Interbrain data analysis

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MILANO 1863

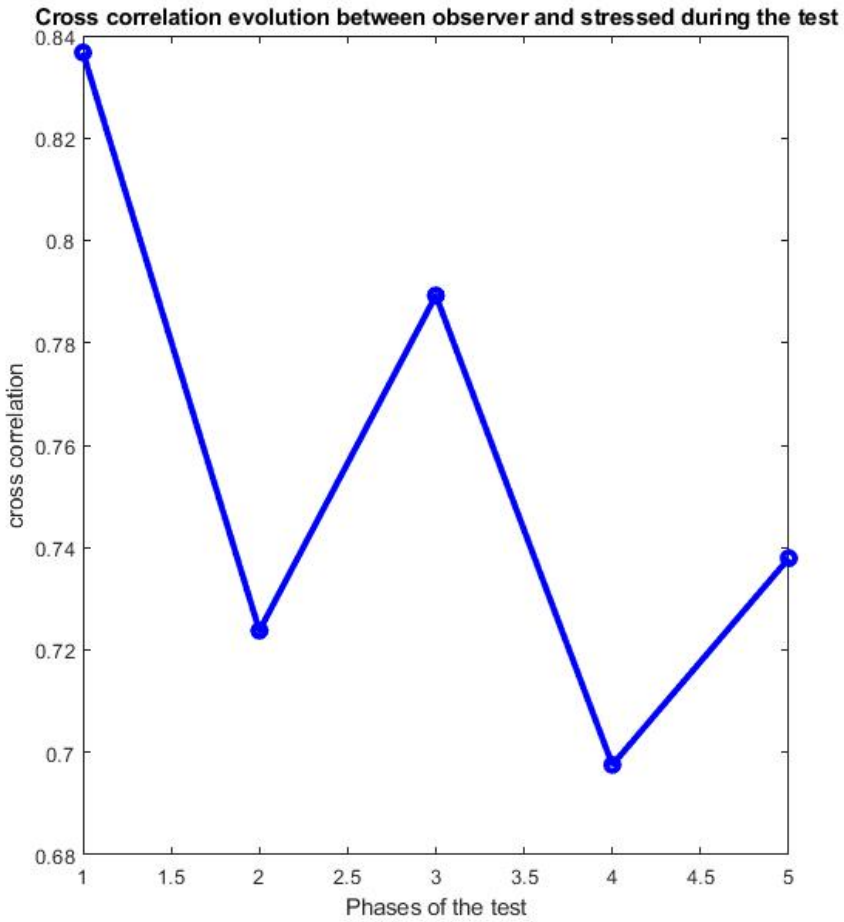
Conclusions on first dataset

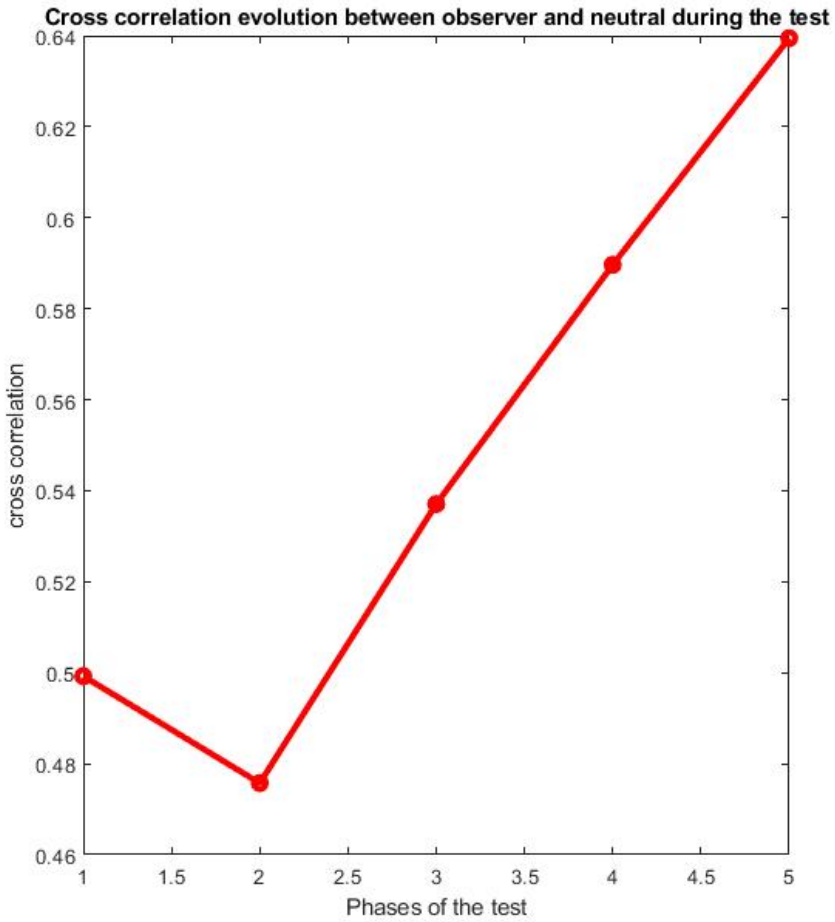
- Higher cross correlation between observer and stressed during the test rather than the habituation
- Such correlation reaches a peak if computed considering the reciprocal sniffing
- A good (even if smaller) correlation between these two mice remains also when the observer leaves the stressed area
- An appreciable correlation between observer and neutral is observed as well (even if smaller than the one between observer and stressed)
- No significant correlation is evident during the sniffing between observer and neutral

Conclusions on second dataset

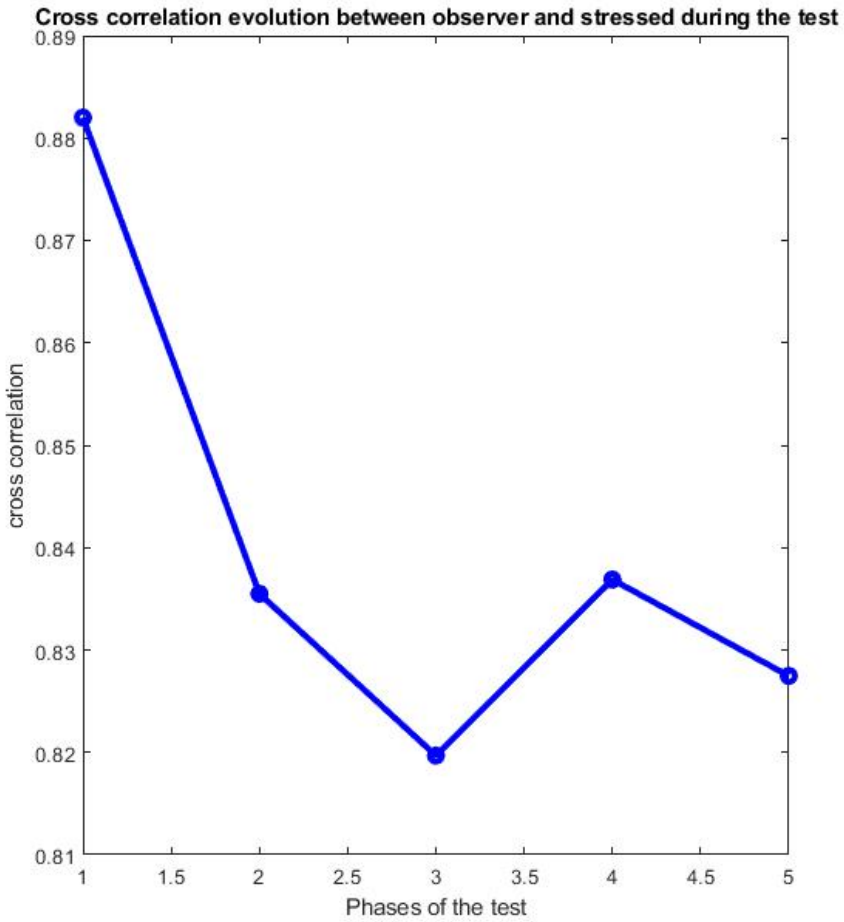
- Higher cross correlation between observer and stressed during the test rather than the habituation
- Such correlation reaches a peak if computed considering the reciprocal sniffing
- A good (even if smaller) correlation between these two mice remains also when the observer leaves the stressed area
- No appreciable correlation between observer and neutral is observed
- No significant correlation is evident during the sniffing between observer and neutral

