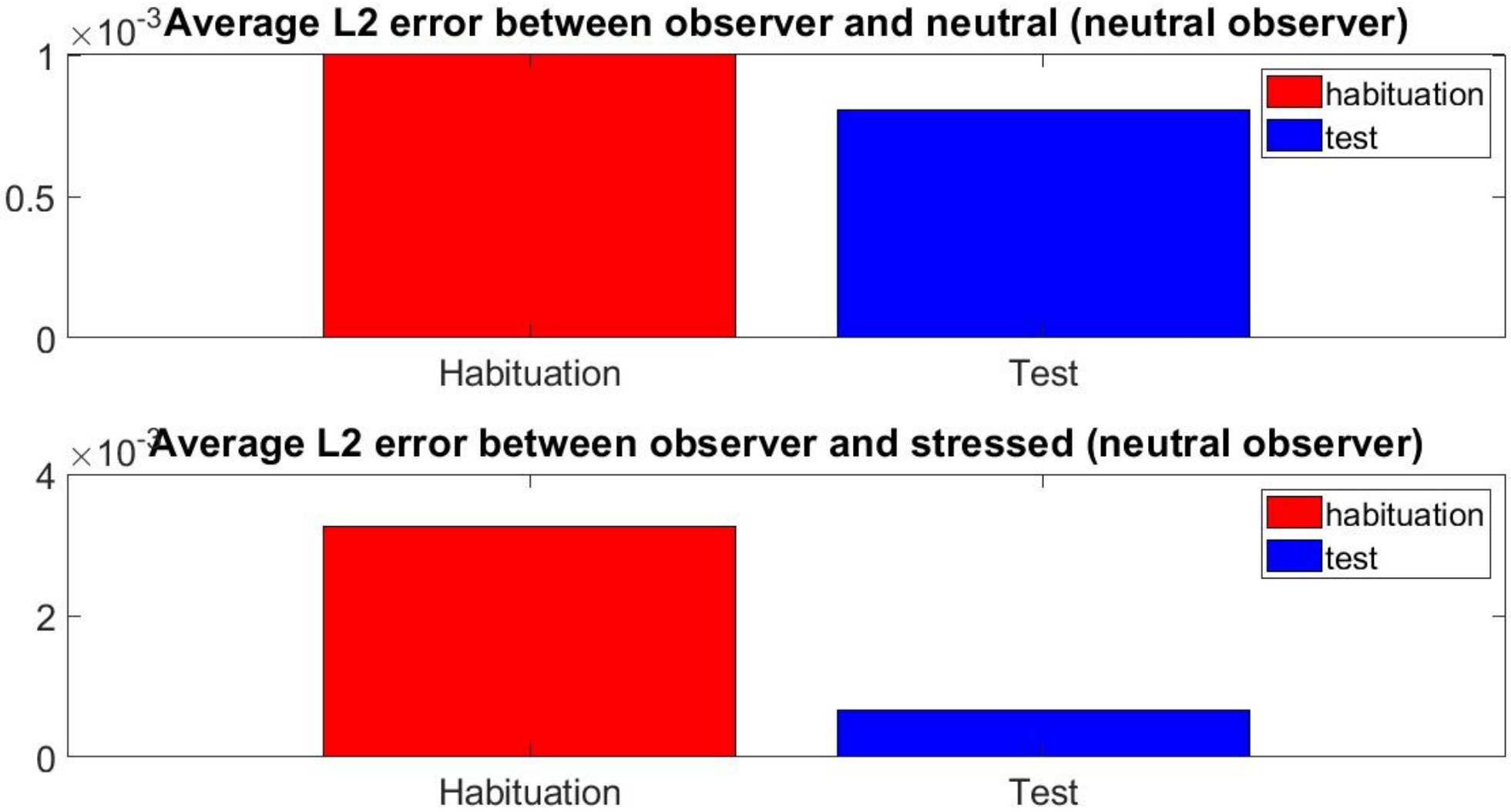
Interbrain data analysis

Fabrizio Bernardi

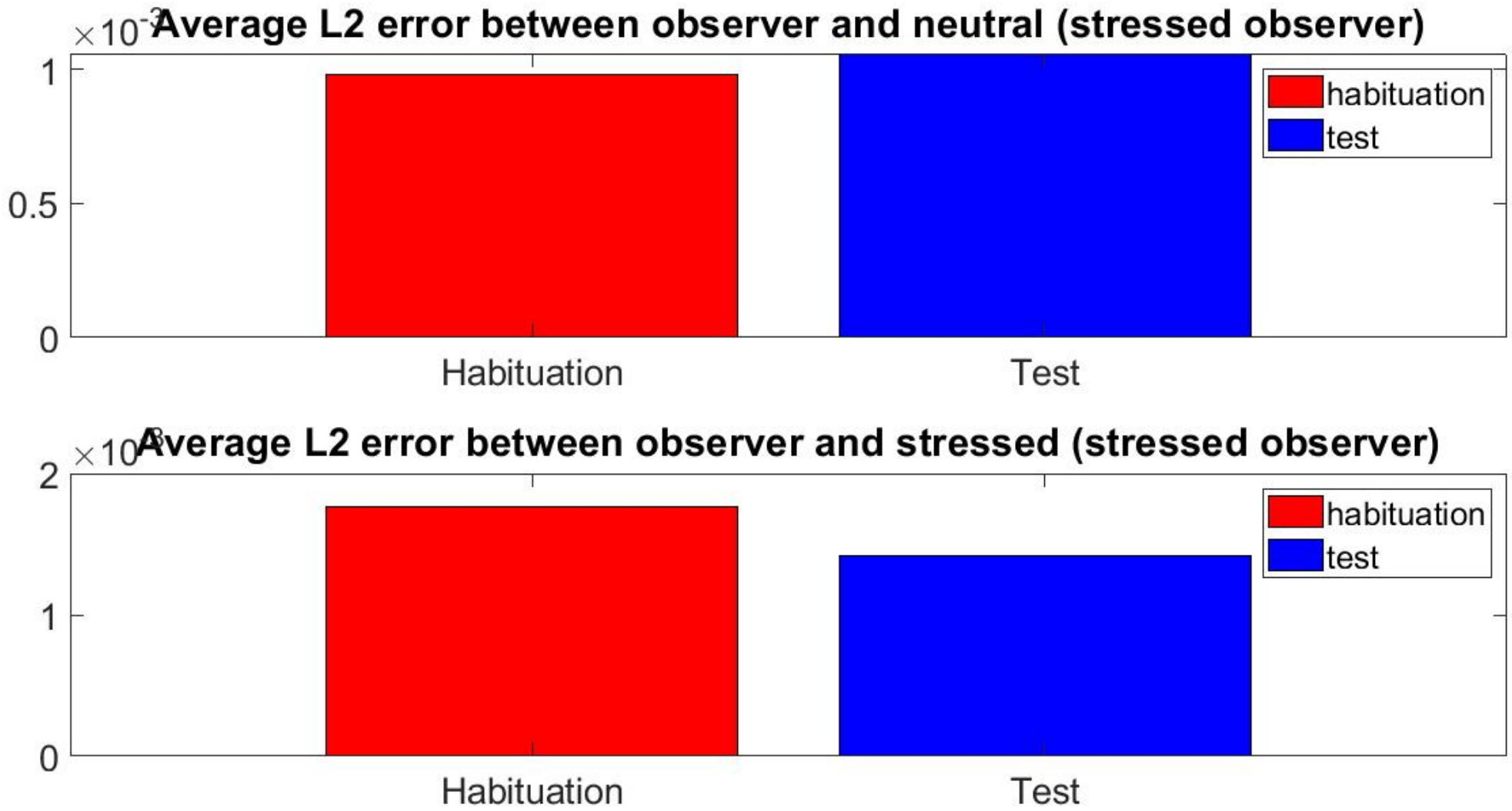
09/12/2021

POLITECNICO
MILANO 1863

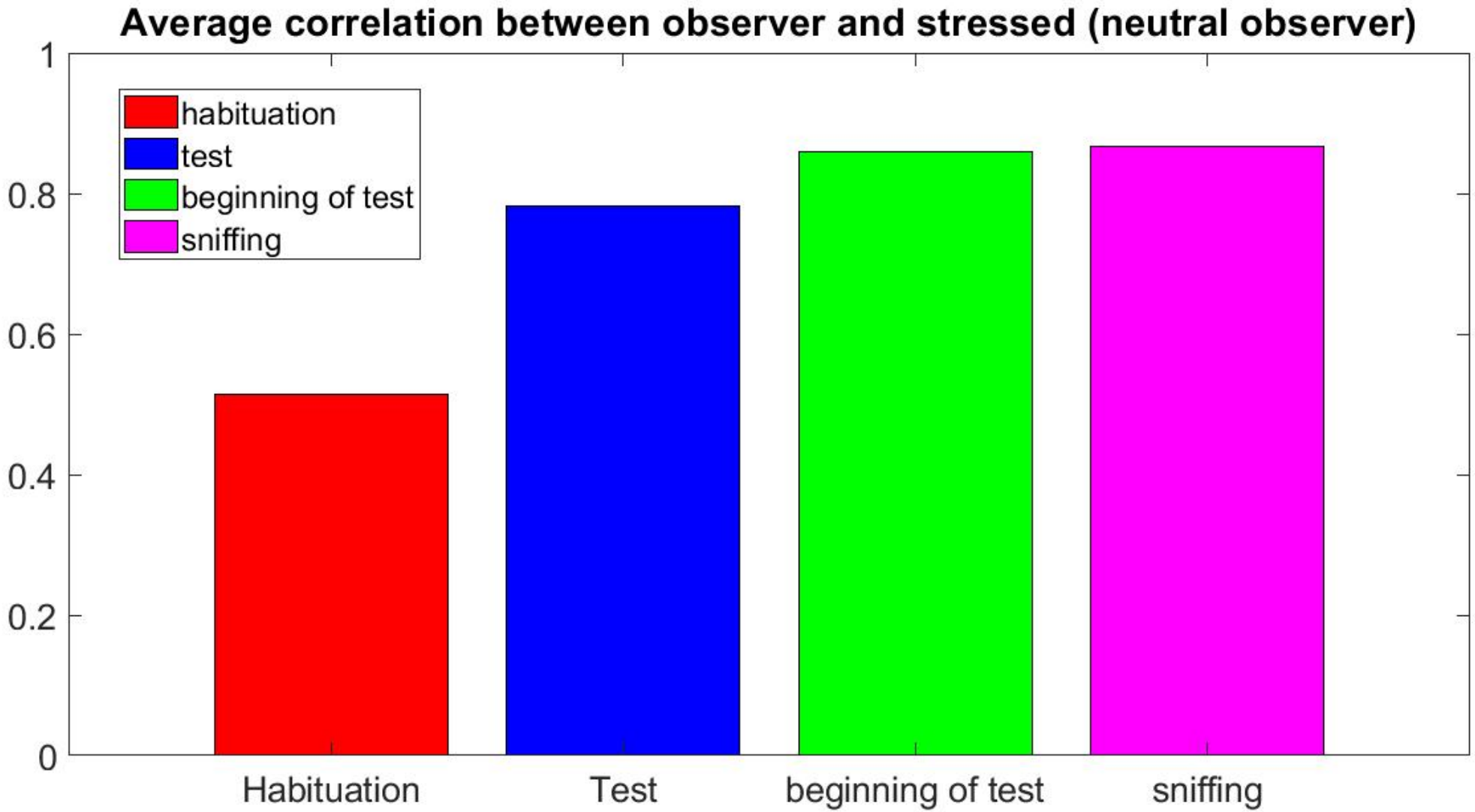
Average L^2 errors with neutral observer



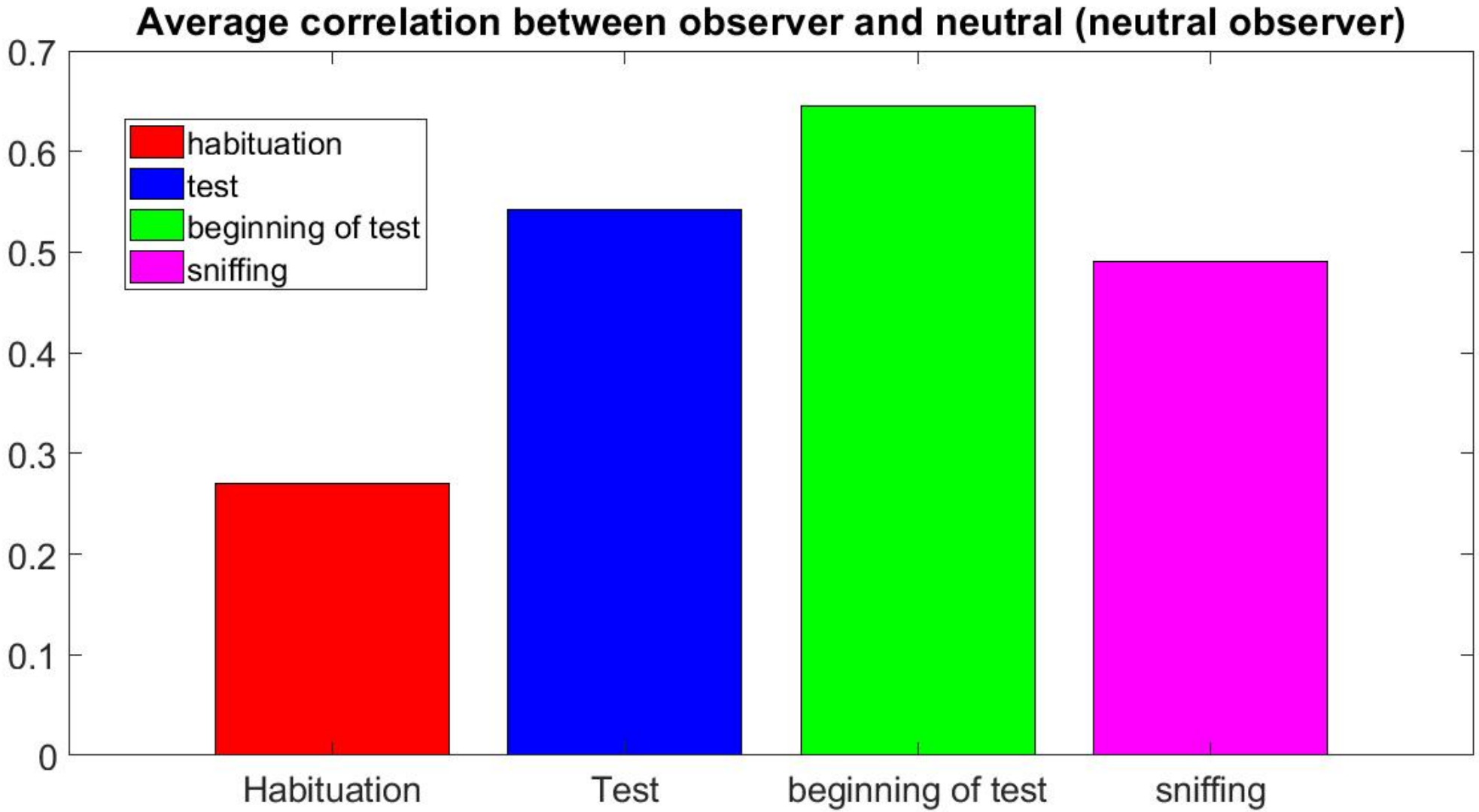
Average L^2 errors with stressed observer



