

# README: Data supporting the published article: 'Behavioural and neural indices of perceptual decision-making in autistic children during visual motion tasks'

## **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/f3wnt>). 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\_ridgereg\_findbestlambda\_osf.m (<https://osf.io/f3wnt>, 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 *Data\_Matched\_Round2\_Autism.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/f3wnt> ).

### **Data for modelling**

#### ***Data\_Matched\_Round2\_Autism.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 an autism diagnosis (SCQ, ADOS). Each variable is described below.

<b>Variable name</b>	<b>Description</b>
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 = autism
groupshuff	Randomly permuted/shuffled group membership, for blinded modelling (0 = typically developing, 1 = autism).
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
SCQ	Social Communication Questionnaire score
ADOS	Autism Diagnostic Observation Schedule-2 total score
inattentive	Average item score on the inattentiveness subtest of the SNAP-IV
hyperactive	Average item score on the hyperactivity subtest of the SNAP-IV
reading	TOWRE-2 phonemic decoding efficiency standardised score
spelling	WIAT-III spelling subtest standardised score
literacycomposite	Spelling and reading composite – mean average of TOWRE and WIAT standardised scores
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
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#### *parsedData-cathyAutism.Rdata*

This .Rdata file is the output from parser-cathyAutism.R (<https://osf.io/f3wnt>) which takes *Data\_Matched\_Round2\_Autism.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>Data_Matched_Round2_Autism.csv</i> – see parser-cathyAutism.R ( <a href="https://osf.io/f3wnt">https://osf.io/f3wnt</a> )
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 = autism)
groups	List of groups (0, 1)
hyperactive.perSub	Hyperactivity/impulsivity score of each participant
inattentive.perSub	Inattentiveness score of each participant
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
reading.perSub	TOWRE-2 phonemic decoding efficiency score of each participant
S	Total number of participants
spelling.perSub	WIAT-III spelling score of each participant
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-cathyAutism-task\_coherence.Rdata*

*/FIT\_DIFF-BayesHier-cathyAutism-task\_coherence\_partialOutPIQ\_allParams.Rdata*

*/FIT\_DIFF-BayesHier-cathyAutism-*

*task\_coherence\_partialOutPIQAndReadingAndSpelling\_allParams.Rdata*

*/FIT\_DIFF-BayesHier-cathyAutism-task\_deviation.Rdata*

*/FIT\_DIFF-BayesHier-cathyAutism-task\_deviation\_partialOutPIQ\_allParams.Rdata*

*/FIT\_DIFF-BayesHier-cathyAutism-*

*task\_deviation\_partialOutPIQAndReadingAndSpelling\_allParams.Rdata*

These files contain the output from the corresponding models (MODEL\_DIFF-BayesHier-cathyAutism...) stored at <https://osf.io/f3wnt>.

*FIT\_DIFF-BayesHier-cathyAutism-task\_coherence.Rdata* and *FIT\_DIFF-BayesHier-cathyAutism-task\_deviation.Rdata* contain the output from the standard models without covariates for the coherence task and deviation (direction integration) task.

*FIT\_DIFF-BayesHier-cathyAutism-task\_coherence\_partialOutPIQ\_allParams.Rdata* and *FIT\_DIFF-BayesHier-cathyAutism-task\_deviation\_partialOutPIQ\_allParams.Rdata* contain the output from models which partial out the variance of PIQ.

*FIT\_DIFF-BayesHier-cathyAutism-task\_coherence\_partialOutPIQAndReadingAndSpelling\_allParams.Rdata* and *FIT\_DIFF-BayesHier-cathyAutism-task\_deviation\_partialOutPIQAndReadingAndSpelling\_allParams.Rdata* contain the output from models which partial out the variance of PIQ, Reading and Spelling (for exploratory analysis)

### **Model output files from EEG joint models**

*ModelOutputFiles\_EEGJointModels.zip*

*/FIT\_DIFF-BayesHier\_JointModel\_RespLocked-cathyAutism-task\_coherence.Rdata*  
*/FIT\_DIFF-BayesHier\_JointModel\_RespLocked-cathyAutism-task\_deviation.Rdata*  
*/FIT\_DIFF-BayesHier\_JointModel\_RespLocked\_PartialOutAge-cathyAutism-task\_coherence.Rdata*  
*/FIT\_DIFF-BayesHier\_JointModel\_RespLocked\_PartialOutAge-cathyAutism-task\_deviation.Rdata*  
*/FIT\_DIFF-BayesHier\_JointModel\_RespLocked\_GroupCors-cathyAutism-task\_coherence.Rdata*  
*/FIT\_DIFF-BayesHier\_JointModel\_RespLocked\_GroupCors-cathyAutism-task\_deviation.Rdata*  
*/FIT\_DIFF-BayesHier\_JointModel\_RespLocked\_PartialOutAge\_GroupCors-cathyAutism-task\_coherence.Rdata*  
*/FIT\_DIFF-BayesHier\_JointModel\_RespLocked\_PartialOutAge\_GroupCors-cathyAutism-task\_deviation.Rdata*

These files contain the output from the corresponding models (MODEL\_DIFF-BayesHier-cathyAutism...) stored at <https://osf.io/f3wnt>.