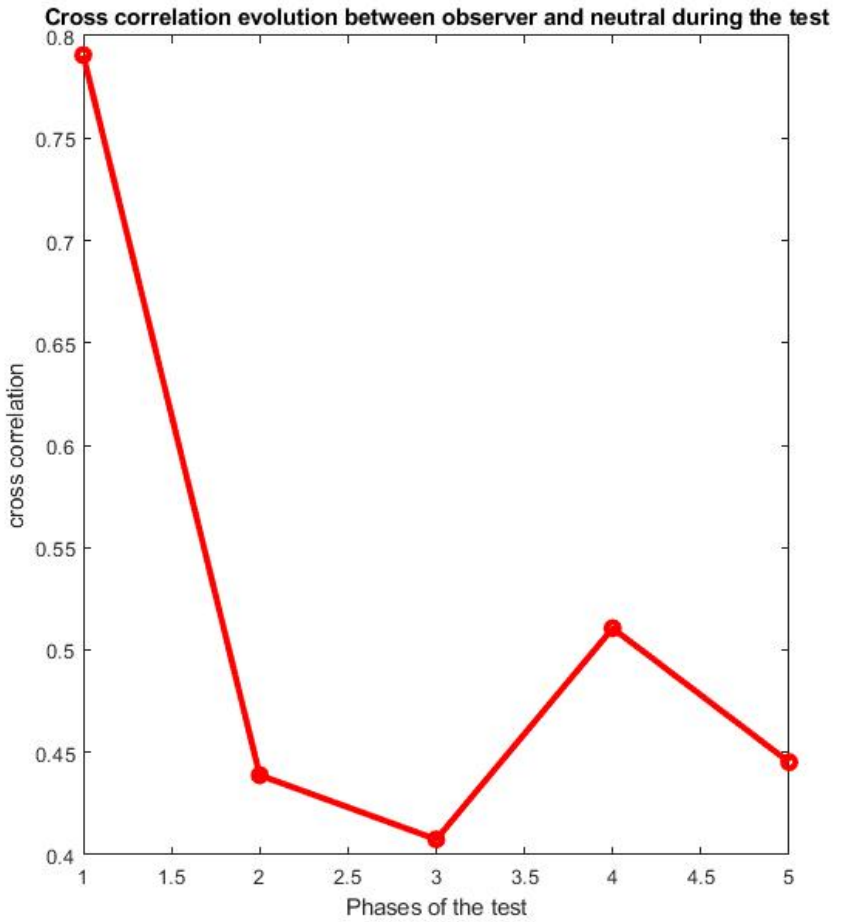
First dataset: correlation behaviour through time





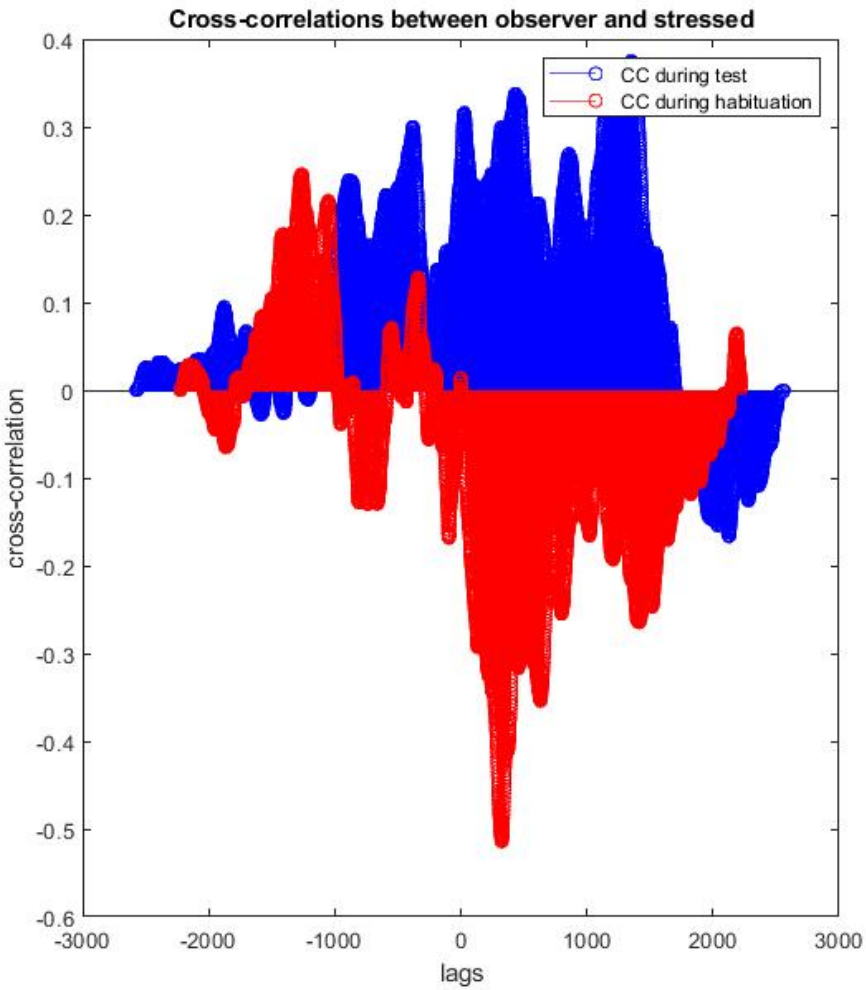
Second dataset: correlation behaviour through time