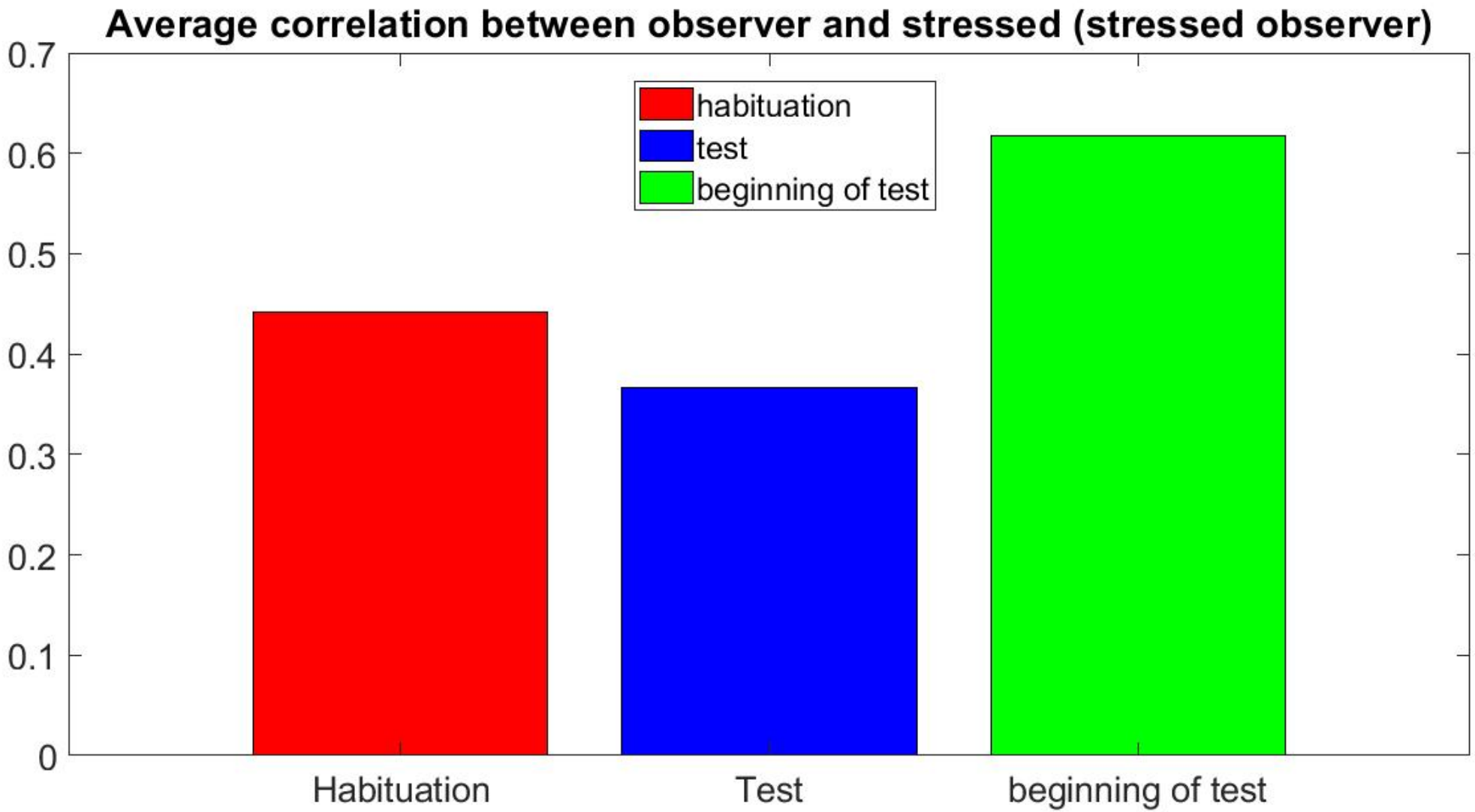
Average correlation between observer and stressed with neutral observer



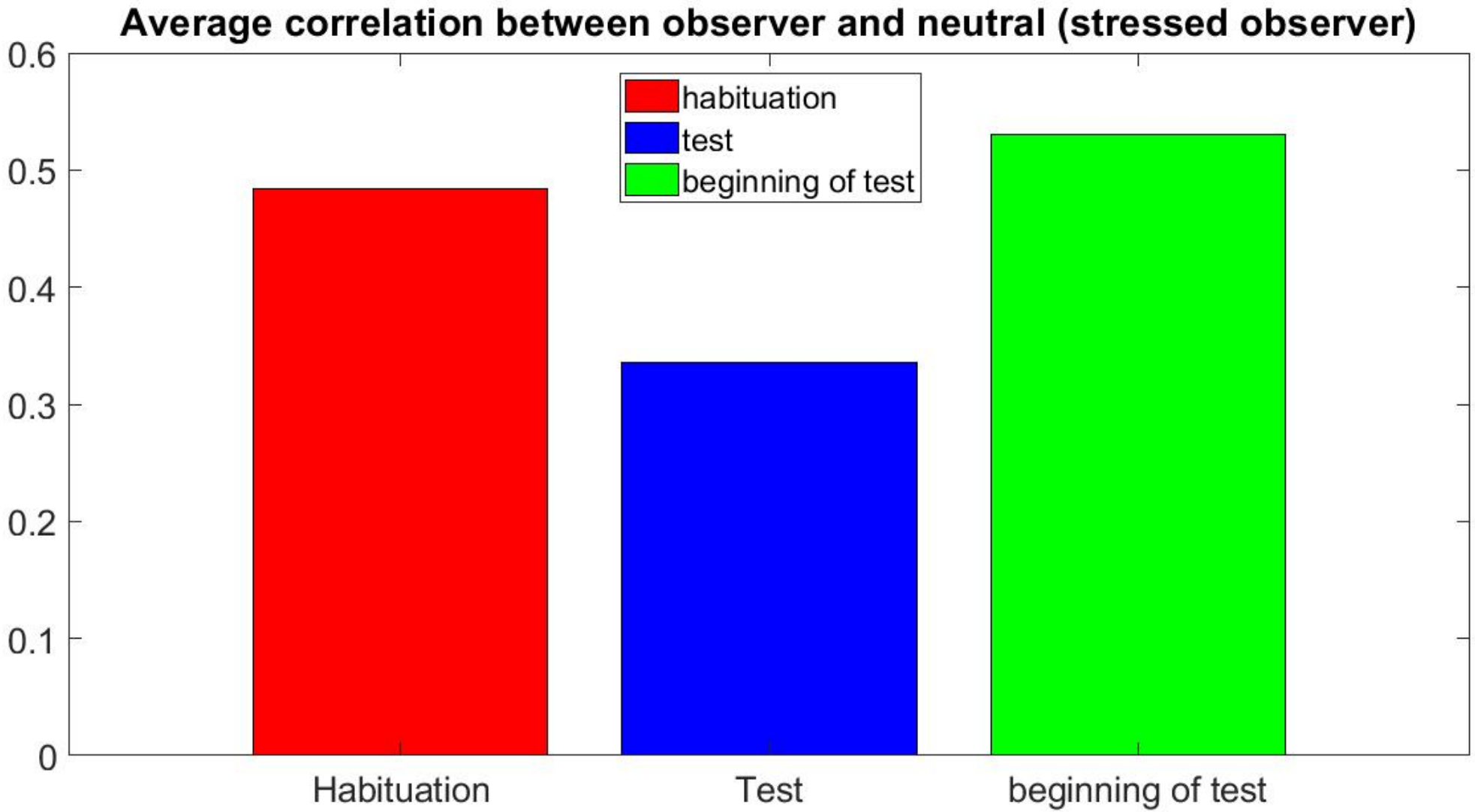
Average correlation between observer and neutral with neutral observer



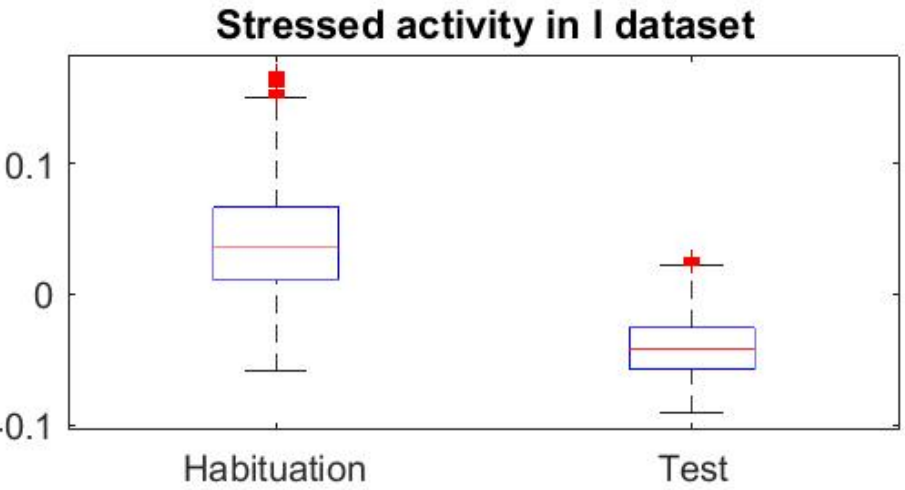
Average correlation between observer and stressed with stressed observer

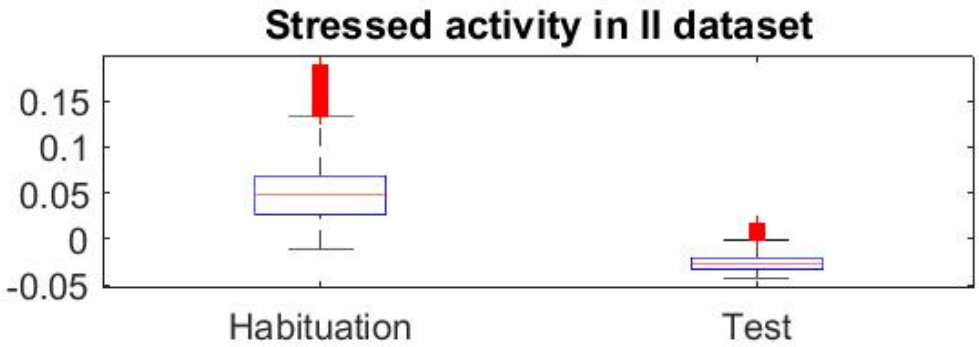


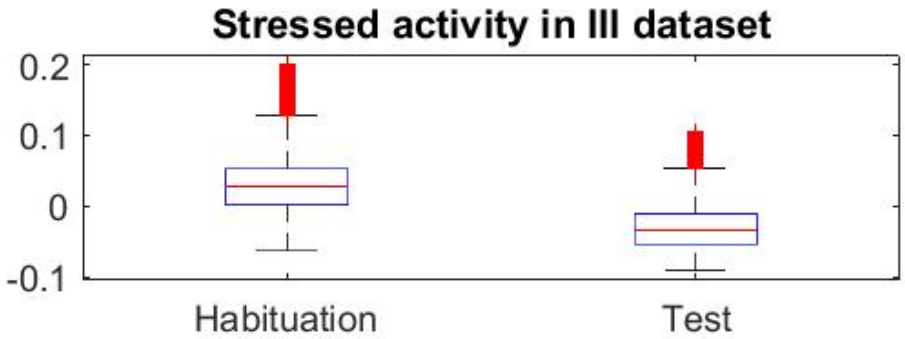
Average correlation between observer and neutral with stressed observer

