The Effect of Time

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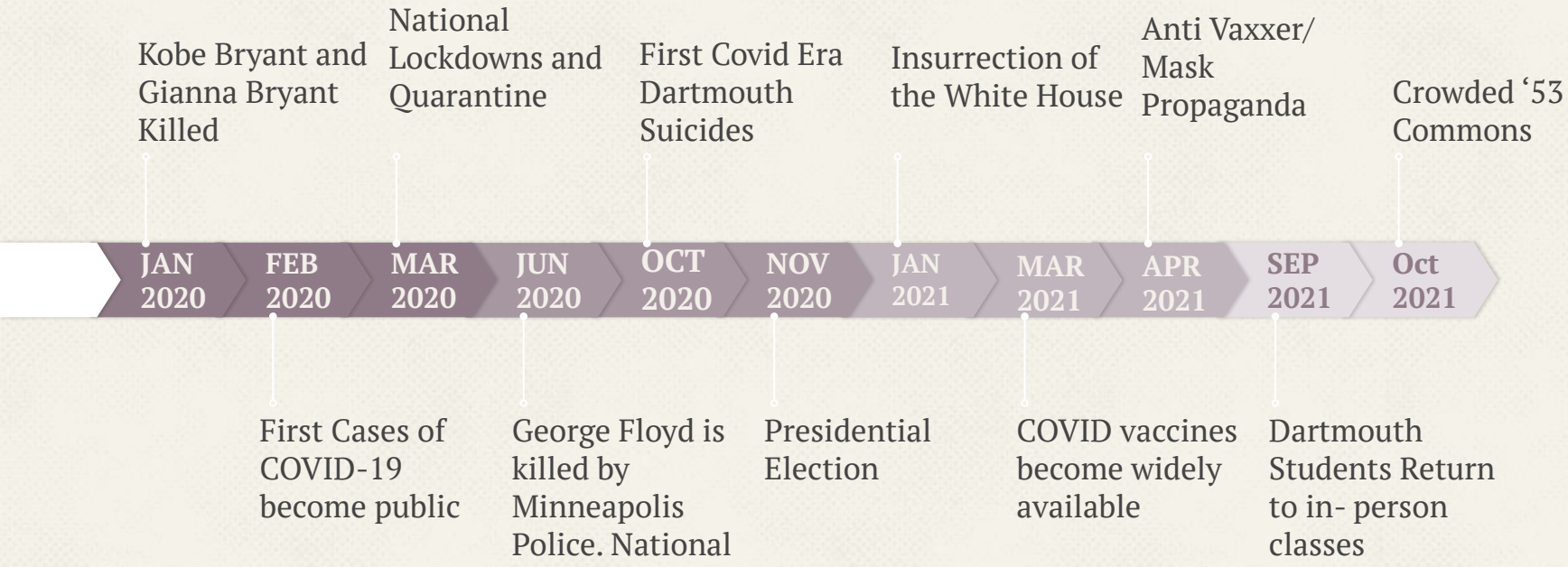
2020-2021 COVID-19 TIMELINE



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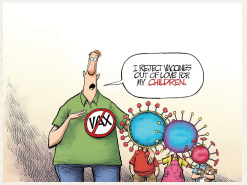


JAN 2020 | FEB 2020 | MAR 2020 | JUN 2020 | OCT 2020 | NOV 2020 | JAN 2021 | MAR 2021 | APR 2021 | SEP 2021 | Oct 2021

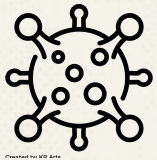
How Does Perceived Recency Impact Brain Responses and Empathy?

Background Research

- **Perception of the Duration of Emotional Events - Sylvie Droit-Volet et al.**
  - Participants did a temporal bisection task with visual stimuli and then were presented comparisons represented by faces expressing anger, happiness, and sadness and a neutral baseline expression.
  - Found that duration of emotional expressions was overestimated compared to a neutral expression
- **Distortions to the passage of time during England's second national lockdown: A role for Depression - Ruth Ogden**
  - Over 80% of people reported experiencing distortion to the passage of time during the second English lockdown in comparison to normal life
- **Empathy Across the Adult Lifespan: Longitudinal and Experience-Sampling Findings- Daniel Grühn et al.**
  - Examined change in self reported empathy over 12 years. Cross sectional analyses suggested older adults had lower empathy than younger adults, but longitudinal analyses showed no age related decline in empathy