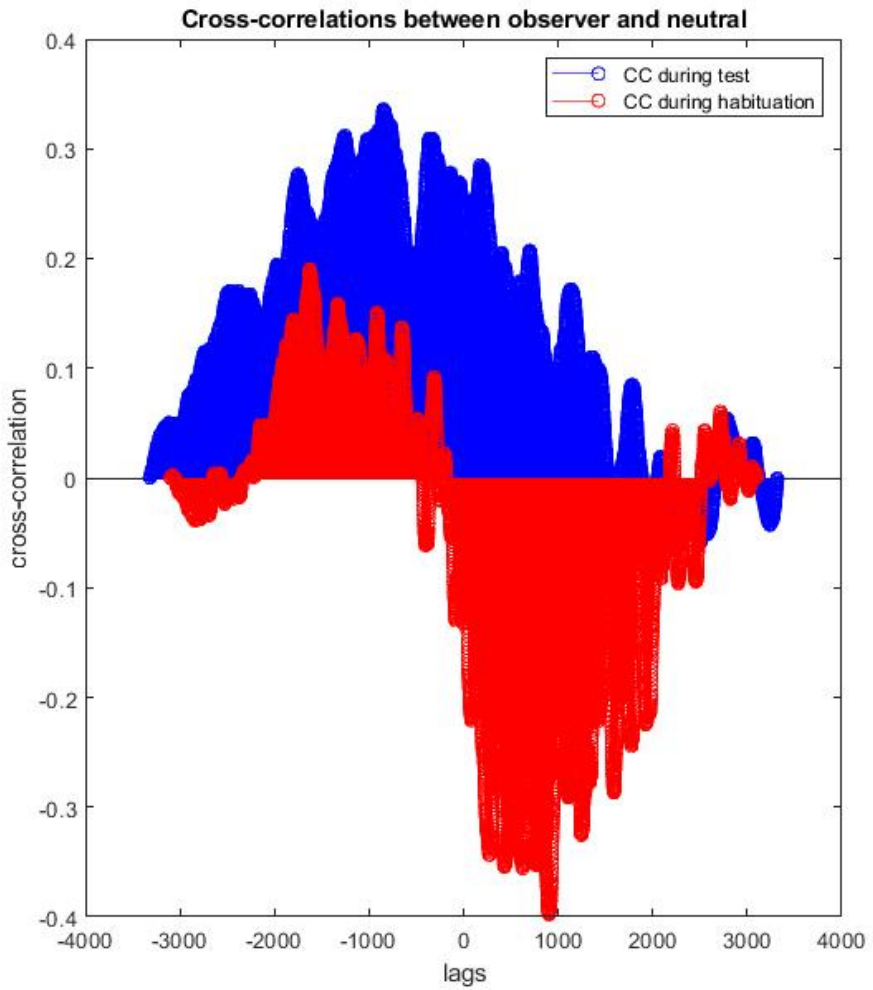




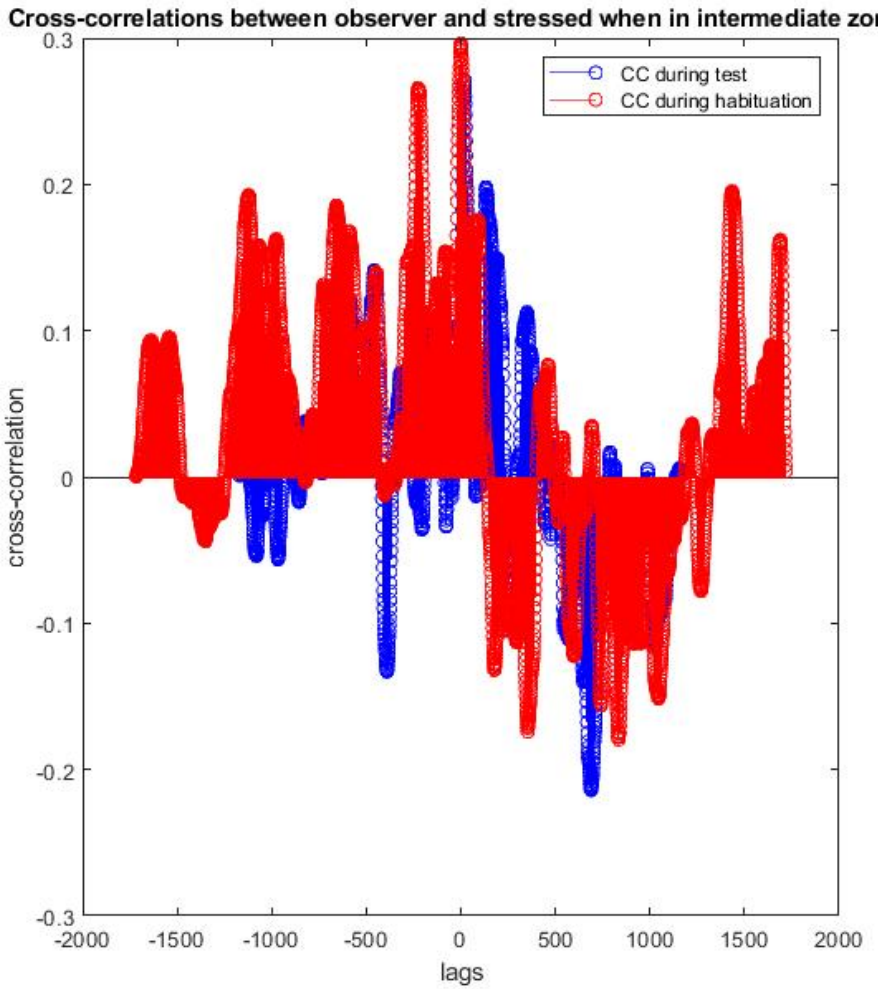
Third dataset: observer vs stressed and neutral

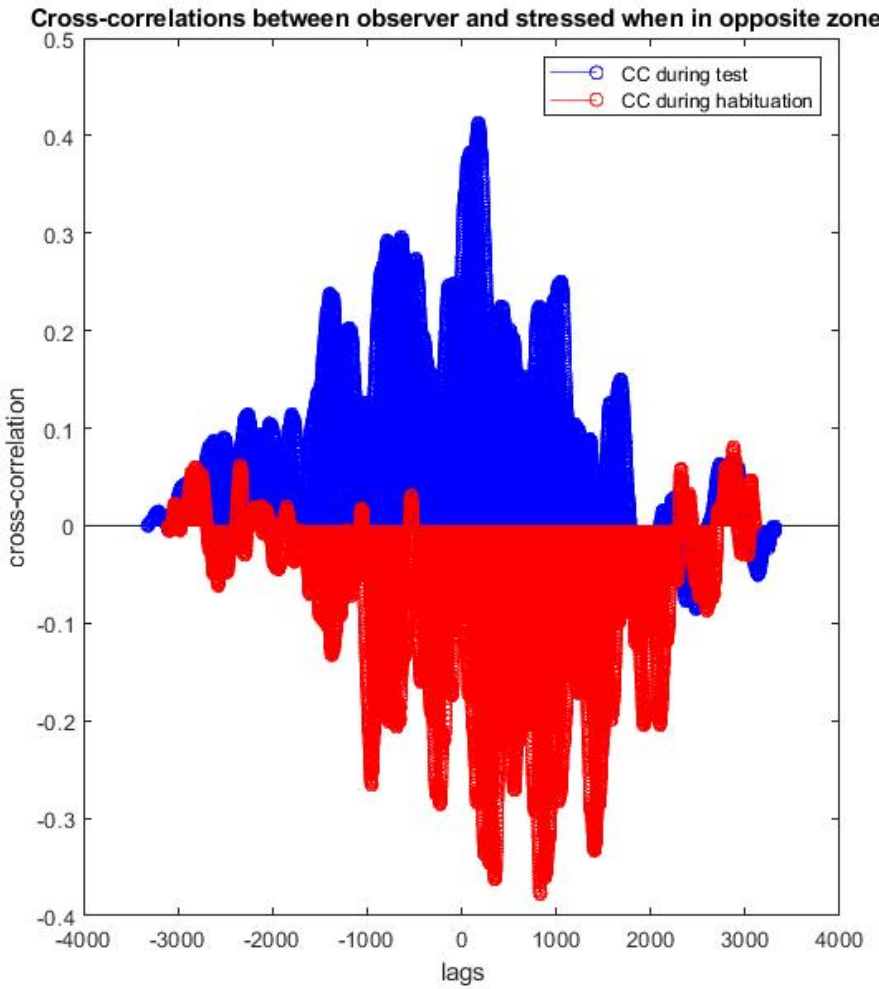
Observer 95 has been stressed for 30 minutes.