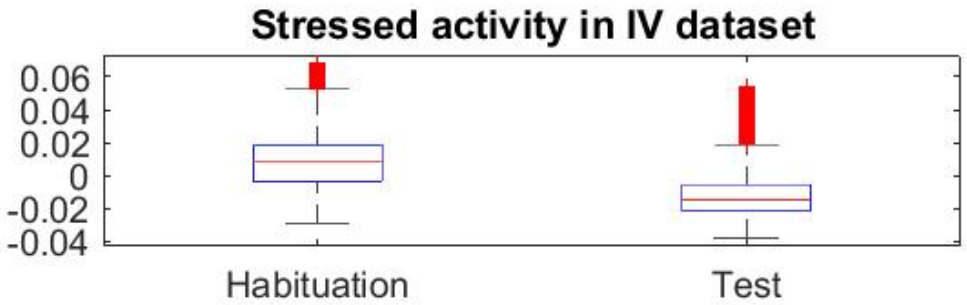


Stressed mice activity in all datasets

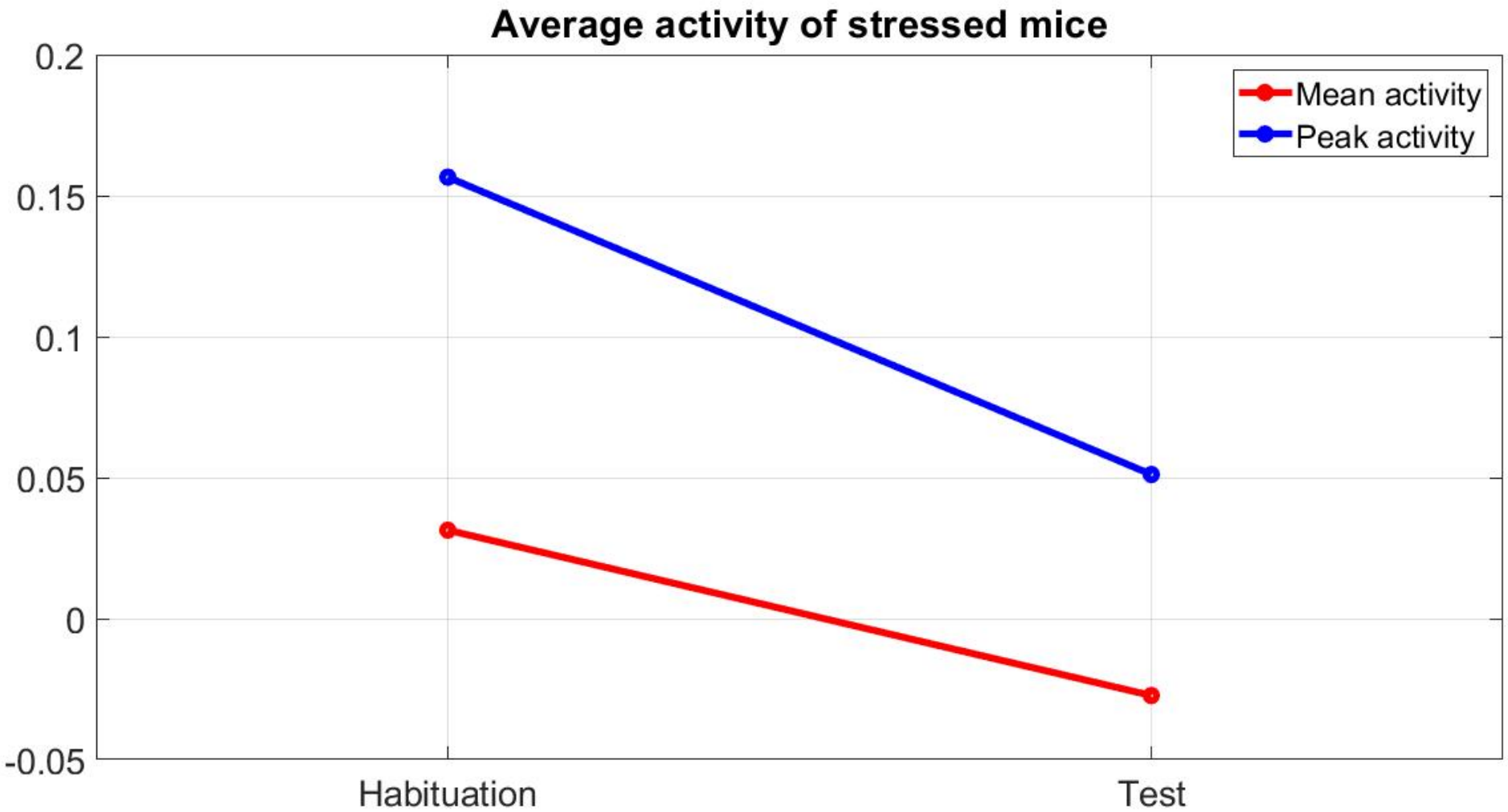








Average stressed mice activity

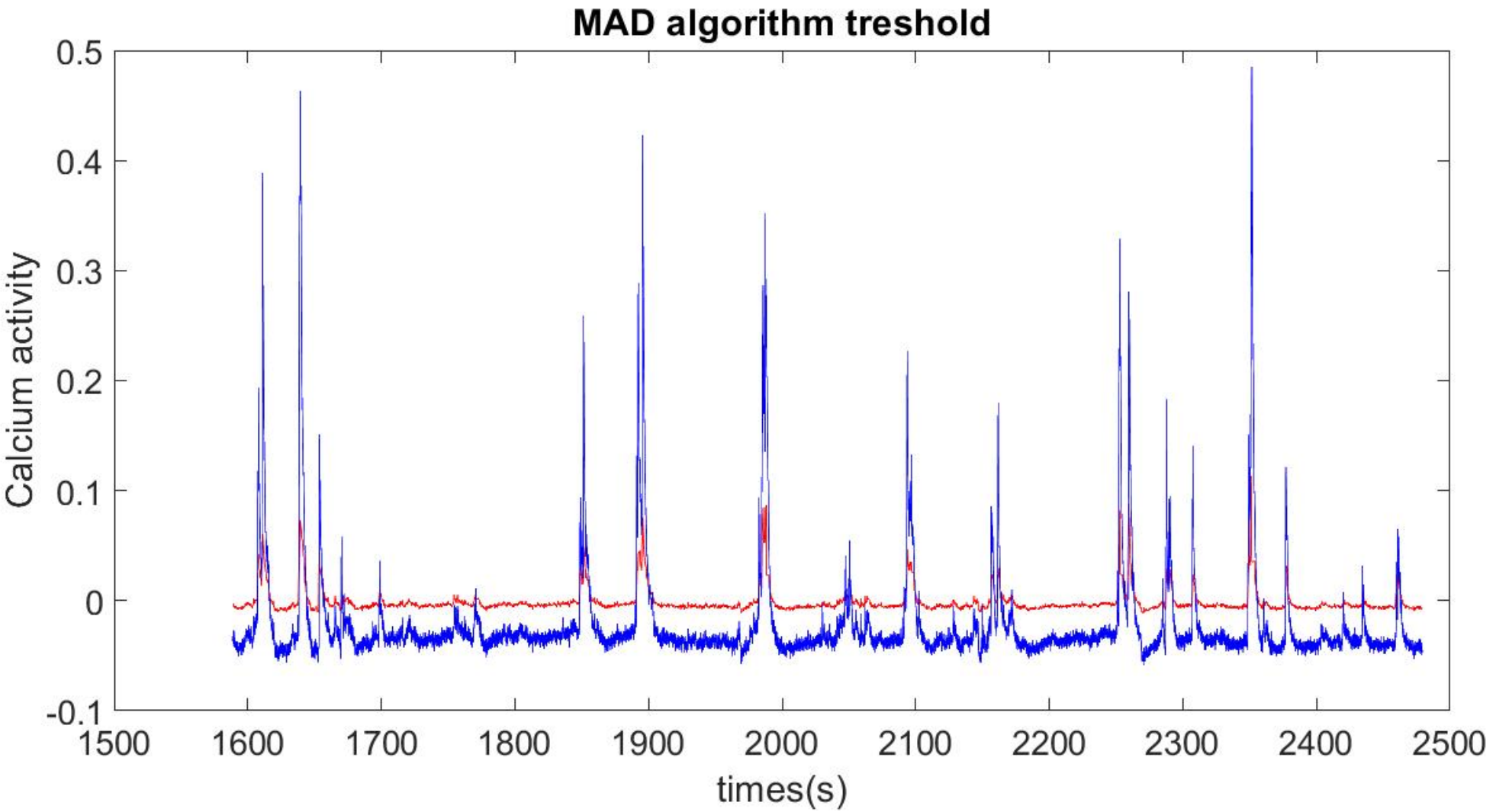


Pattern recognition in activity peaks

The pattern recognition analysis follows the steps:

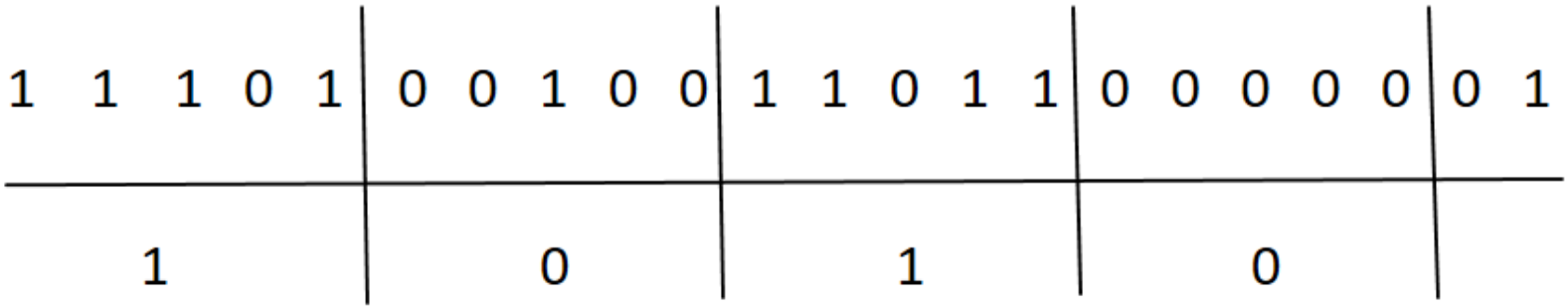
1. Detect peak activity through appropriate algorithms
2. Partition the overall time interval in windows of a fixed length and associate the presence of an event or not for every time window
3. Confront different signals to look for simultaneous events