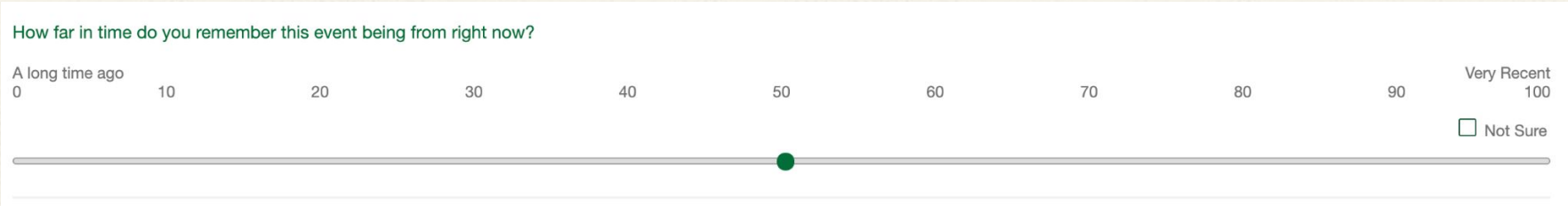






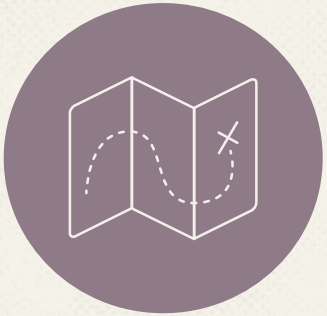

BRIEF METHODS OVERVIEW

- 155 covid-related image stimuli displayed in 4 trials
  - cut down to 110 for analysis due to incomplete survey responses
- Scanned 7 participants
  - Excluded 3 because of incomplete scans or survey responses



POTENTIAL SOURCES OF ERROR

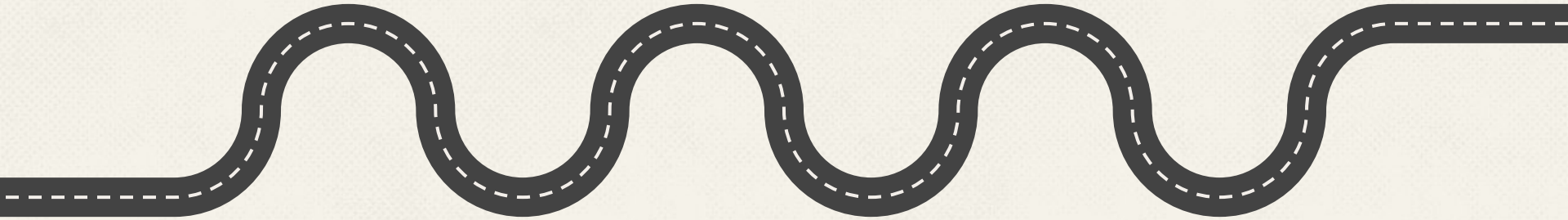
- Small sample size (4)
- Phrasing of questions
- Self report surveys
- Lack of stimuli comprehension
  - Tried to filter for this; some success
- Outside influences on image perceptions



