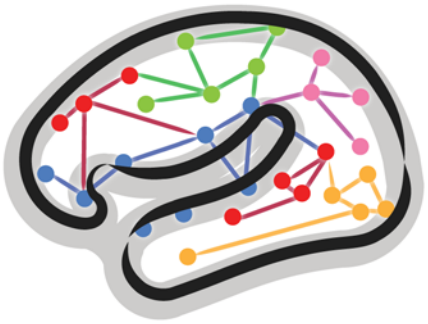

HUMAN Connectome PROJECT

WU-Minn HCP MEG Initial Data Release: Reference Manual

Appendix V – tMEG: Extracting subsets of trials from the cleaned data produced by tmegpreproc pipeline

4 March 2014

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Groups of trials produced by the tmegpreproc pipeline

The hcp_tmegpreproc.m pipeline (see description in the **tMEG Channel-level Analysis Pipelines** section of the MEG1 Reference Manual) removes bad channels, bad segments and artifactual Independent Components from the raw data of each scan and splits the resulting cleaned data into groups of trials.

For reader's convenience below is reproduced the existing division of the data by tmegpreproc pipeline into groups of trials locked on different events in each experiment.

Experiment	Data Group	Defining event
Motor Task	TFLA	onset of flashing cross that instructs subject to perform movement by hand or foot.
Motor Task	TEMG	onset of the EMG signal from hand.or foot recorded muscles.
Working Memory	TIM	Onset of an image that the subject has.to match or not with the target image.
Working Memory	TRESP	Onset of button press by the subject.
Story/Math	TEV	Onset of any task event during the question and option period in stories and math problems.
Story/Math	TRESP	Onset of button press by the subject.
Story/Math	BSENT	trials containing entire sentences. For stories, this is a sentence during narration without the option sentence at the end of the story. For math, this is the sentence of the Math problem excluding the option sentence at the end.
Story/Math	BUN	trials containing entire Blocks of stimulus Units. A stimulus unit is defined as an entire story or an entire math problem including the option part.

In each of these data groups, there are numerous subsets of trials according to the specific experimental conditions. In example, in the Working Memory trial group TIM (trials locked on image onset), one subset of trials is this for images in 0-Back memory blocks. As another example, in the Motor Task trial group TEMG, one subset of trials is for movements in the Left Hand blocks.

In order to allow one to separate such subsets of trials according to experimental conditions, such information about the conditions to which each trial belongs is saved.

The tmegpreproc pipeline produces for each scan an output file, named with the convention $EXPERIMENTID_$SCANID_tmegpreproc_trialinfo.mat. This matlab data file contains the structure variable "trialinfo", which contains trial definition and additional information for each of the data groups for a specific scan. This trial information describes the CLEAN set of trials within each data group.

The field "trlInfo.lockTrl" is a cell array with one entry per trial group, as described in the table above. Each such entry is a numerical matrix, with each row corresponding to a trial and each column corresponding to a specific condition or type of information regarding each trial. This numerical matrix is also contained as a field in the clean data structure saved in output file "$EXPERIMENTID_$SCANID_tmegpreproc_$GROUPMNEMONIC.mat".

The description of what each column represents can be found in the corresponding cell entry of the field, "trlInfo.trlColDescr". There the description of each column can be found in string format.

For the convenience of the reader, this description string for each column is presented for the different experiments and different trial groups.