Activity detection: MAD algorithm



Characteristic time for an event

Choosen time window: $\tau = 250ms$



Peak correlation index

$$i_{AB} = \frac{N_{AB}T}{N_A N_B dT}$$

$T =$ overall signal time window

$dT =$ synchronization time window

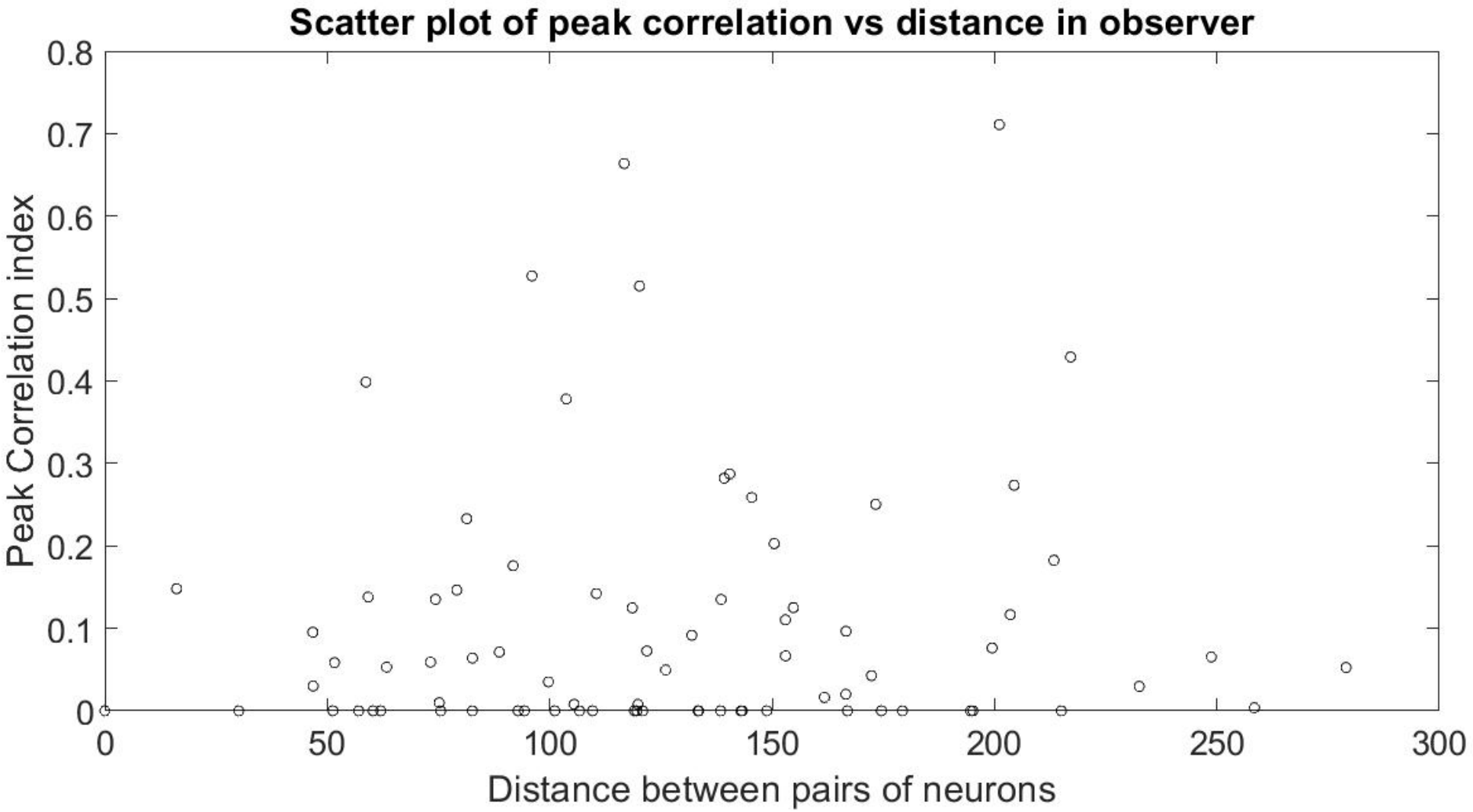
$N_A =$ Number of peaks in signal A