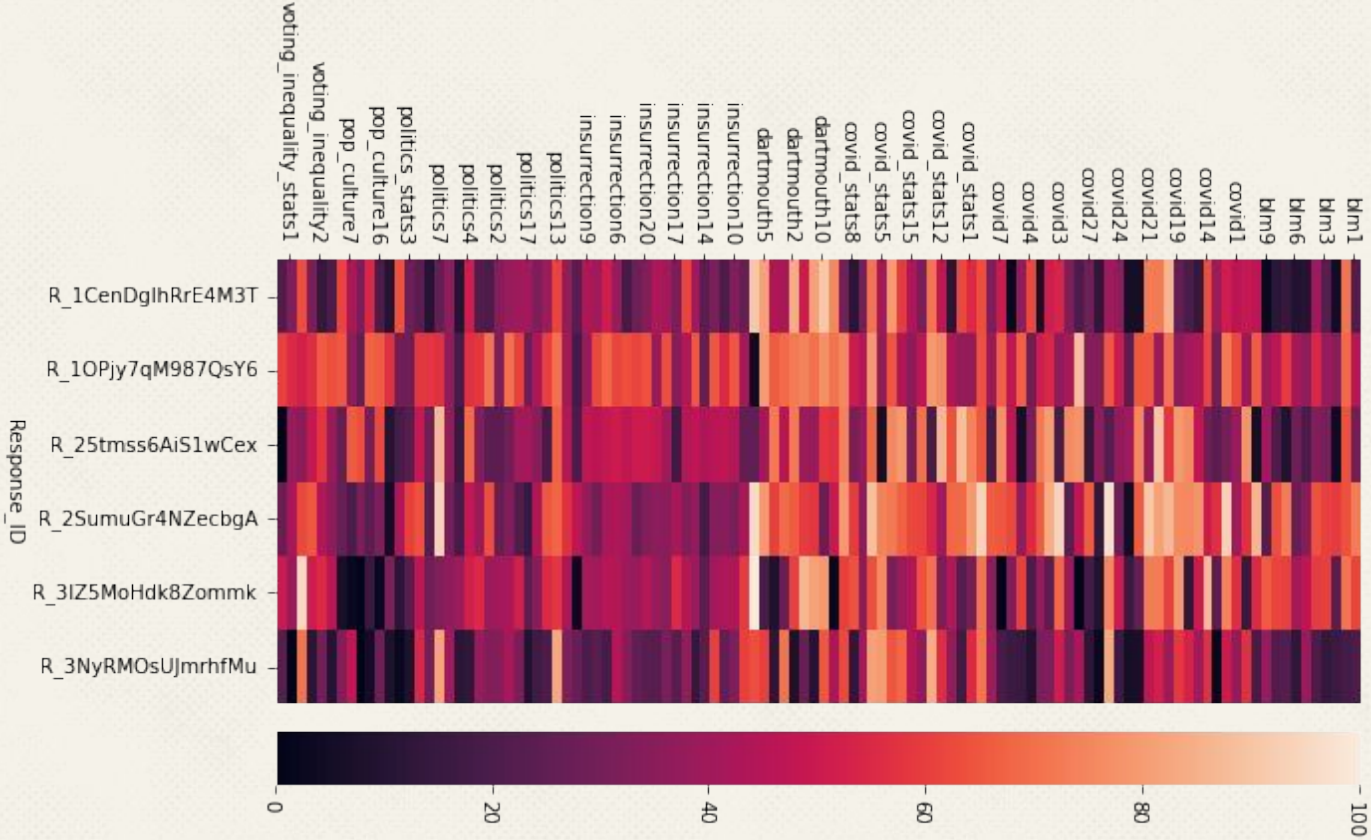
Representational Similarity Analysis

RSA ROADMAP

1. Preprocessing and run single level model over each subject
2. Create matrix of relative euclidean distance for each subject's time survey response
3. Create a mask for each subject's brain data with all 50 regions
4. Create matrix of relative correlation between all 50 regions for a single subject
5. Run representational similarity analysis to calculate the correlation between the distance matrix and the brain region matrix
6. Plot the correlation between time judgment distance and brain pattern distance and run a group level analysis and t-test

