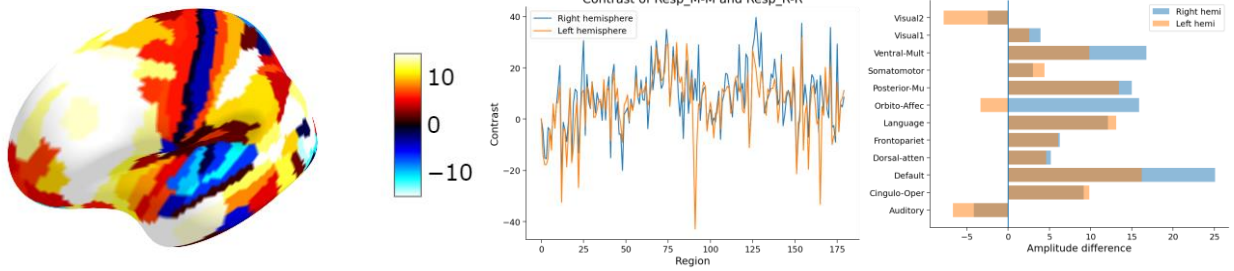
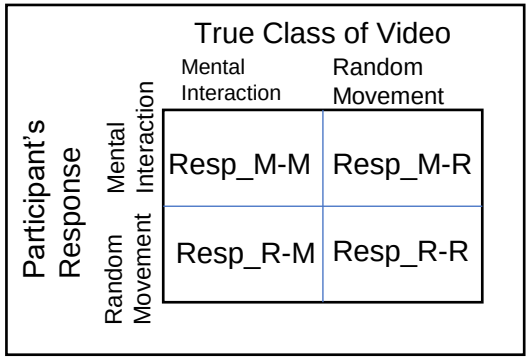


Fig. 2 : Subtraction Analysis Between Resp_M-M and Resp_R-R



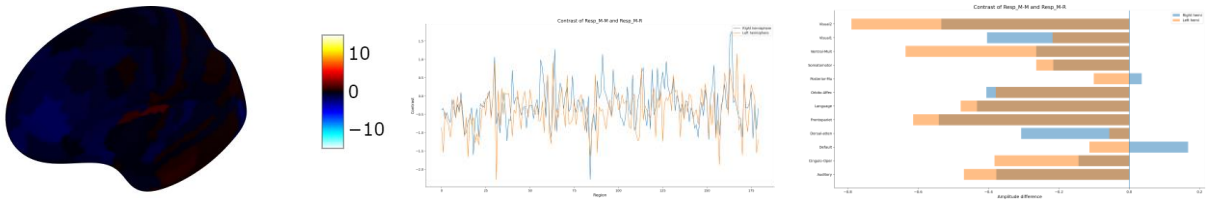


Fig. 3 : Subtraction Analysis Between Resp_M-M and Resp_R-M

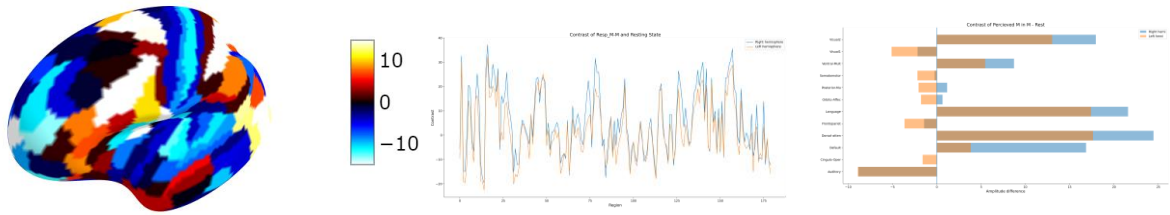
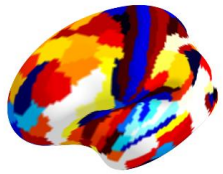


Fig. 4 : Subtraction Analysis taking Resting State as Control and Resp_M-M

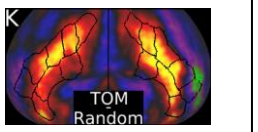
Functional Connectivity Analysis

Subtraction Analysis Based on Video Classes



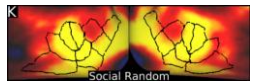
(According to the analysis done in the HCP dataset itself)

Regions with high contrasts, excluded from our analysis



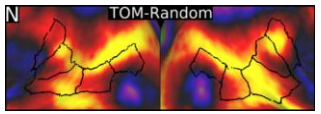
(Inferior Frontal Cortex - Attention and Working Memory)

(Medial Temporal - Spatial Memory and Long Term Memory)



MT+ Complex & Neighbouring Visual Areas

Source : [1]



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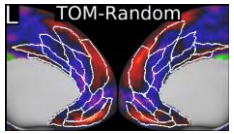

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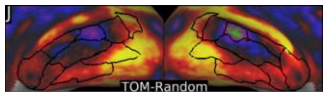
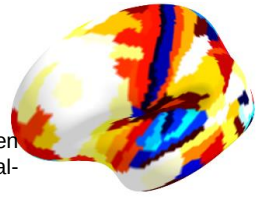