$N_B =$ Number of peaks in signal B

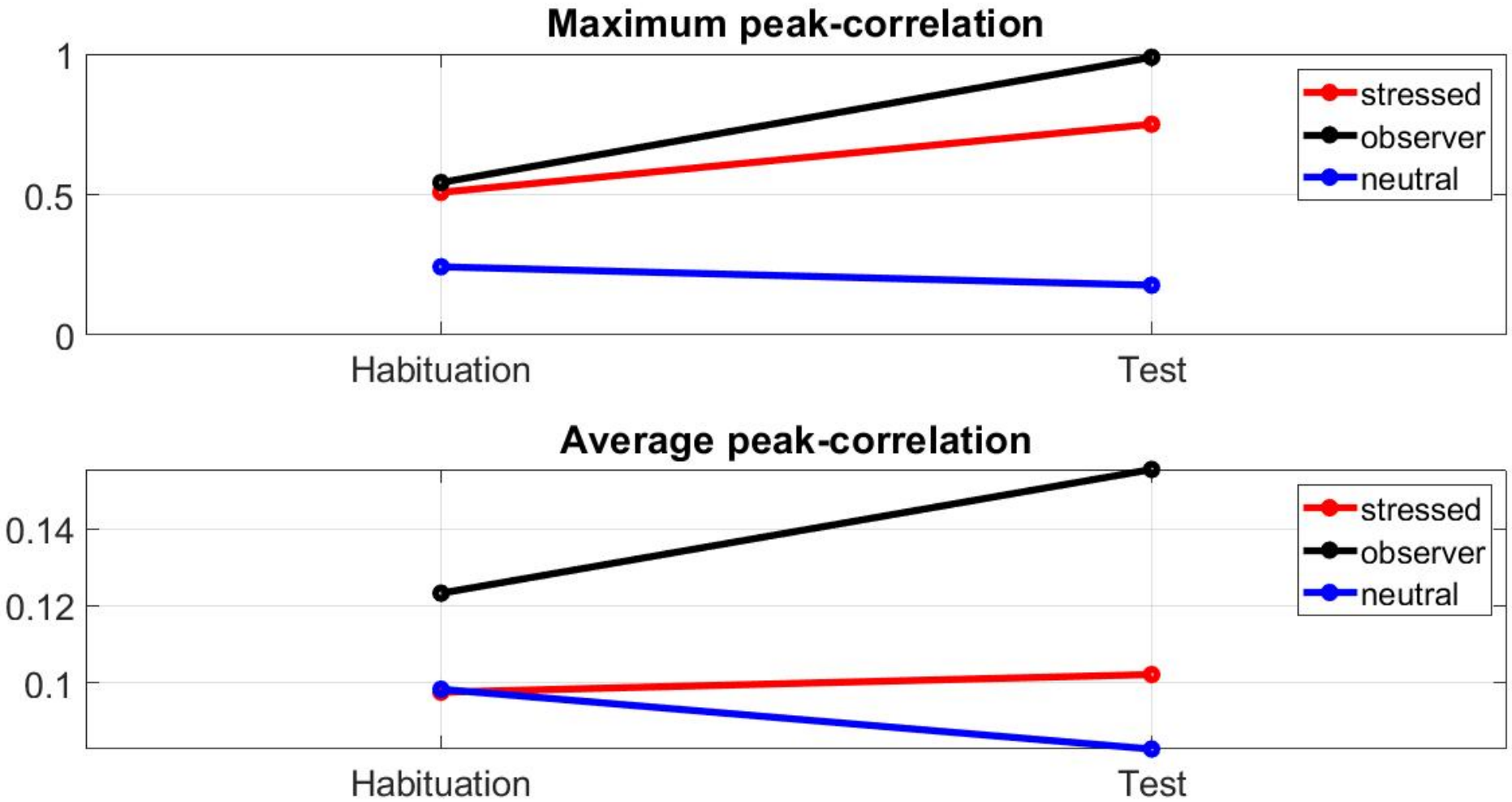
$N_{AB} = \sum_{i=1}^{N_A} \sum_{j=1}^{N_B} I_{[-dT,dT]}(|a_i - b_j|)$

Distance analysis

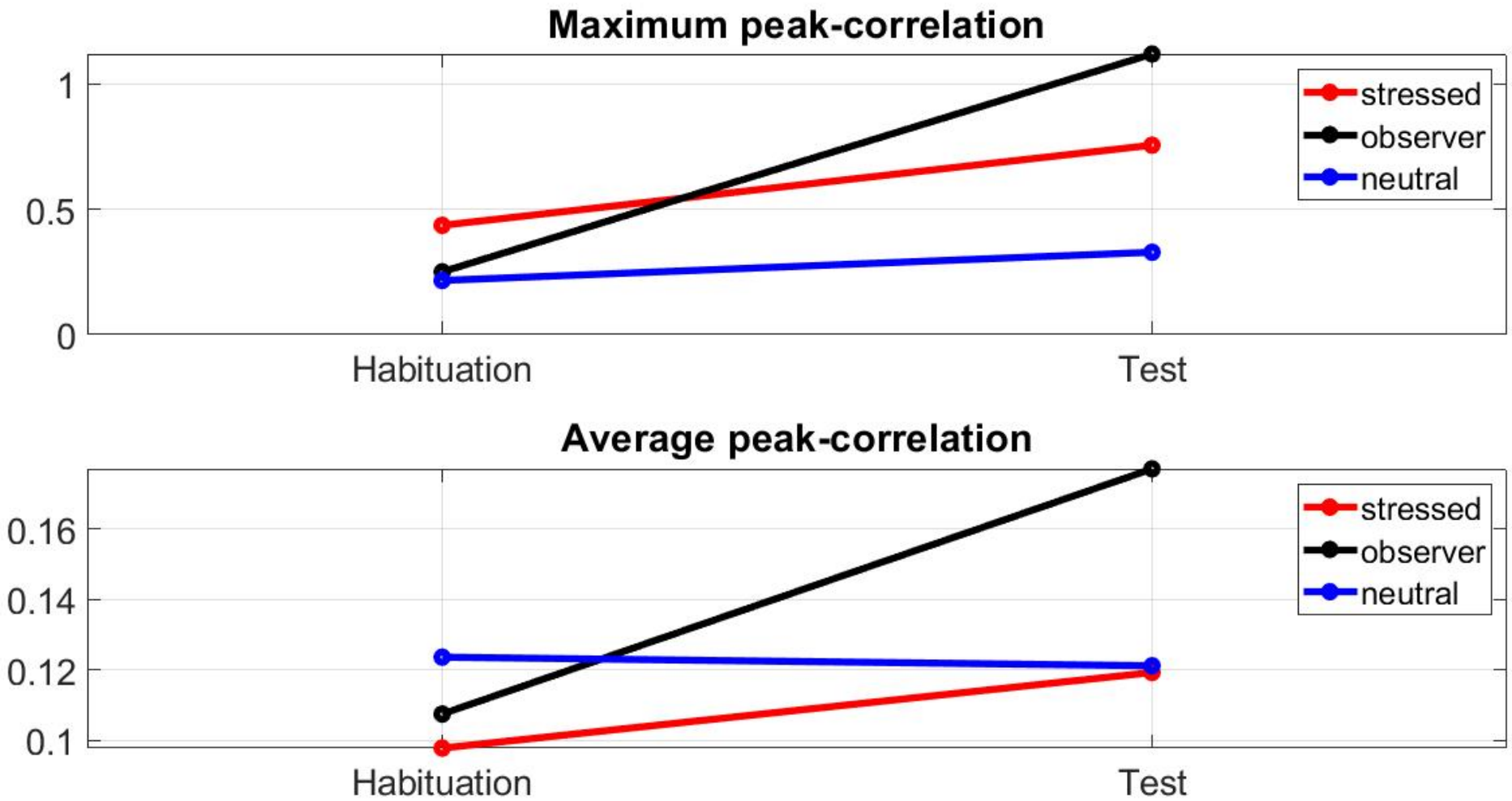
Linear fit: $R^2 = 0.024$



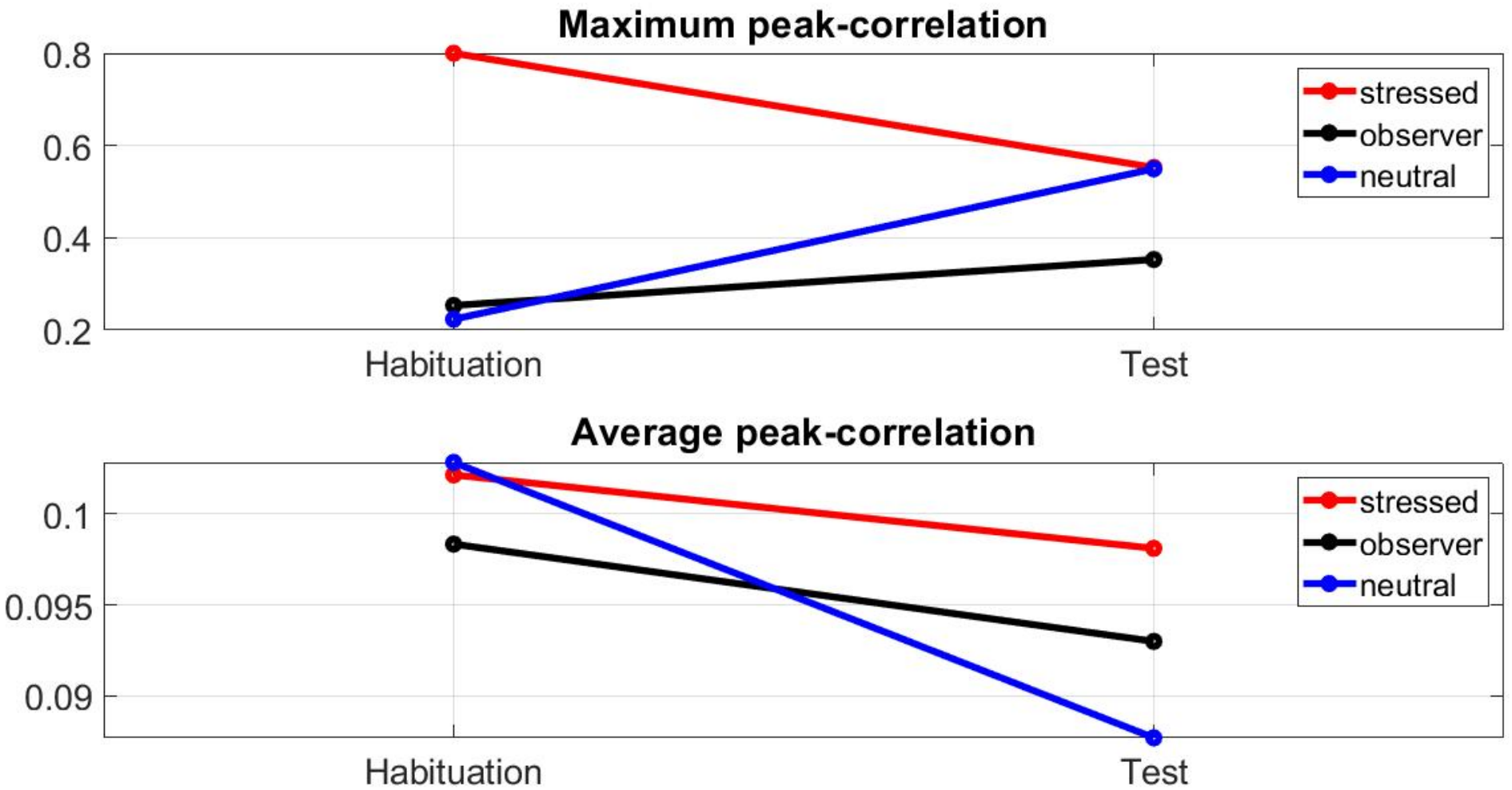
Peak correlation in single mouse (I dataset)