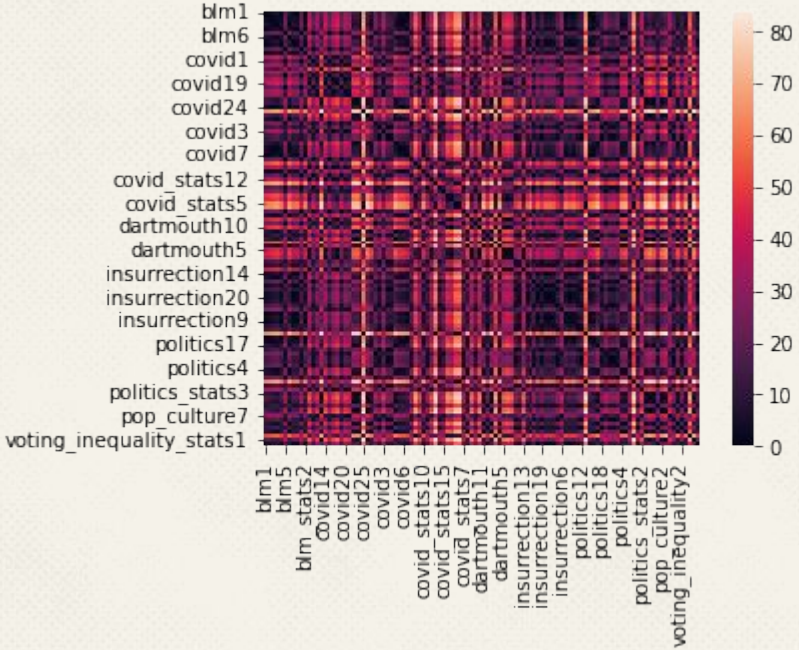


Time Survey Response Matrix

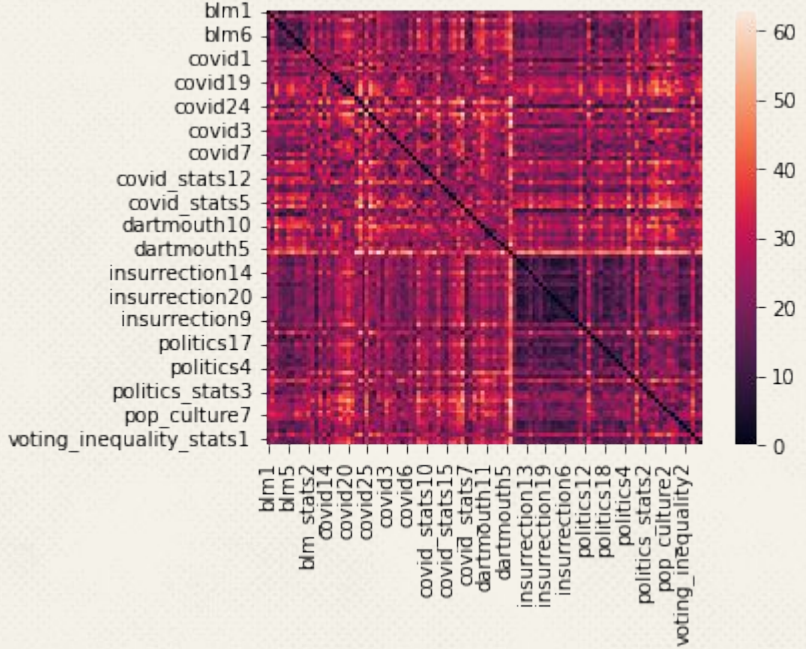


Time and Brain Activity RSA

Single Subject Euclidean Distance Matrix

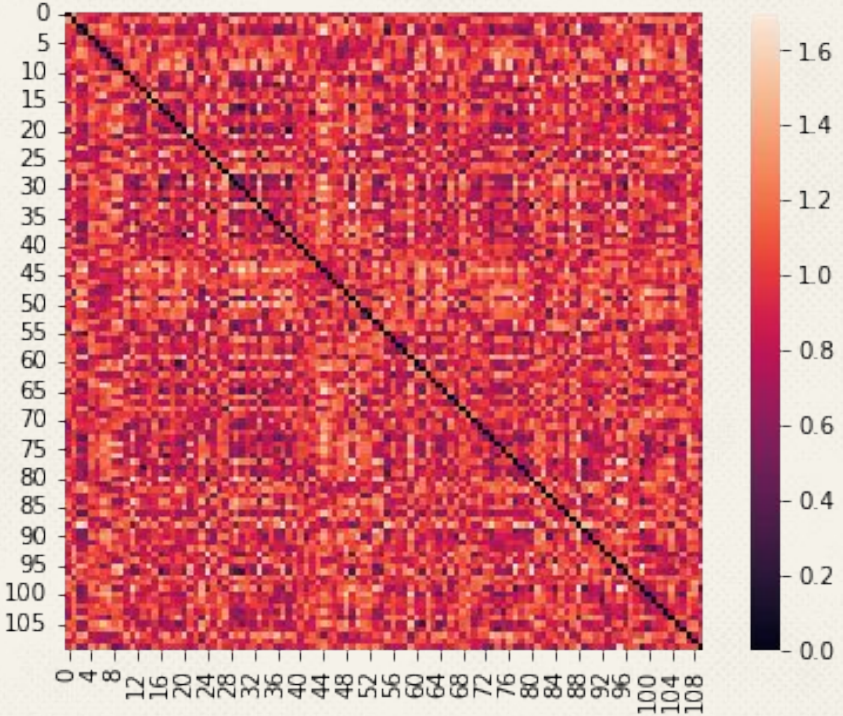


Distance Matrix Averaged across Responses



Brain Distance Matrix

Brain Activation Distance Pattern Matrix Within One Region for One Subject

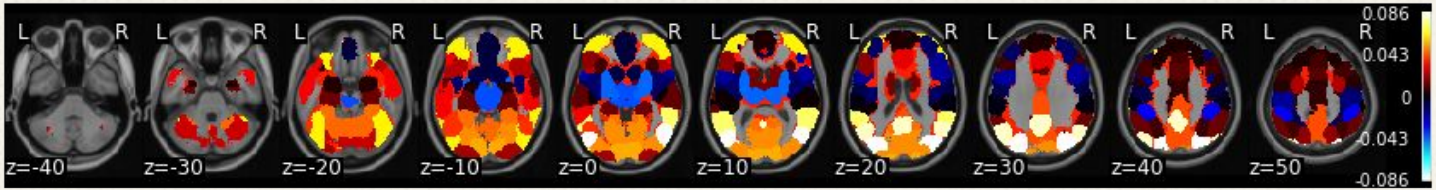


ANALYSES LIST