Source : [1]

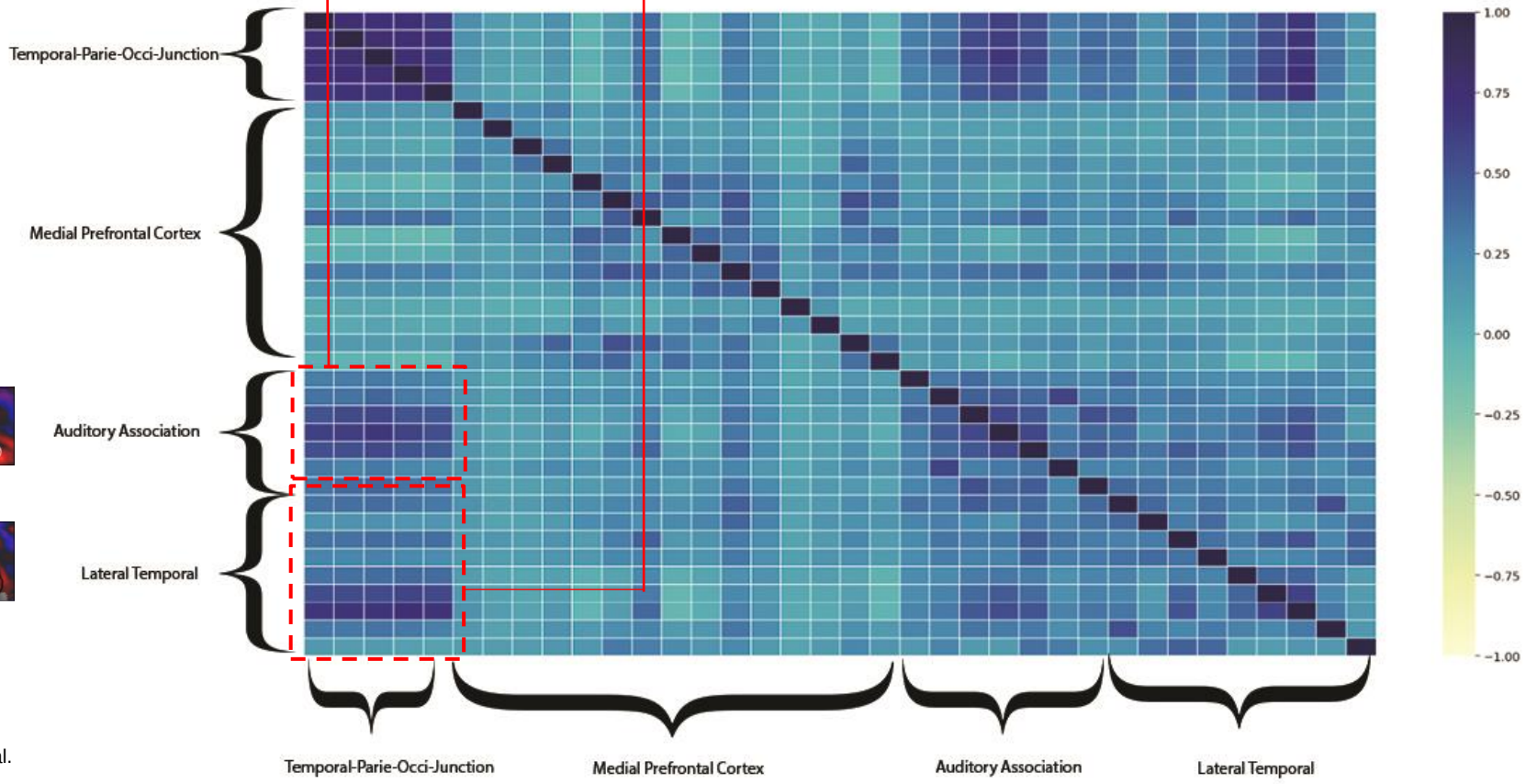
[1] Supplementary Material et. al. Glasser (2016)

Functional Connectivity between Auditory Association and Temporal-Parietal-Occipital Junction Regions

Functional Connectivity between Lateral Temporal and Temporal-Parietal-Occipital Junction Regions



Subtraction Analysis Between Perceived Mental (in M) and Perceived Random (in R)



Who are we? (No, not night owls)

Minaxi Goel
M.S. (R) Computer Science
@IIIT Hyderabad, India

Sanil Shrestha
A.I. Research Intern
@NAAMII, Nepal

Suraj Joshi
Final year ECE Under-grad
Nepal

Varad Srivastava
M.S. Computer Science
@BHU, India

Back to the Future :

- Autistic people have been found to be less capable of empathy. Hence, we plan to include datasets involving clinical population in our further analysis, which can then help us predict autism and other disorders.

- Mentalizing, empathy and mirroring of emotional response are closely related. We'd also try to further investigate if we can comment on the presence of mirror neurons. (Now you get our team name! Ironical?!)