

Project description

Important Step:

Students are required to form groups of a maximum of 4 students, each identifying their group number and listing all group members and their student's ID in the Excel file on Google Drive that is shared with you. It is important since you will use the group number to identify the dataset number for individual analysis.

Data description

The dataset used has been published by [Henson et al. \(2011\)](#)¹. This dataset contains EEG, MEG, functional MRI, and structural MRI data from 16 subjects who undertook multiple runs of a simple task performed on a large number of Famous, Unfamiliar, and Scrambled faces. There were 9 runs (sessions) per subject for the fMRI experiment.

During this project, you will be only analyzing the functional MRI data.

More information about the data acquisition can be found here:

<https://www.nature.com/articles/sdata20151>

Question:

Using the same pipeline shown in the tutorial report the following activation maps for one subject (assigned based on your group number) and for the group :

- Famous face > 0
- Unfamiliar face > 0
- Faces > Scrambled Faces

For the group analysis, report the result on the MNI template. For the subject result, report the result on the subject-specific anatomy (skip normalization). For both, report all statistically significant results with a threshold of $p < 0.05$ (FWE corrected).

¹ <https://doi.org/10.3389/fnhum.2011.00076>

Guidance

The following page gives some guidance on how to proceed with the project. For details on the rapport writing consulate Page 3 and 4.

Data Download

Download the data from the following FTP server:

`ftp://ftp.mrc-cbu.cam.ac.uk/personal/rik.henson/wakemandg_hensonrn/`

This can be achieved using an FTP client (eg. FileZilla)

You can start by downloading only the subject assigned to you before downloading all the data.

Data exploration

Start by exploring the dataset :

1. What are the data available, and what do they look like? Is there anything out of the ordinary?
2. What are the key parameters necessary for the analysis? Write down your analysis pipeline and every parameter needed from the data. Ask your TA if you cannot find a specific parameter in the data.

Data analysis

1. Unlike the dataset presented in the lab, this dataset has multiple sessions. Start by analyzing each session for one subject. Then think about how to estimate the response for the subject by combining the responses of the different sessions. (Lab 04)

2. The timing of the tasks is given to you in the following folder: BOLD/Trials either as txt files with the following columns (Task, Onset, Duration) or SPM files. The SPM file can be used directly in the SPM to provide the task information.

In SPM select "multiple conditions" and input the corresponding .mat file.

Report

One report per person must be submitted on moodle as a pdf file. Your report should follow the following structure (from 15 to 20 pages):

1. Abstract:

The abstract provides a brief summary of the entire report, including the research question, methodology, results, and conclusions. It should be concise and informative, typically around 150-250 words.

Here's what to include:

Purpose: Clearly state the purpose or objective of the study.

Methodology: Briefly describe the methods used to conduct the research.

Results: Summarize the key findings.

Conclusions: Provide a brief overview of the main conclusions drawn from the study.

2. Introduction:

The introduction sets the stage for the report by providing background information, stating the research problem or question, and outlining the objectives of the study. Key components include: Background: Provide relevant context or literature review related to the topic.

Research Question/Hypothesis: Clearly state the main research question or hypothesis.

Objectives: Outline the specific goals or aims of the study.

3. Method:

The method section details how the research was conducted, including participants, materials, procedures, and data analysis. Here's what to include:

Participants: Describe the characteristics of the participants. Procedure: Explain the protocol applied for data collection. Data Analysis: Explain the methods used to analyze the data collected.

4. Results:

The results section presents the findings of the study in a clear and organized manner. It should focus on presenting the data without interpretation or discussion.

Highlight the most important findings relevant to the research question.

5. Discussion:

The discussion section interprets the results in the context of the research question, compares findings with existing literature, and offers explanations for observed patterns or discrepancies. Here's what to include:

Interpretation of Results: Discuss the implications of the findings and how they relate to the research question.

Comparison with Previous Studies: Compare your results with previous research.

Limitations: Address any limitations of the study and of the conducted analysis that may have affected the results.

Future Directions: Suggest areas for further research or potential applications of the findings.

General Tips:

Ensure consistency in formatting and style throughout the report.

Use clear and concise language, avoiding jargon or technical terms that may be unfamiliar to the reader.

Provide references for any sources cited in the report, following a consistent citation style (e.g., APA, MLA).

Proofread the report carefully to check for grammatical errors, typos, or formatting issues.

By following these guidelines, you can effectively structure and write a comprehensive report with abstract, introduction, method, results, and discussion sections.