

README: Data supporting the published article: 'Visual motion and decision-making in dyslexia: Reduced accumulation of sensory evidence and related neural dynamics'

Ethical consent

ParentInfoConsent_Combined.pdf

Information sheet and blank consent form which was completed by all parents/carers of child participants.

EEG data

EEGdata_task1_batch1.zip

EEGdata_task1_batch2.zip

EEGdata_task1_batch3.zip

EEGdata_task2_batch1.zip

EEGdata_task2_batch2.zip

EEGdata_task2_batch3.zip

/ PXXX_taskY.mat

Zipped files contain the preprocessed EEG data for each participant for the motion coherence task (*EEGdata_task1_batchZ.zip*) and the direction integration task (*EEGdata_task2_batchZ.zip*). Within the zipped folders is a .mat file containing the continuous, preprocessed EEG data for each participant (*PXXX_taskY.mat*) where PXXX is the ID number, and taskY refers to the task (task1 = motion coherence task; task2 = direction integration task). Preprocessing was conducted using analysis01_preprocess_CM.m (<https://osf.io/nvwf7>). Each file contains a structure 'EEG' which is in EEGLAB format.

Following preprocessing, the EEG data were analysed with RunRespLockedRCA_osf.m and UnfoldAnalysis_AllParticipants_ridgegereg_findbestlambda_osf.m (<https://osf.io/nvwf7>, see associated README.txt) to extract stimulus-locked and response-locked slope measures, which are output in:

RegResults_RR_task1.csv

RegResults_RR_task2.csv

These files contain the following variables:

Variable name	Description
ID	ID number of participant in PXXX format (corresponds to filenames in EEG data files PXXX_taskY.mat as above)
stim_slope_cond1	Regression slope fitted to EEG activity in centro-parietal component from 240 ms to 520 ms after stimulus onset in difficulty level condition 1 (difficult)
stim_slope_cond2	Regression slope fitted to EEG activity in centro-parietal component from 240 ms to 520 ms after stimulus onset in difficulty level condition 2 (easy)
resp_slope_cond1	Regression slope fitted to EEG activity in centro-parietal component from -200 ms to 0 ms around the response in difficulty level condition 1 (difficult)
resp_slope_cond2	Regression slope fitted to EEG activity in centro-parietal component from -200 ms to 0 ms around the response in difficulty level condition 2 (easy)

These values are incorporated in *BehavData_Matched_Round2_Dyslexia.csv* (see below).

Key explaining EEG triggers

MarkUpFile_DC.pdf

This is a key explaining the 4 digit codes that were assigned to EEG triggers (Triggers.matrix) during recording (see Experimental code <https://osf.io/wmtpx/>).

Data for modelling

BehavData_Matched_Round2_Dyslexia.csv

This is the unblinded dataset that was used for modelling, where there is a row for each trial in the dataset. It includes the EEG slope measure used for joint modelling (EEG_respslope). At the initial stage of analysis, a blinded version of this dataset was sent to the blind modeler, which did not include the 'group' column, or the key variables reflecting a dyslexia diagnosis (TOWRE, WIAT). Each variable is described below.