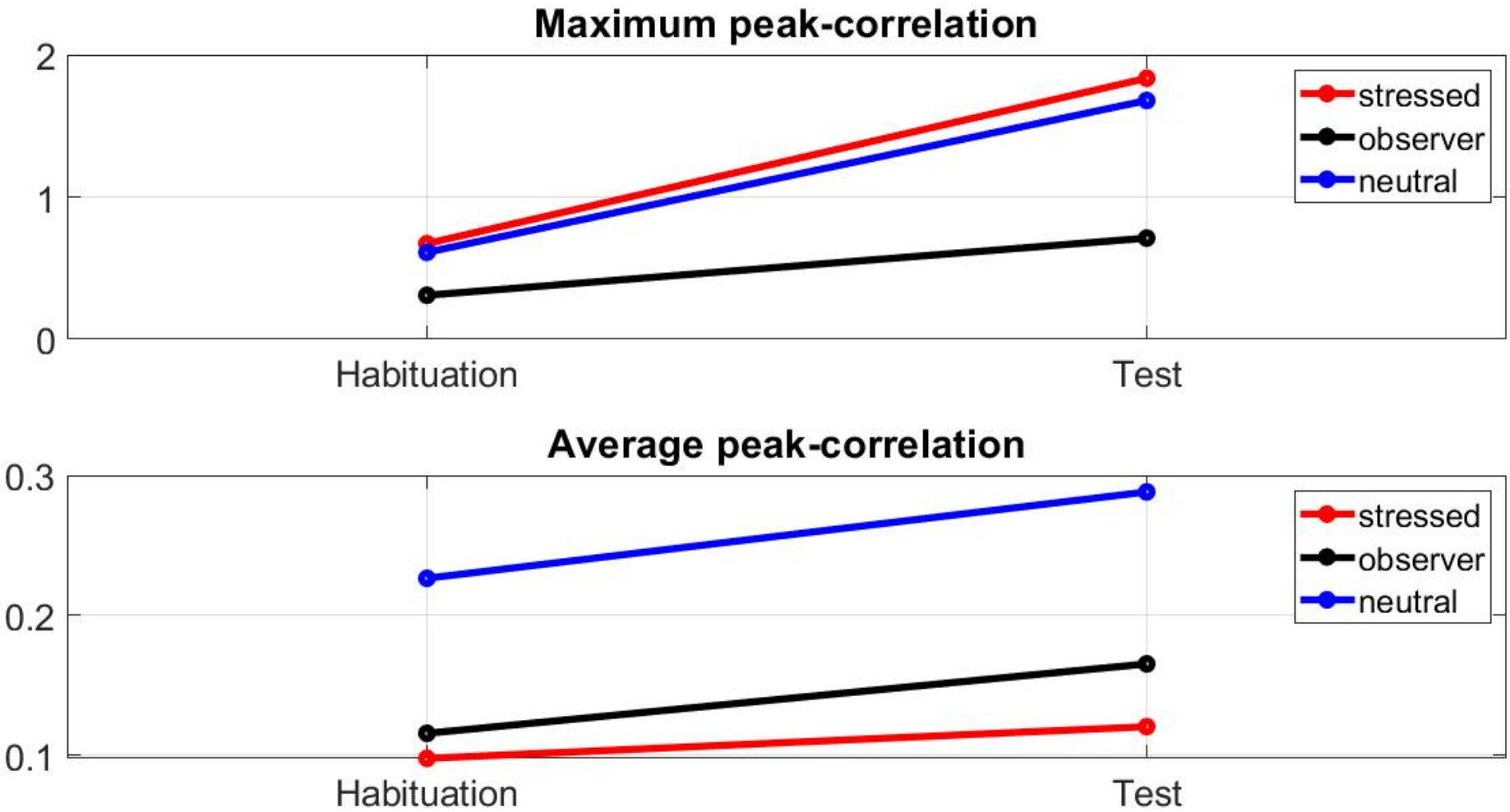
Peak correlation in single mouse (II dataset)



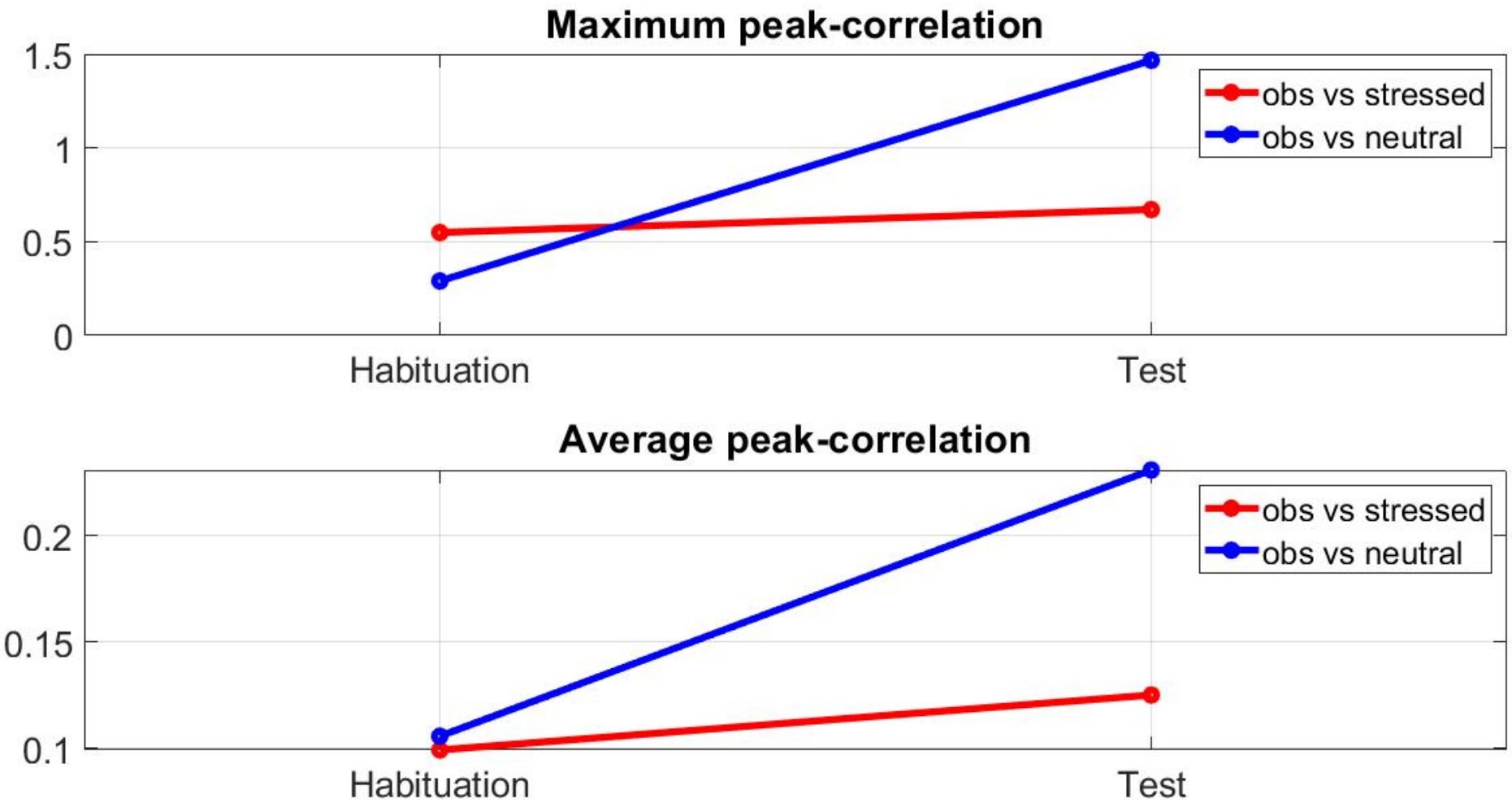
Peak correlation in single mouse (III dataset)