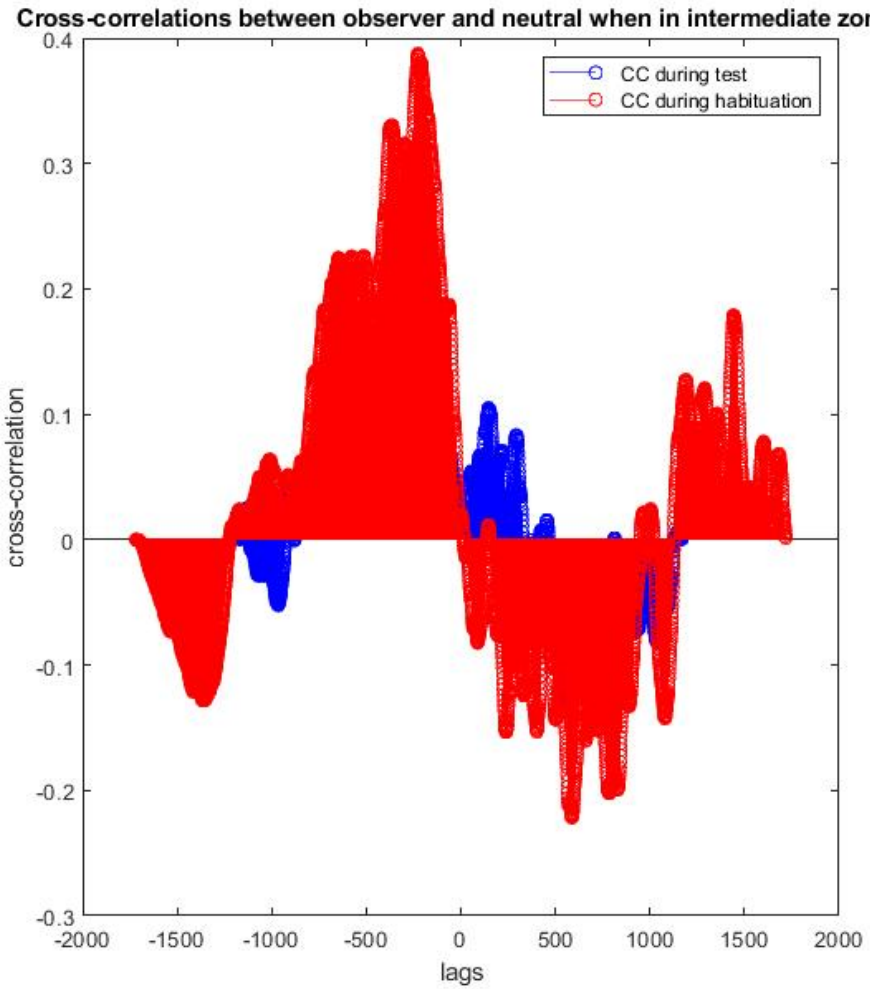


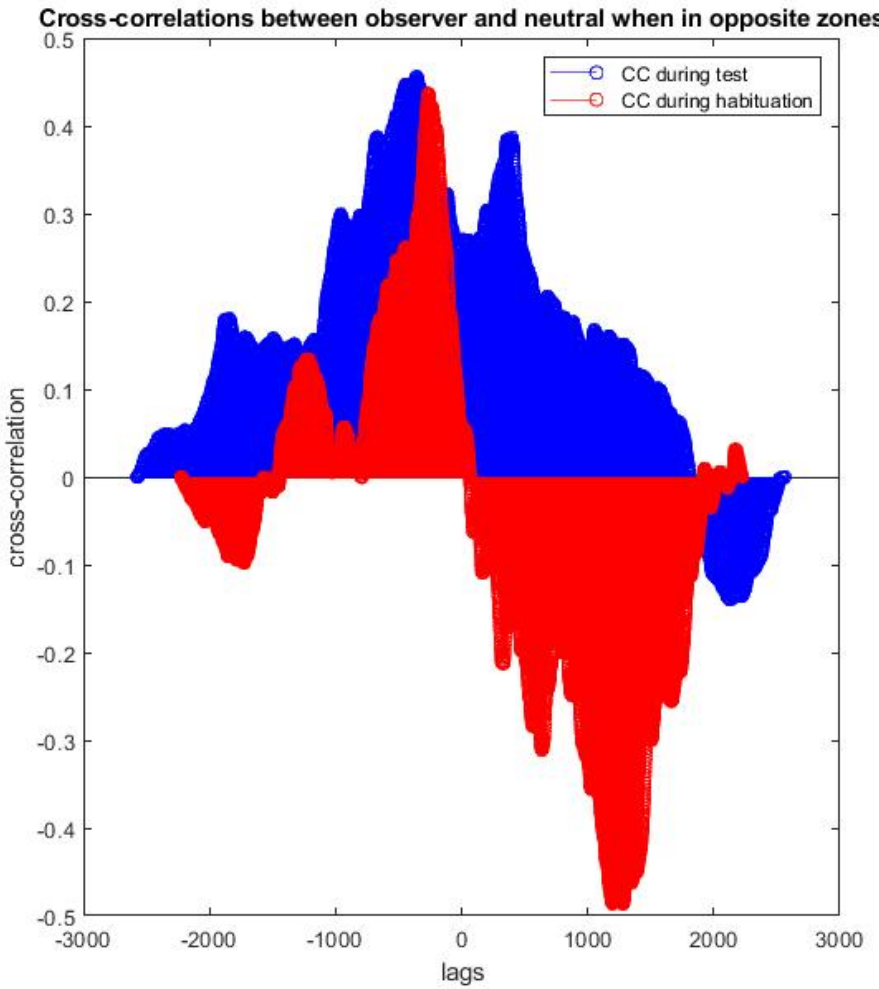
Third dataset: observer vs stressed when distant