1. Within Subject Time vs. Brain Region RSA
2. Group Average Time vs. Brain Region RSA
3. Within Subject Time vs. Empathy Correlation
4. Group Average Time vs. Empathy RSA

Results

Plot of correlation between time judgment distance and brain pattern distance for a single subject



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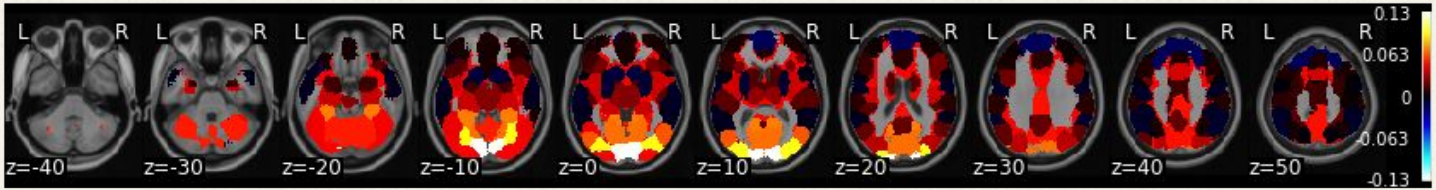

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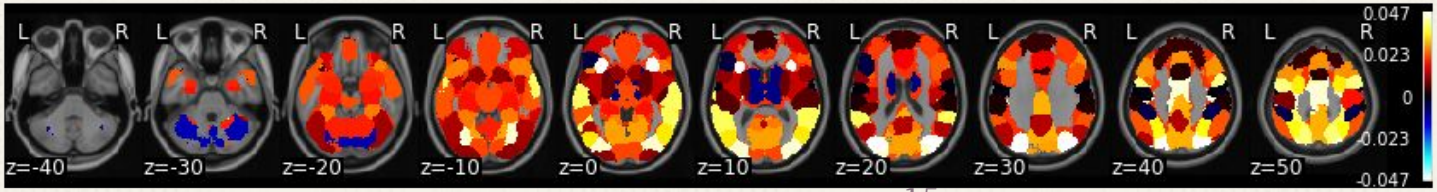