Variable name	Description
PNo	Participant number from 1 to 100
subj	ID number of participant in PXXX format (corresponds to filenames in EEG data files PXXX_taskY.mat as above)
group	Group. 0 = typically developing, 1 = dyslexia
groupshuff	Randomly permuted/shuffled group membership, for blinded modelling (0 = typically developing, 1 = dyslexia).
age	Age at testing (in years)
sex	Sex. 0 = male; 1 = female
order	Order of tasks. 1 = motion coherence task first; 2 = direction integration task (standard deviation of Gaussian motion) first.
VIQ	Verbal IQ composite score, measured with the WASI-2
PIQ	Performance IQ composite score, measured with the WASI-2
FSIQ	Full-scale IQ composite score, measured with the WASI-2
TOWRE	TOWRE-2 Phonemic Decoding Efficiency (PDE) standardised score
WIAT	WIAT-III spelling subtest standardised score
Composite	Spelling and reading composite – mean average of TOWRE and WIAT standardised scores
inattentive	Average item score on the inattentiveness subtest of the SNAP-IV
hyperactive	Average item score on the hyperactivity subtest of the SNAP-IV
task	Task. 1 = motion coherence, 2 = direction integration (standard deviation of Gaussian motion).
trialno	Trial number from 1 to 152 for each task.
motiondir	Direction of stimulus motion (1 = leftwards, 2 = rightwards)
cond	Difficulty level condition (1 = difficult, 2 = easy, 3 = catch trial)
stimlev	Stimulus level corresponding to 'cond'. In the motion coherence task, the stimulus level was either .30 coherence (difficulty), .75 coherence (easy) or 1 (catch trial). In the direction integration task, the stimulus level was a standard deviation of dot directions of 70 deg (difficult), 30 deg (easy) or 0 (catch trial). Note that the catch trials in the two tasks are identical (as a standard deviation of 0 deg is equivalent to 100% coherence).
keypress	Which button on the response box was pressed (1 = left, 2 = right, or 0 if no button was pressed before the trial timed out).
accuracy	Whether the participant reported the motion direction correctly (i.e., whether keypress == motiondir; 0 = incorrect, 1 = correct, or NaN if no response was made before the trial timed out)
RT	Response time in seconds measured from the start of the stimulus phase
EEG_respslope	Regression slope fitted to EEG activity in centro-parietal component from -200 ms to 0 ms around the response
EEG_stimslope	Regression slope fitted to EEG activity in centro-parietal component from 240 ms to 520 ms after stimulus onset

parsedData-cathyDyslexia.Rdata

This .Rdata file is the output from parser-cathyDyslexia.R (<https://osf.io/nvwf7/>) which takes *BehavData_Matched_Round2_Dyslexia.csv* and puts it in the right format for modelling. Each variable is described below:

data	All trial-by-trial data, as taken from <i>BehavData_Matched_Round2_Dyslexia.csv</i> – see parser-cathyDyslexia.R (https://osf.io/nvwf7/)
age.perSub	Age (in years) of each participant
conds	List of difficulty level conditions (“easy” “hard”)
EEGresp.perSubAndCondAndTask	Response-locked EEG slope parameter (regression slope fitted to EEG activity in centro-parietal component from -200 ms to 0 ms around the response) for each participant, each difficulty level condition and each task
EEGstim.perSubAndCondAndTask	Stimulus-locked EEG slope parameter (regression slope fitted to EEG activity in centro-parietal component from 240 ms to 520 ms after stimulus onset) for each participant, each difficulty level condition and each task
group.perSub	Group membership of each participant (0 = typically developing; 1 = dyslexia)
groups	List of groups (0, 1)
maxRT	Maximum RT in seconds
n.cond	Number of difficulty level conditions
n.group	Number of groups
n.stim	Number of stimulus directions
n.task	Number of tasks
PIQ.perSub	Performance IQ of each participant
S	Total number of participants
stims	List of stimulus directions (left, right)
subs	Participant ID for each participant
tasks	List of tasks (coherence, deviation [=direction integration])

Model output files from behavioural models

ModelOutputFiles_BehavModels.zip

/FIT_DIFF-BayesHier-cathyDyslexia-task_coherence.Rdata

/FIT_DIFF-BayesHier-cathyDyslexia-

task_coherence_partialOutAge_allParams.Rdata

/FIT_DIFF-BayesHier-cathyDyslexia-

task_coherence_partialOutAgeAndPIQ_allParams.Rdata

/FIT_DIFF-BayesHier-cathyDyslexia-task_deviation.Rdata

/FIT_DIFF-BayesHier-cathyDyslexia-task_deviation_partialOutAge_allParams.Rdata

/FIT_DIFF-BayesHier-cathyDyslexia-

task_deviation_partialOutAgeAndPIQ_allParams.Rdata

These files contain the output from the corresponding models (MODEL_DIFF-BayesHier-cathyDyslexia...) stored at <https://osf.io/nvwf7/>.