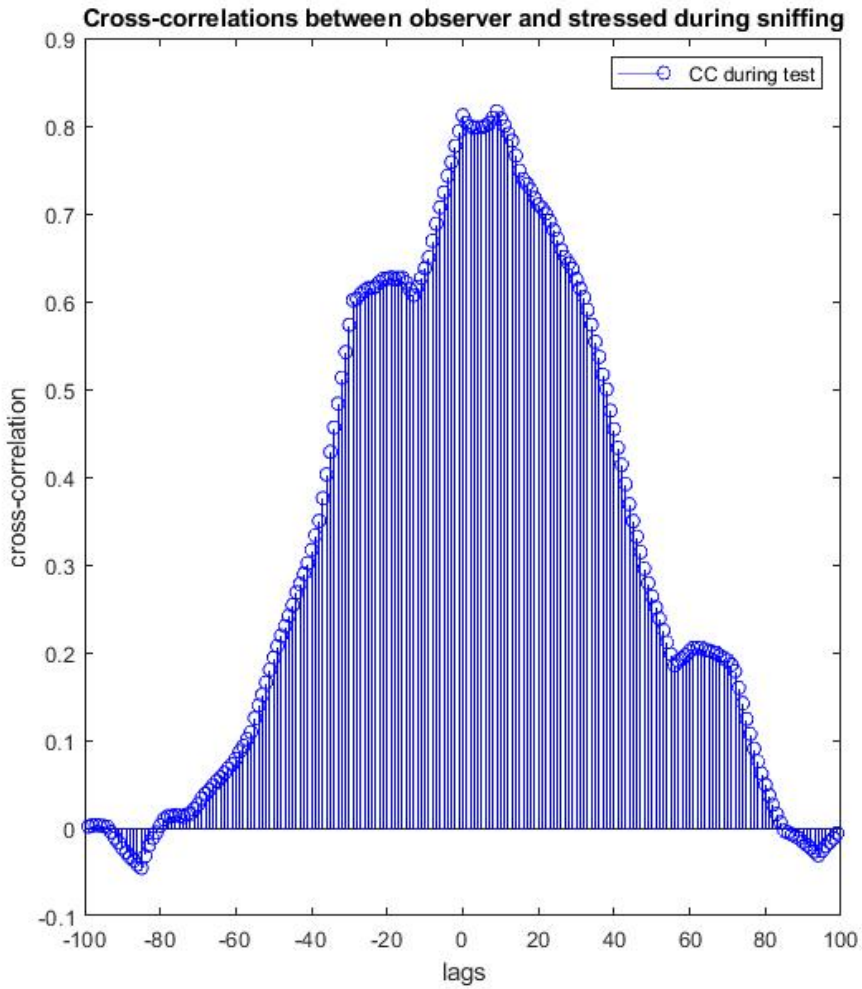


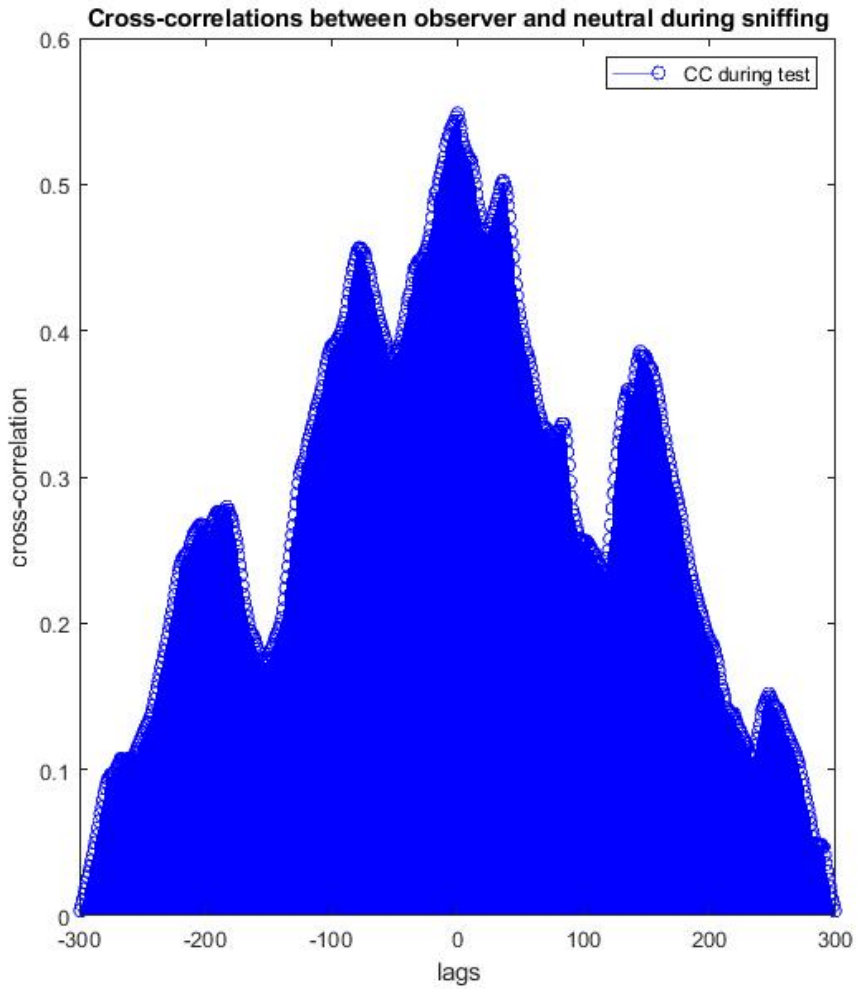
Third dataset: observer vs neutral when distant