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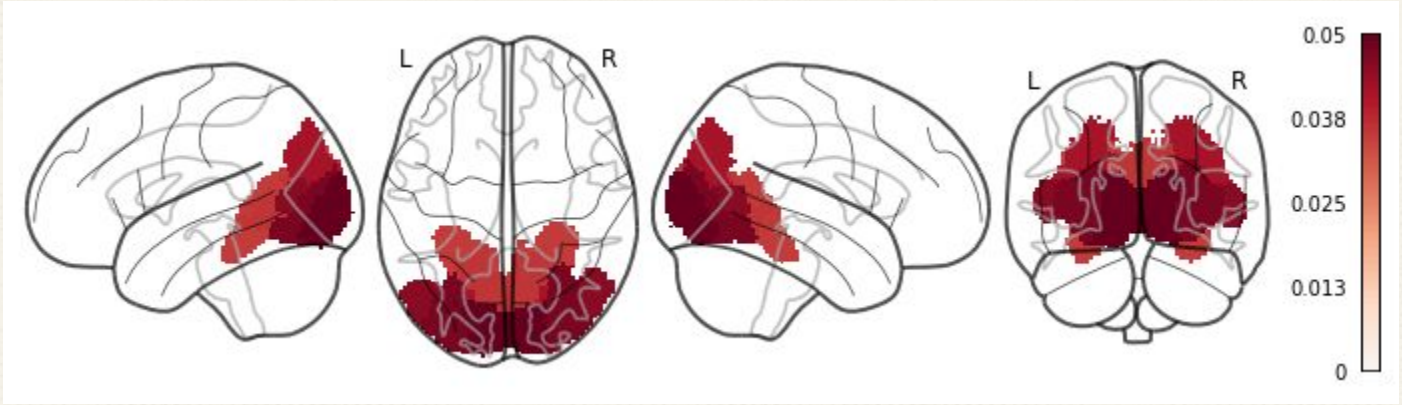
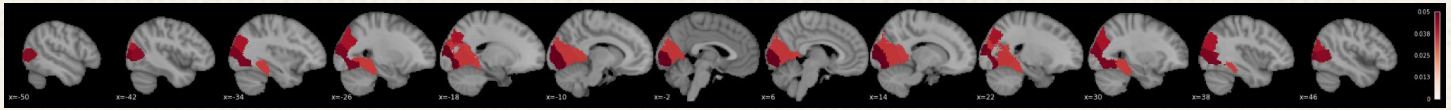
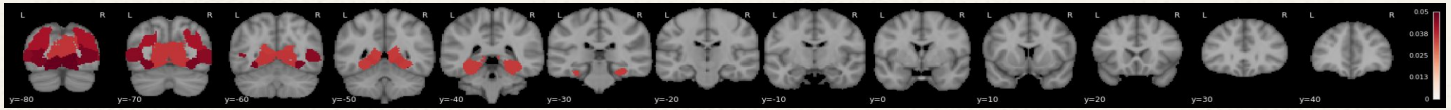
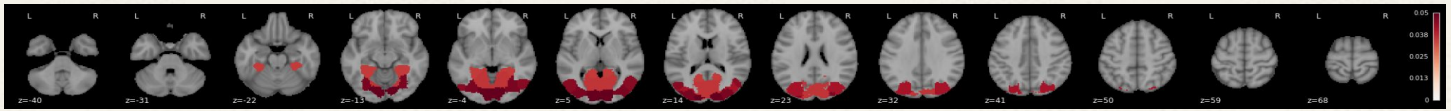
Group Analysis