Working Memory

TIM and TRESP trial groups

Column number	Description	Notes
1	Run Number	The run number is decoded from the E-Prime triggers. In many cases this initial trigger is not available. In that case, the run number is set to 1, and the run number has to be inferred by the user from the scan name.
2	Block Number within run	
3	NaN (Not a Number)	(This column has been reserved to contain the image ID number, which is not encoded in the trigger values. This is not yet implemented.)
4	ImageType: 1- Face, 2- Tools, 0- Fixation	

5	memoryType: 1: 0-Back, 2: 2-Back
6	targetType: 1- target, 2- nontarget, 3: lure
7	Trial trigger onset Sample
8	Trial trigger offset Sample
9	Sequence of image in the block
10	isPressed : 0- subject did not press any response button 1- subject pressed a response button
11	isPressedLate: 1- If subject responded after the image is displayed (at the longest, 2 sec), but before the next trial. 0- If subject pressed response button within the presentation time of the image. NaN: Otherwise
12	isDoubleResponse: 1- If subject pressed two response buttons in the same trial 0: user DID NOT press two response buttons in the same trial
13	pressedCode: Code of the pressed button (If not pressed, NaN)
14	isCorrect: 1- If subject responded that she saw a target when an actual target was on or that she saw a nontarget when a actual nontarget was on 0: The opposite of the above. NaN: When subject has not responded or has pressed two buttons

15	isLureAsCorrect: 1- If subject has responded that he saw a target when a lure image of actual target was on. 0: In all other cases where subject has responded NaN: When subject has not responded or has pressed two buttons'
16	respTime: The time from onset of Image to response (sec)
17	respDuration: Duration of button press in seconds
18	is First In Block
19	is Last In Block
20	prev. Trial: Run Number. Same as 1 but for the previous trial.
21	prev. Trial: Block number within run. Same as 2 but for the previous trial.
22	prev. Trial: Nan. Same as 3 but for the previous trial.
23	prev. Block: ImageType. Same as 4 but for the previous Block.
24	prev. Block: memoryType. Same as 5 but for the previous Block.
25	prev. Trial: targetType. Same as 6 but for the previous Block.
26	prev. Trial: Trial start Sample. Same as 7 but for the previous Block.
27	prev. Trial: Trial end Sample. Same as 8 but for the previous Block.

28	prev. Trial: Sequence of image in the block. Same as 9 but for the previous Block.	
29	prev. Trial: isPressed. Same as 10 but for the previous Block.	
30	prev. Trial: isPressedLate. Same as 11 but for the previous Block.	
31	prev. Trial: isDoubleResponse. Same as 12 but for the previous Block.	
32	prev. Trial: pressedCode. Same as 13 but for the previous Block.	
33	prev. Trial: isCorrect. Same as 14 but for the previous Block.	
34	prev. Trial:isLureAsCorrect. Same as 15 but for the previous Block.	
35	prev. Trial: respTime. Same as 16 but for the previous Block.	
36	prev. Trial: respDuration. Same as 17 but for the previous Block.	
37	prev. Trial: isFirstInBlock. Same as 18 but for the previous Block.	
38	prev. Trial: isLastInBlock. Same as 19 but for the previous Block.	
39	Is button pressed during onset of the stimulus	
40	has trial NANs.	This flag is used to indicate if there are data segments in the trial where data has been replaced by NaNs. This is used in data groups where trials do not have fixed trial length and tend to be long.

Language Processing (Story-Math)

TEV trial group

Column number	Description	Notes
1	Block Number within Run	
2	Unit Type : 1.Story 2.Math	
3	Unit Number within Run	
4	Total Number of units (N of Stories or N of Math problems) in same Run	
5	Unit Number within Block	
6	Total Number of units (N of Stories or N of Math problems) in same Block	
7	Attribute1: For story this is the story number. For Math this is the difficulty level	
8	Unit Narration interval Start Sample - Start with the onset of the first word trigger or the beginning of the first sentence	
9	Unit Narration interval End Sample	
10	N subunits within Narration interval	
11	Unit Option interval Start Sample	
12	Unit Option interval End Sample	
13	N subunits within Option interval	
14	Correct Option- 1 or 2	
15	Unit Response interval start sample	
16	Unit Response interval end sample	
17	Unit Response sample	

18	is Response Correct	
19	is Response Early	
20	Event Sample	
21	Event Type – 20.Math Narration number word 21.Math Narration operand word 22.Math Option Intro Word 23.Math Option 1 Word 24. Math Option OR Word 25.Math Option 2 Word 10.Story Sentence 12.Story Option Intro 13.Math Option 1 Word 14. Math Option OR Word 15.Math Option 2 Word	
22	Narration Event Number in Narration interval (Applies only to Sentence or number or operation in Narration interval	
23	has trial NANs (Not a Number values)	This flag is used to indicate if there are data segments in the trial where data has been replaced by Nans. This is used in data groups where trials do not have fixed trial length and tend to be long.