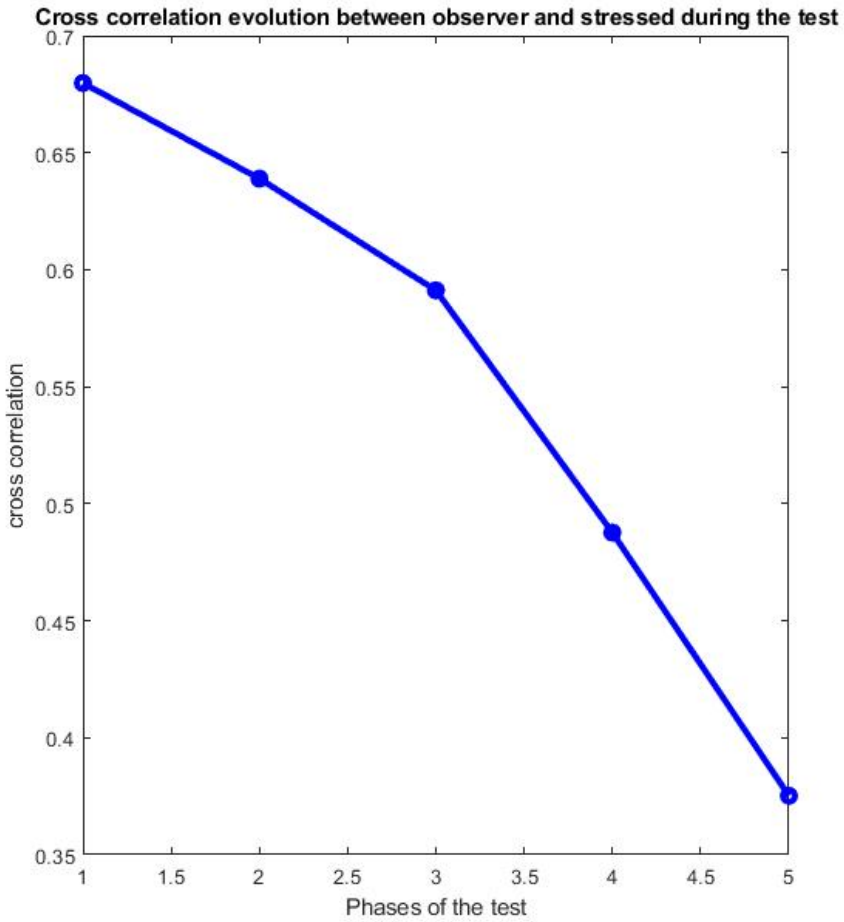


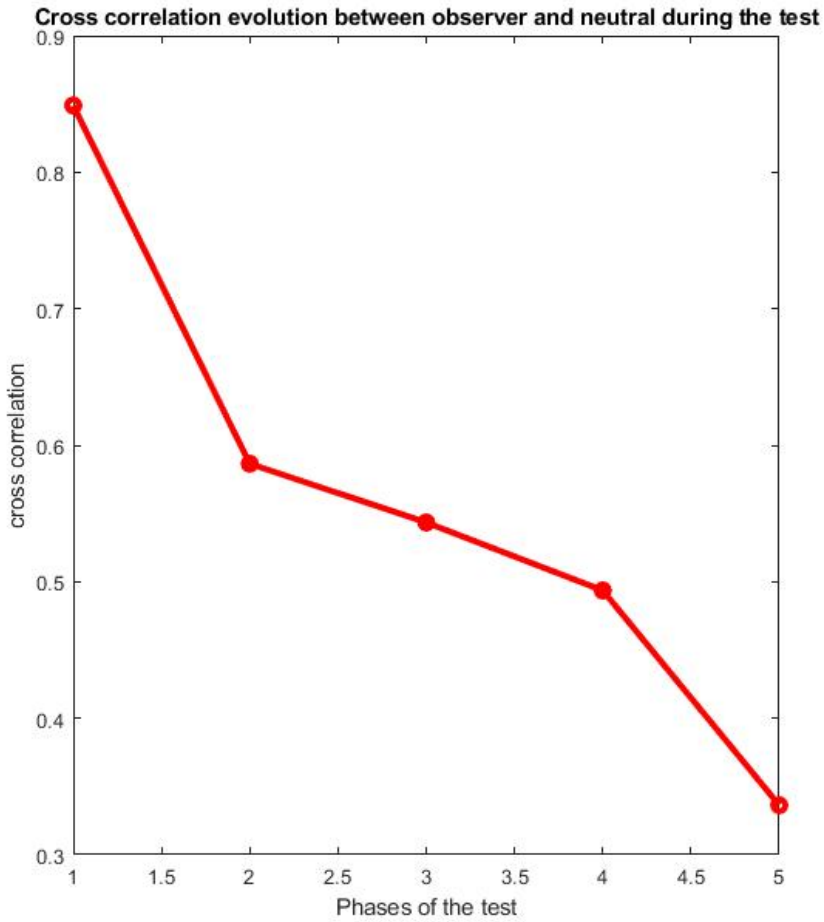
Third dataset: correlation during sniffing