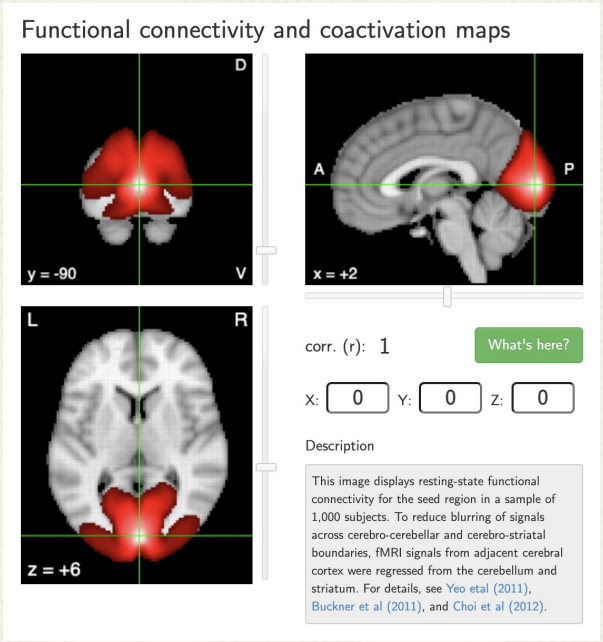








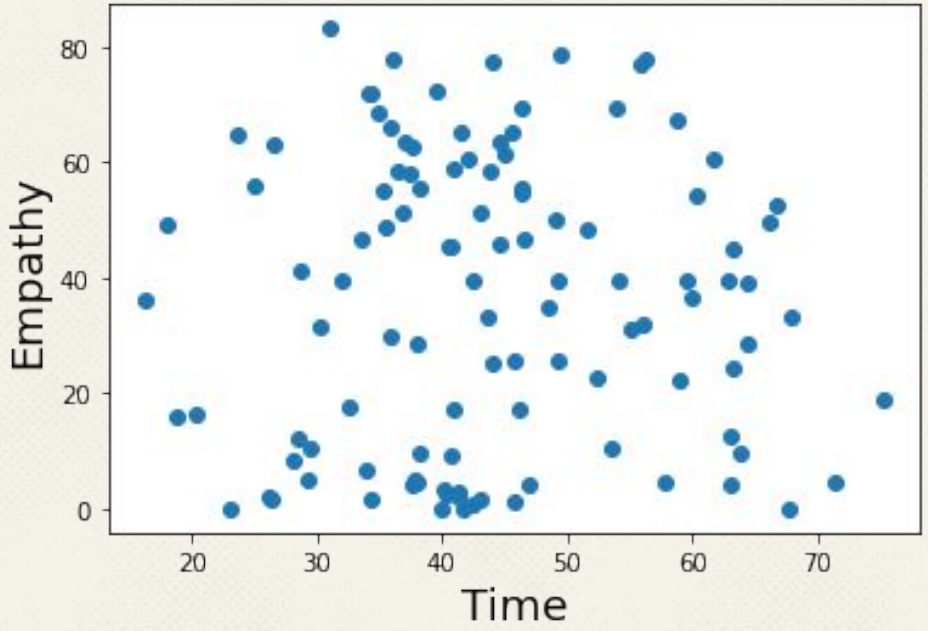
Activated Region: Occipital Lobe



Name	z-score	Posterior prob.	Func. conn. (r)	Meta-analytic coact. (r)
primary visual	5.99	0.84	0.32	0.37
mental imagery	5.65	0.85	0.1	0.14
visual	5.43	0.67	0.51	0.46
occipital	5.29	0.69	0.49	0.4
visual cortex	5	0.74	0.37	0.39
readers	4.46	0.81	-0.01	0.08
sighted	4.35	0.83	0.33	0.26
v1	4.15	0.81	0.5	0.49
imagery	3.5	0.72	-0.01	0.05

Empathy and Time: First Order

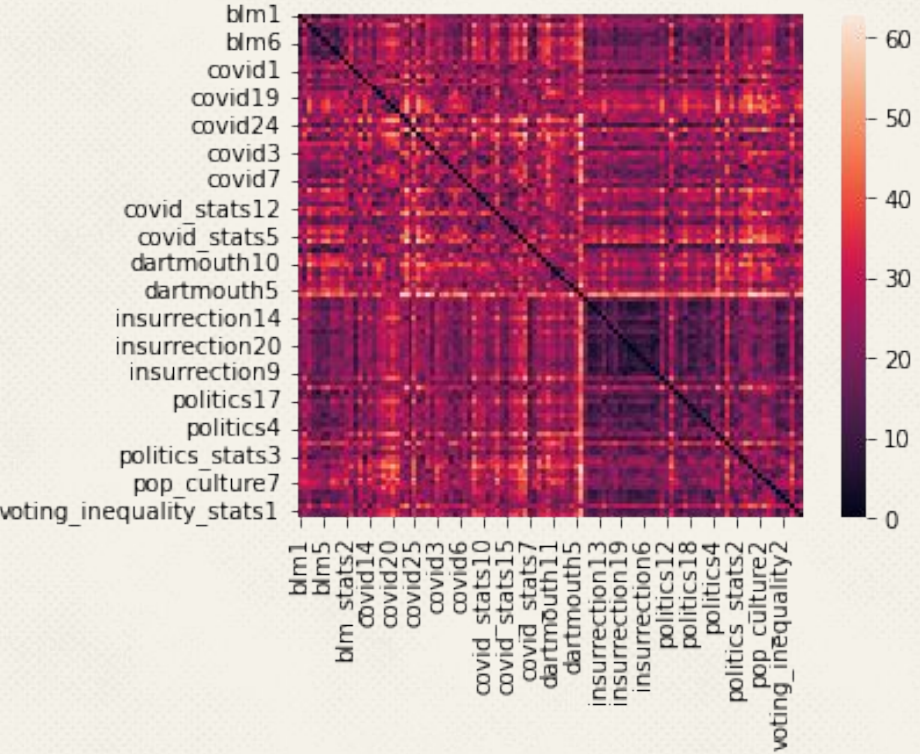
Relationship between average Empathy ratings and Time Judgment for each image