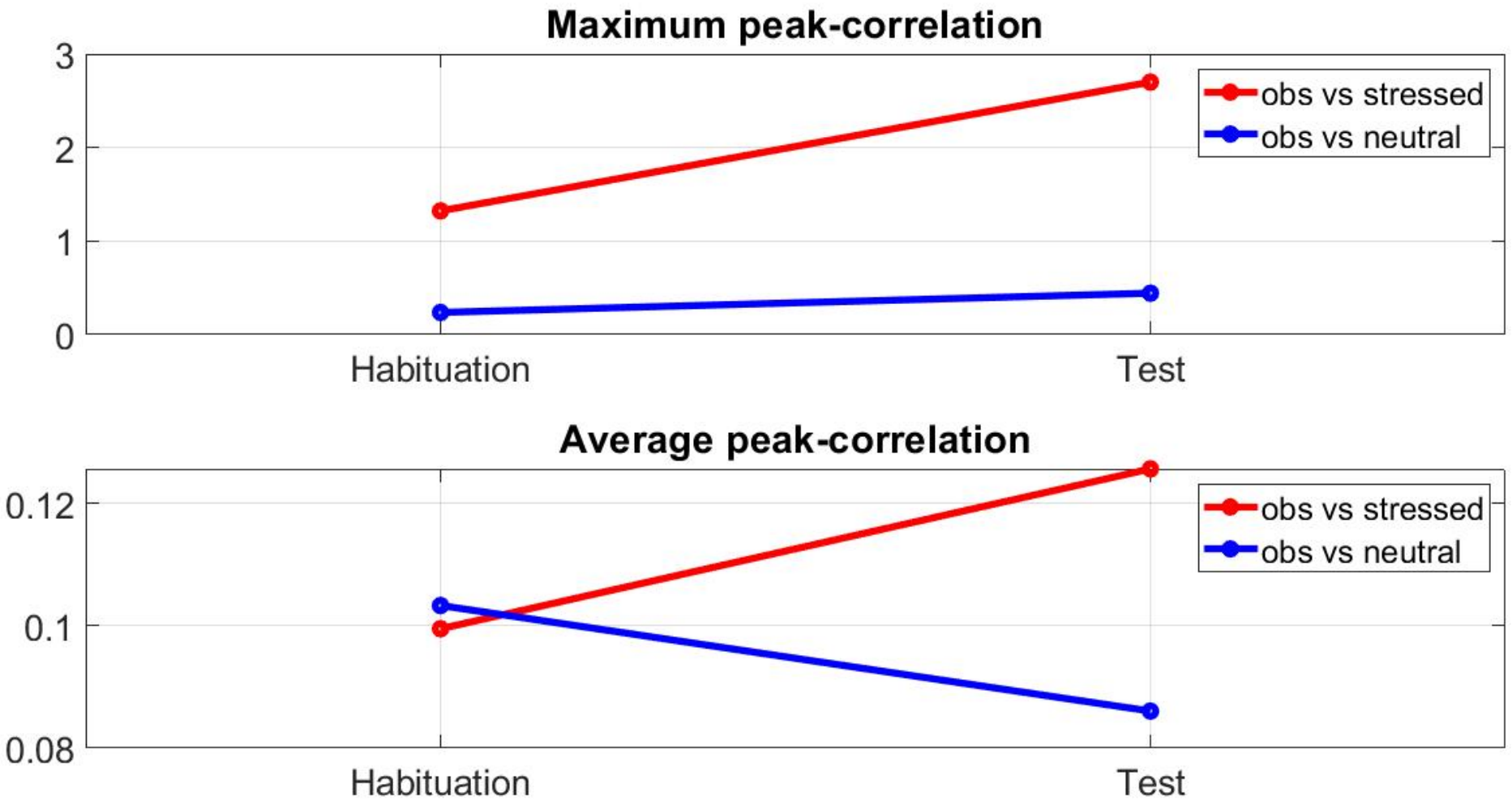
Peak correlation in single mouse (IV dataset)



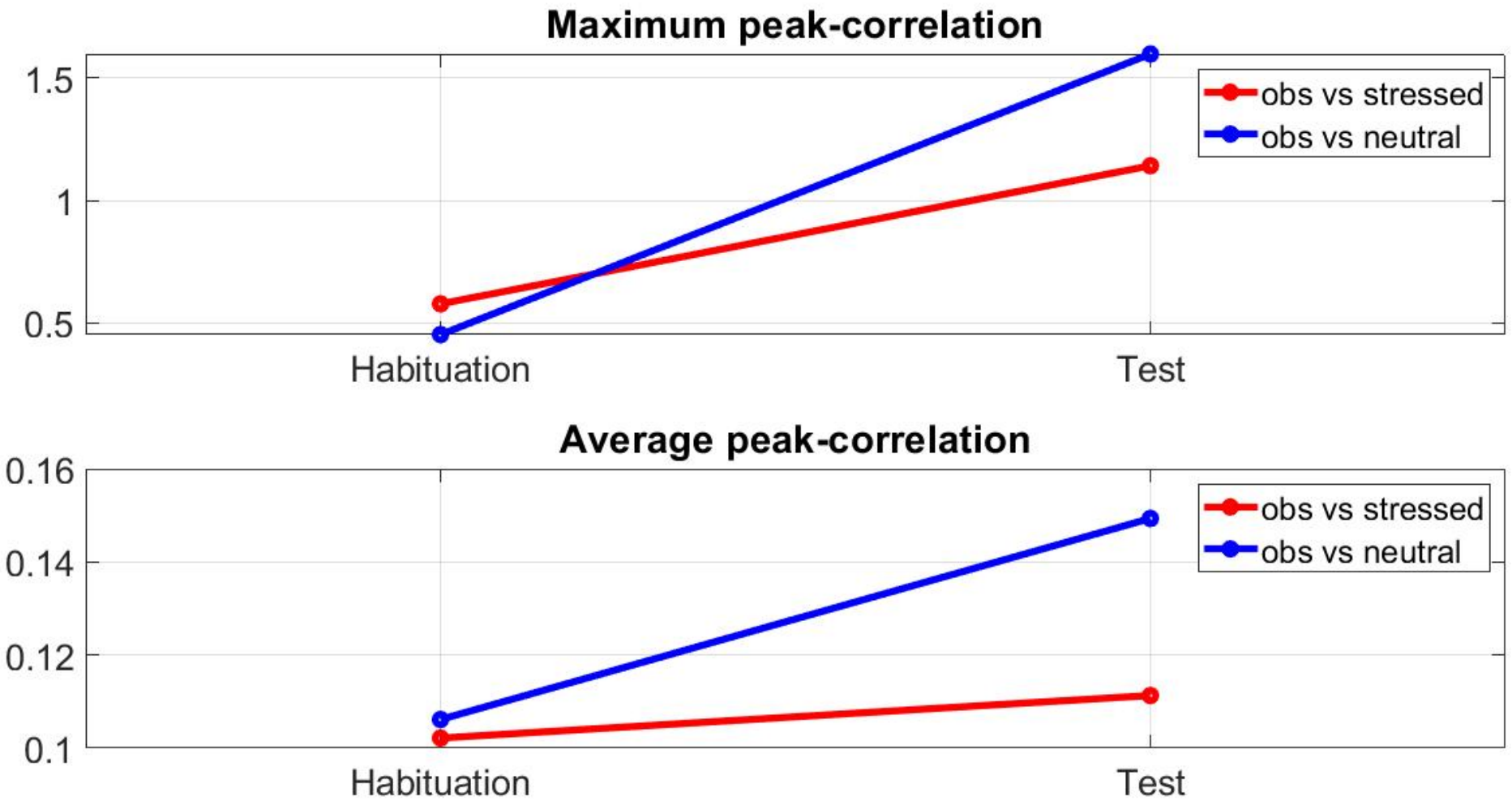
Peak synchronization between mice (I dataset)



Peak synchronization between mice (II dataset)



Peak synchronization between mice (III dataset)



Peak synchronization between mice (IV dataset)