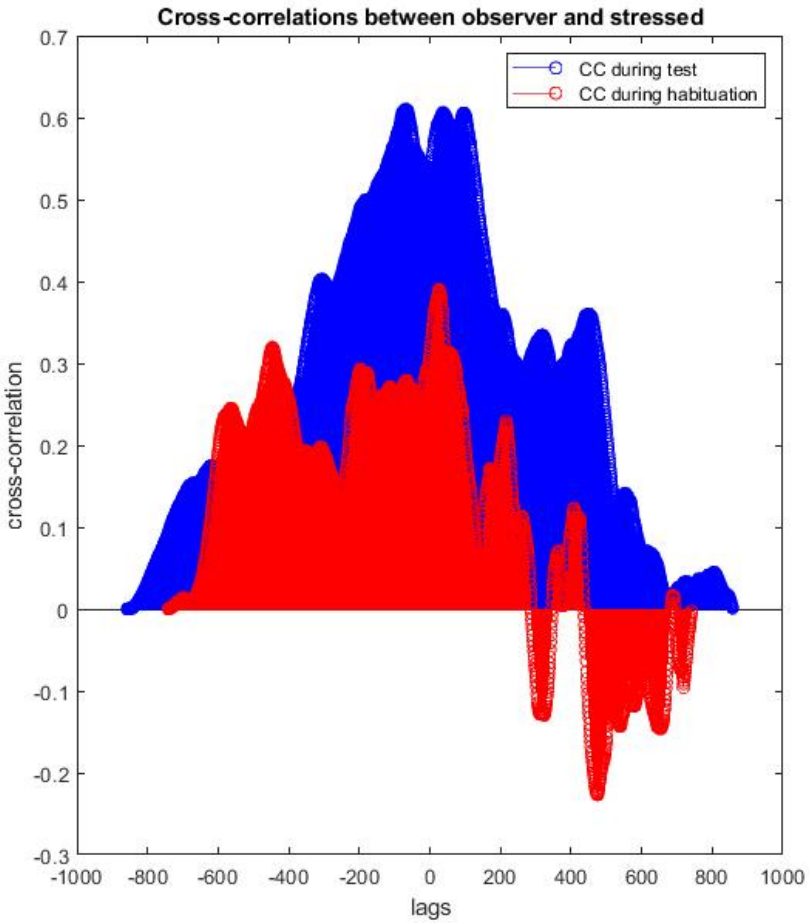


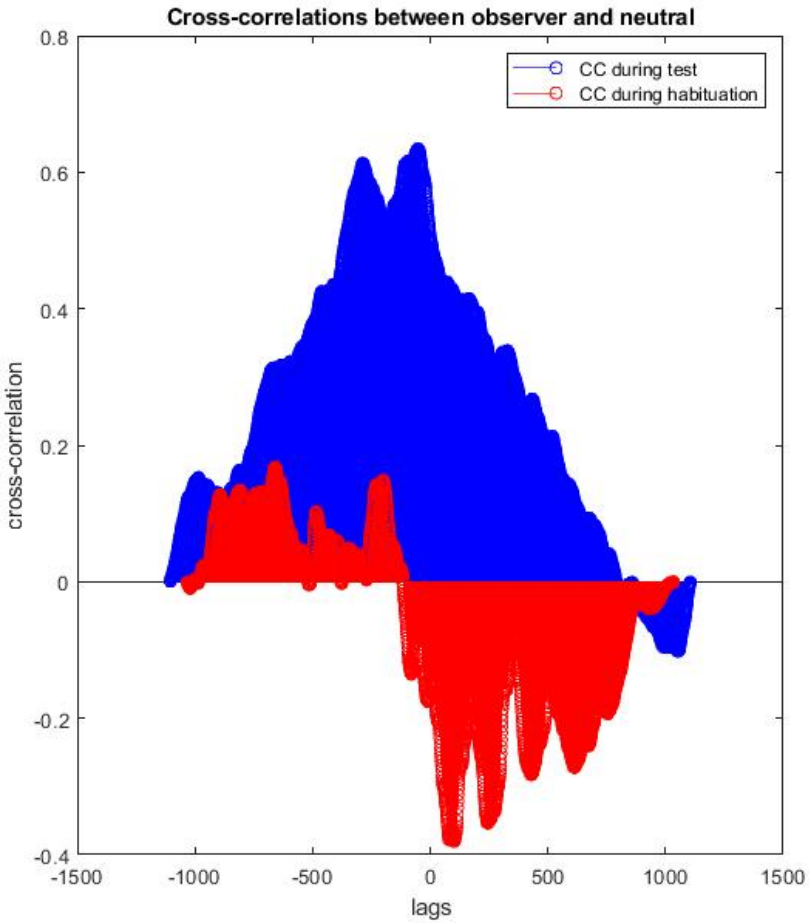
Third dataset: correlation behaviour through time



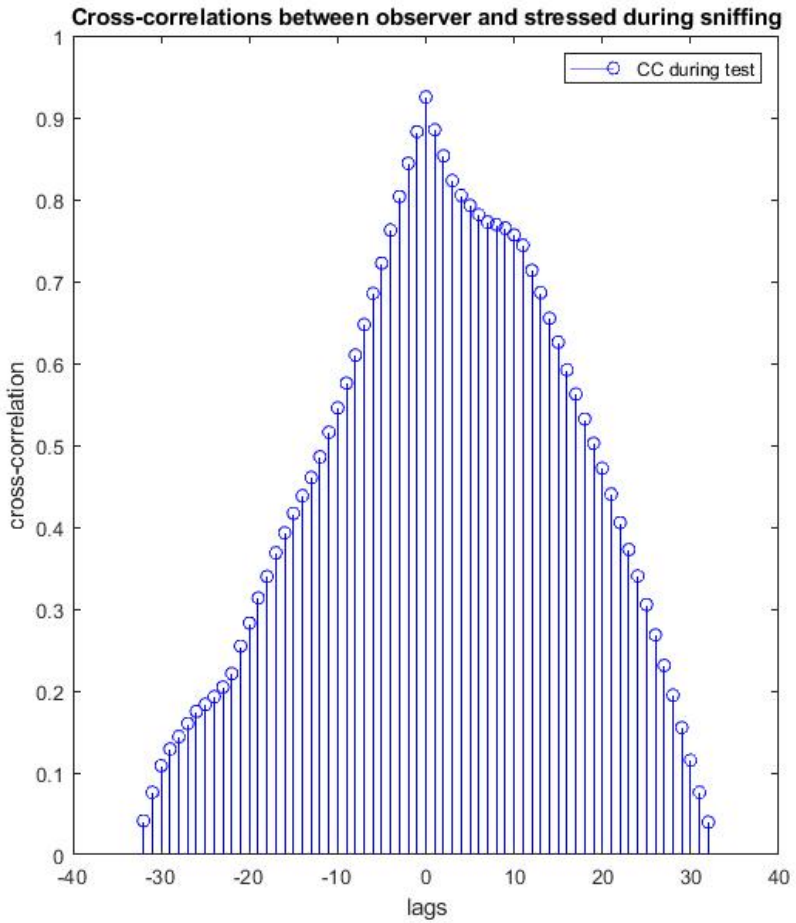


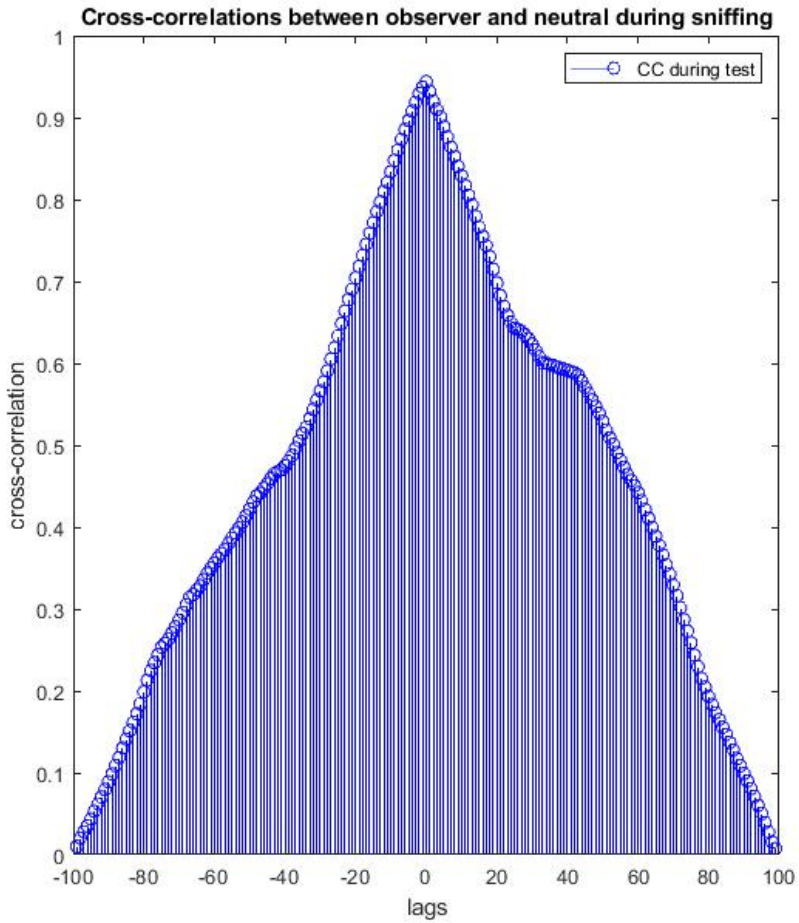
Third dataset: correlation during first interactions