*FIT\_DIFF-BayesHier\_JointModel\_RespLocked-cathyAutism-task\_coherence.Rdata* and *FIT\_DIFF-BayesHier\_JointModel\_RespLocked-cathyAutism-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-cathyAutism-task\_coherence.Rdata* and *FIT\_DIFF-BayesHier\_JointModel\_RespLocked\_PartialOutAge-cathyAutism-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-cathyAutism-task\_coherence.Rdata* and *FIT\_DIFF-BayesHier\_JointModel\_RespLocked\_GroupCors-cathyAutism-task\_deviation.Rdata* contain the output from joint models which estimate

separate correlations between EEG and drift-rate parameters in each group (typically developing, autism), without age partialled out.

*FIT\_DIFF-BayesHier\_JointModel\_RespLocked\_PartialOutAge\_GroupCors-cathyAutism-task\_coherence.Rdata* and *FIT\_DIFF-BayesHier\_JointModel\_RespLocked\_PartialOutAge\_GroupCors-cathyAutism-task\_deviation.Rdata* contain the output from joint models which estimate separate correlations between EEG and drift-rate parameters in each group (typically developing, autism), with age partialled out.

### **Model output files from ADHD joint models**

*ModelOutputFiles\_ADHDJointModels.zip*  
    */FIT\_DIFF-BayesHier\_ADHDJointModel\_GroupCors-cathyAutism-task\_coherence.Rdata*  
    */FIT\_DIFF-BayesHier\_ADHDJointModel\_GroupCors-cathyAutism-task\_deviation.Rdata*  
    */FIT\_DIFF-BayesHier\_ADHDJointModel\_otherParams\_thres\_GroupCors-cathyAutism-task\_coherence.Rdata*  
    */FIT\_DIFF-BayesHier\_ADHDJointModel\_otherParams\_thres\_GroupCors-cathyAutism-task\_deviation.Rdata*  
    */FIT\_DIFF-BayesHier\_ADHDJointModel\_otherParams\_nonDec\_GroupCors-cathyAutism-task\_coherence.Rdata*  
    */FIT\_DIFF-BayesHier\_ADHDJointModel\_otherParams\_nonDec\_GroupCors-cathyAutism-task\_deviation.Rdata*  
    */FIT\_DIFF-BayesHier\_ADHDJointModel\_otherParams\_driftDiff\_GroupCors-cathyAutism-task\_coherence.Rdata*  
    */FIT\_DIFF-BayesHier\_ADHDJointModel\_otherParams\_driftDiff\_GroupCors-cathyAutism-task\_deviation.Rdata*  
    */FIT\_DIFF-BayesHier\_ADHDJointModel\_otherParams\_beta\_GroupCors-cathyAutism-task\_coherence.Rdata*  
    */FIT\_DIFF-BayesHier\_ADHDJointModel\_otherParams\_beta\_GroupCors-cathyAutism-task\_deviation.Rdata*

These files contain the output from the corresponding models (MODEL\_DIFF-BayesHier-cathyAutism...) stored at <https://osf.io/f3wnt>.

*FIT\_DIFF-BayesHier\_ADHDJointModel\_GroupCors-cathyAutism-task\_coherence.Rdata* and *FIT\_DIFF-BayesHier\_ADHDJointModel\_GroupCors-cathyAutism-task\_deviation.Rdata* contain the output from joint models which estimate separate correlations between mean drift-rate (v.mean) and ADHD measures in each group, for the coherence and deviation (direction integration) tasks.

*FIT\_DIFF-BayesHier\_ADHDJointModel\_otherParams\_thres\_GroupCors-cathyAutism-task\_coherence.Rdata* and *FIT\_DIFF-BayesHier\_ADHDJointModel\_otherParams\_thres\_GroupCors-cathyAutism-task\_deviation.Rdata* contain the output from joint models which estimate separate correlations between boundary separation and ADHD measures in each group, for the coherence and deviation (direction integration) tasks.

*FIT\_DIFF-BayesHier\_ADHDJointModel\_otherParams\_nonDec\_GroupCors-cathyAutism-task\_coherence.Rdata* and *FIT\_DIFF-BayesHier\_ADHDJointModel\_otherParams\_nonDec\_GroupCors-cathyAutism-task\_deviation.Rdata*

contain the output from joint models which estimate separate correlations between non-decision time and ADHD measures in each group, for the coherence and deviation (direction integration) tasks.

*FIT\_DIFF-BayesHier\_ADHDJointModel\_otherParams\_driftDiff\_GroupCors-cathyAutism-task\_coherence.RData* and *FIT\_DIFF-BayesHier\_ADHDJointModel\_otherParams\_driftDiff\_GroupCors-cathyAutism-task\_deviation.RData*

contain the output from joint models which estimate separate correlations between difference in drift-rate between conditions (v.diff) and ADHD measures in each group, for the coherence and deviation (direction integration) tasks.

*FIT\_DIFF-BayesHier\_ADHDJointModel\_otherParams\_beta\_GroupCors-cathyAutism-task\_coherence.RData* and *FIT\_DIFF-BayesHier\_ADHDJointModel\_otherParams\_beta\_GroupCors-cathyAutism-task\_deviation.RData*

contain the output from joint models which estimate separate correlations between starting point and ADHD measures in each group, for the coherence and deviation (direction integration) tasks.