FIT_DIFF-BayesHier-cathyDyslexia-task_coherence.Rdata and *FIT_DIFF-BayesHier-cathyDyslexia-task_deviation.Rdata* contain the output from the standard models without covariates for the coherence task and deviation (direction integration) task.

FIT_DIFF-BayesHier-cathyDyslexia-task_coherence_partialOutAge_allParams.Rdata and *FIT_DIFF-BayesHier-cathyDyslexia-task_deviation_partialOutAge_allParams.Rdata* contain the output from models which partial out the variance of age.

FIT_DIFF-BayesHier-cathyDyslexia-task_coherence_partialOutAgeAndPIQ_allParams.Rdata and *FIT_DIFF-BayesHier-cathyDyslexia-task_deviation_partialOutAgeAndPIQ_allParams.Rdata* contain the output from models which partial out the variance of age and PIQ (for exploratory analysis).

Model output files from joint models (EEG + behavioural data)

ModelOutputFiles_JointModels.zip

/FIT_DIFF-BayesHier_JointModel_RespLocked-cathyDyslexia-task_coherence.Rdata

/FIT_DIFF-BayesHier_JointModel_RespLocked-cathyDyslexia-task_deviation.Rdata

/FIT_DIFF-BayesHier_JointModel_RespLocked_PartialOutAge-cathyDyslexia-task_coherence.Rdata

/FIT_DIFF-BayesHier_JointModel_RespLocked_PartialOutAge-cathyDyslexia-task_deviation.Rdata

/FIT_DIFF-BayesHier_JointModel_RespLocked_GroupCors-cathyDyslexia-task_coherence.Rdata

/FIT_DIFF-BayesHier_JointModel_RespLocked_GroupCors-cathyDyslexia-task_deviation.Rdata

/FIT_DIFF-BayesHier_JointModel_RespLocked_PartialOutAge_GroupCors-cathyDyslexia-task_coherence.Rdata

/FIT_DIFF-BayesHier_JointModel_RespLocked_PartialOutAge_GroupCors-cathyDyslexia-task_deviation.Rdata

These files contain the output from the corresponding models (MODEL_DIFF-BayesHier-cathyDyslexia...) stored at <https://osf.io/nvwf7/>.

FIT_DIFF-BayesHier_JointModel_RespLocked-cathyDyslexia-task_coherence.Rdata and *FIT_DIFF-BayesHier_JointModel_RespLocked-cathyDyslexia-task_deviation.Rdata* contain the output from joint models which estimate a single correlation between EEG and drift-rate parameters across the whole sample, without age partialled out, for the coherence and deviation (direction integration) tasks.

FIT_DIFF-BayesHier_JointModel_RespLocked_PartialOutAge-cathyDyslexia-task_coherence.Rdata and *FIT_DIFF-BayesHier_JointModel_RespLocked_PartialOutAge-cathyDyslexia-task_deviation.Rdata* contain the output from joint models which estimate a single correlation between EEG and drift-rate parameters across the whole sample, with age partialled out.

FIT_DIFF-BayesHier_JointModel_RespLocked_GroupCors-cathyDyslexia-task_coherence.Rdata and *FIT_DIFF-BayesHier_JointModel_RespLocked_GroupCors-cathyDyslexia-task_deviation.Rdata* contain the output from joint models which estimate separate correlations between EEG and drift-rate parameters in each group (typically developing, dyslexia), without age partialled out.

FIT_DIFF-BayesHier_JointModel_RespLocked_PartialOutAge_GroupCors-cathyDyslexia-task_coherence.Rdata and *FIT_DIFF-BayesHier_JointModel_RespLocked_PartialOutAge_GroupCors-cathyDyslexia-task_deviation.Rdata* contain the output from joint models which estimate separate correlations between EEG and drift-rate parameters in each group (typically developing, dyslexia), with age partialled out.