TRESP and BUN trial groups

Column number	Description	Notes
1	Block Number within Run	
2	Unit Type: 1. Story 2. Math	
3	Unit Number within Run	
4	Total Number of units (N of Stories or N of Math problems) in same Run	

5	Unit Number within Block	
6	Total Number of units (N of Stories or N of Math problems) in same Block	
7	Attribute1: For story this is the story number. For Math it is the difficulty level	
8	Unit Narration interval Start Sample - Start with the onset of the first word trigger or the beginning of the first sentence	
9	Unit Narration interval End Sample	
10	N subunits within Narration interval	
11	Unit Option interval Start Sample	
12	Unit Option interval End Sample	
13	N subunits within Option interval	
14	Option Intro Sample - "equals" or "That was about"	
15	Option1 onset sample	
16	OR onset sample	
17	Option2 onset sample	
18	Correct Option- 1 or 2	
19	Unit Response interval start sample	
20	Unit Response interval end sample	
21	Unit Response sample	
22	is Response Correct	
23	is Response Early	
24	has trial NANs (Not a Number values)	This flag is used to indicate if there are data segments in the trial where data has been replaced by Nans. This is used in data groups where trials do not have fixed trial length and tend to be long.

BSENT trial group

Column number	Description	Notes
1	Block Number within Run	
2	Unit Type: 1. Story 2. Math	
3	Unit Number within Run	
4	Total Number of units (N of Stories or N of Math problems) in same Run	
5	Unit Number within Block	
6	Total Number of units (N of Stories or N of Math problems) in same Block	
7	Attribute1: For story this is the story number. For Math it is the difficulty level	
8	N sentences within Narration interval	(always 1 for math as in math one narration interval corresponds to one math sentence)
9	is Response Correct	(For Story this refers to the response at the very end of the sentence)
10	is Response Early	
11	Narration Sentence Number in Narration interval (For math always equal to one)	
12	Narration Sentence Start Sample	
13	Narration Sentence End Sample	
14	has trial NANs (Not a Number values)	This flag is used to indicate if there are data segments in the trial where data has been replaced by Nans. This is used in data groups where trials do not have fixed trial length and tend to be long.

Motor

TEMG trial group

Column number	Description	Notes
1	Block Number within Run	
2	Block Stim Code: 1-Left Hand 2 - Left Foot 4 - Right Hand 5 - Right Foot 6 - Fixation	
3	Trial Index in Block	For the TEMG group this is derived by finding the flash cross onset just before the EMG onset
4	Trial EMG Onset Sample	
5	prev. Block Stim Code	
6	Time from EMG onset to the previous Flashing Cross	
7	has trial NANs (Not a Number values)	This flag is used to indicate if there are data segments in the trial where data has been replaced by Nans. This is used in data groups where trials do not have fixed trial length and tend to be long.

TFLA trial group

Column number	Description	Notes
1	Block Number within Run	

2	Block Stim Code: 1-Left Hand 2 - Left Foot 4 - Right Hand 5 - Right Foot 6 - Fixation	
3	Trial Index in Block	
4	Trial Onset Sample	
5	prev. Block Stim Code	
7	has trial NANs (Not a Number values)	This flag is used to indicate if there are data segments in the trial where data has been replaced by Nans. This is used in data groups where trials do not have fixed trial length and tend to be long.