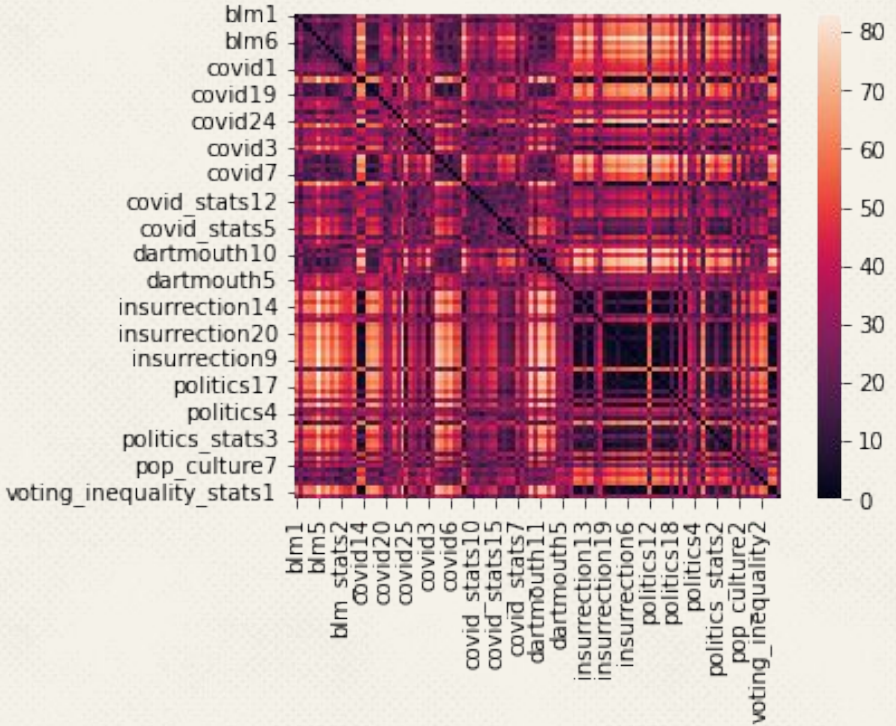
R=0.001, p=0.992

Empathy and Time: Second Order

Average Time Distance



Average Empathy Distance

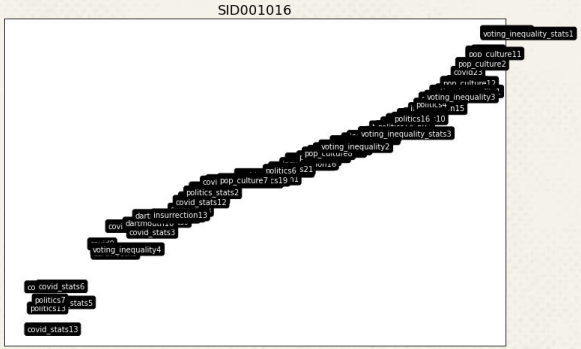


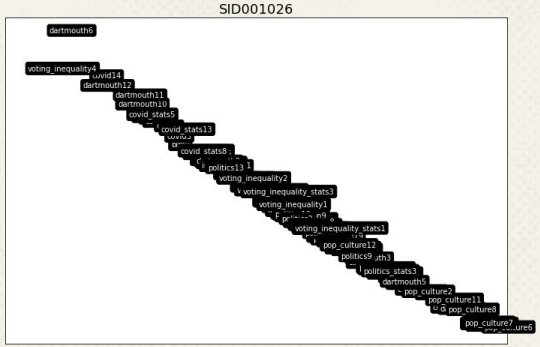
Empathy and Time Correlation:

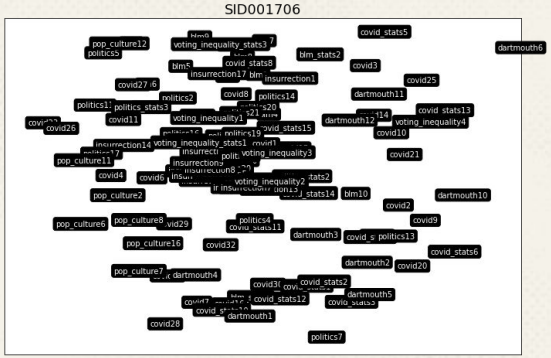
Correlation value: -0.008803089232371943

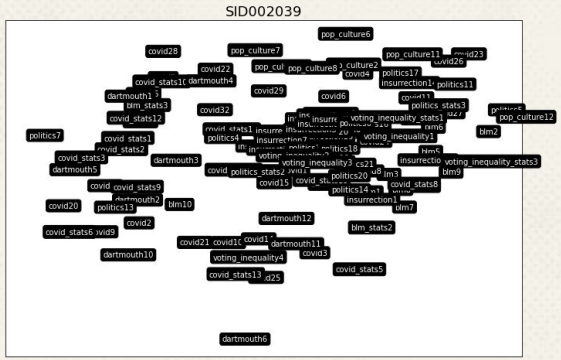
P-value: 0.6656668666266746

Illustration of the stimuli arrangement with Multi-Dimensional Scaling









CONCLUSIONS

- Limited power to our analysis and low correlation
  - Needed more subjects…
- Main activation in the visual cortex
- **Further Exploration:**
  - Look more at the differences between categories in regards to time
  - Does time judgement differ with different mediums of stimuli?
  - Comparison to real time

THANKS!

Any questions?