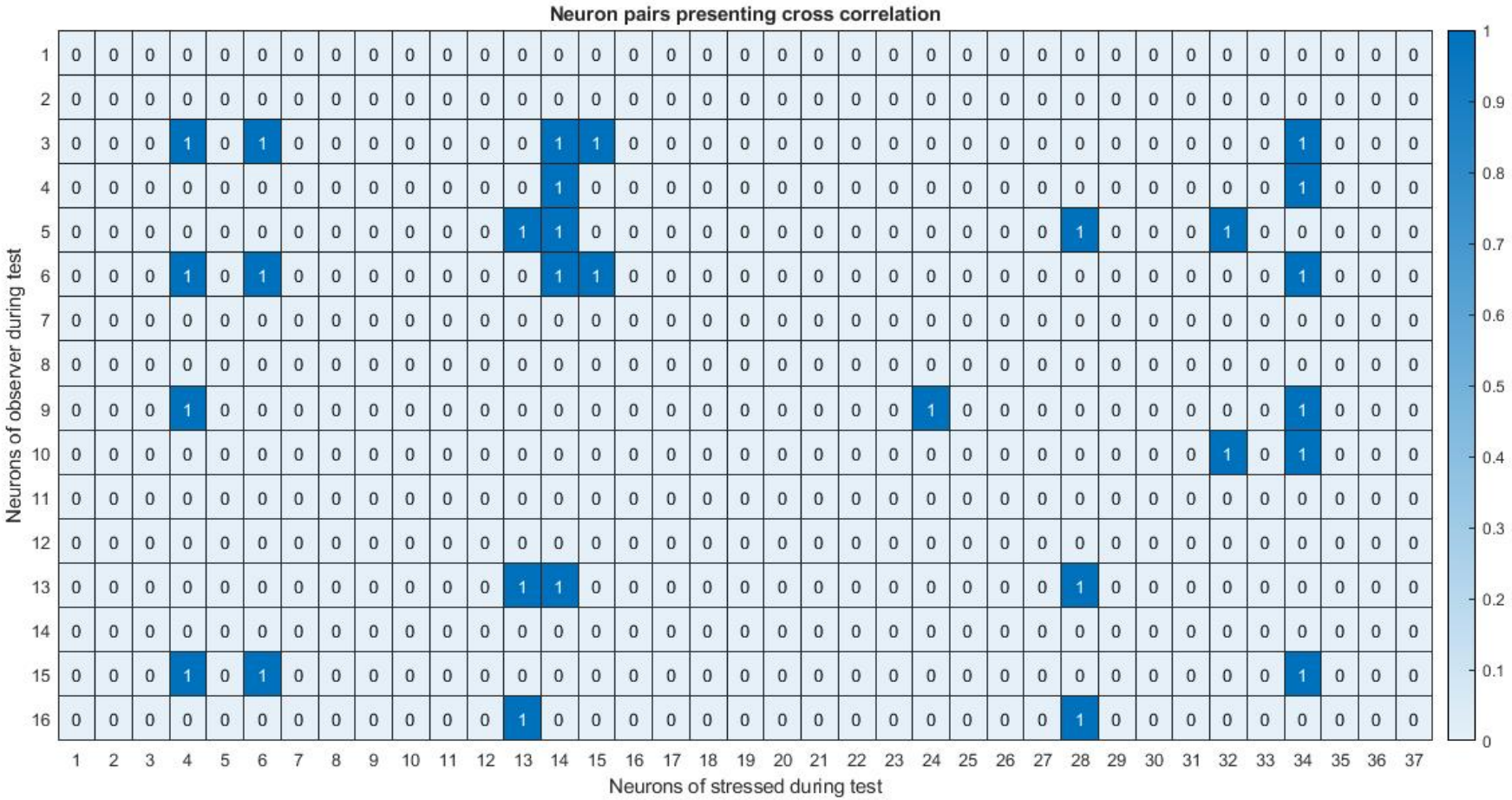
Third dataset: sniffing during first interactions





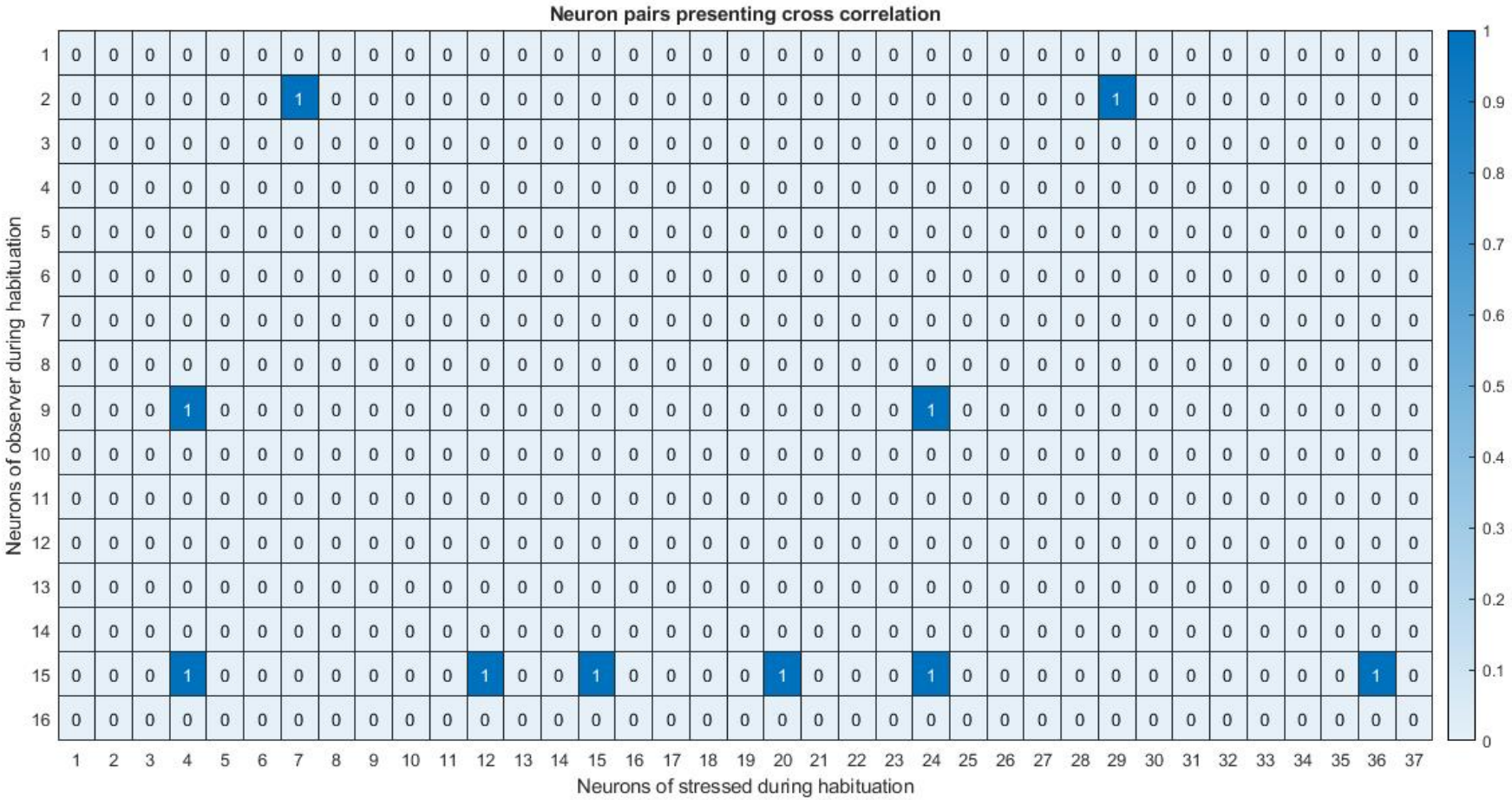
Third dataset: pairs correlation with stressed during test

Percentage of pairs showing correlation = 4.9%



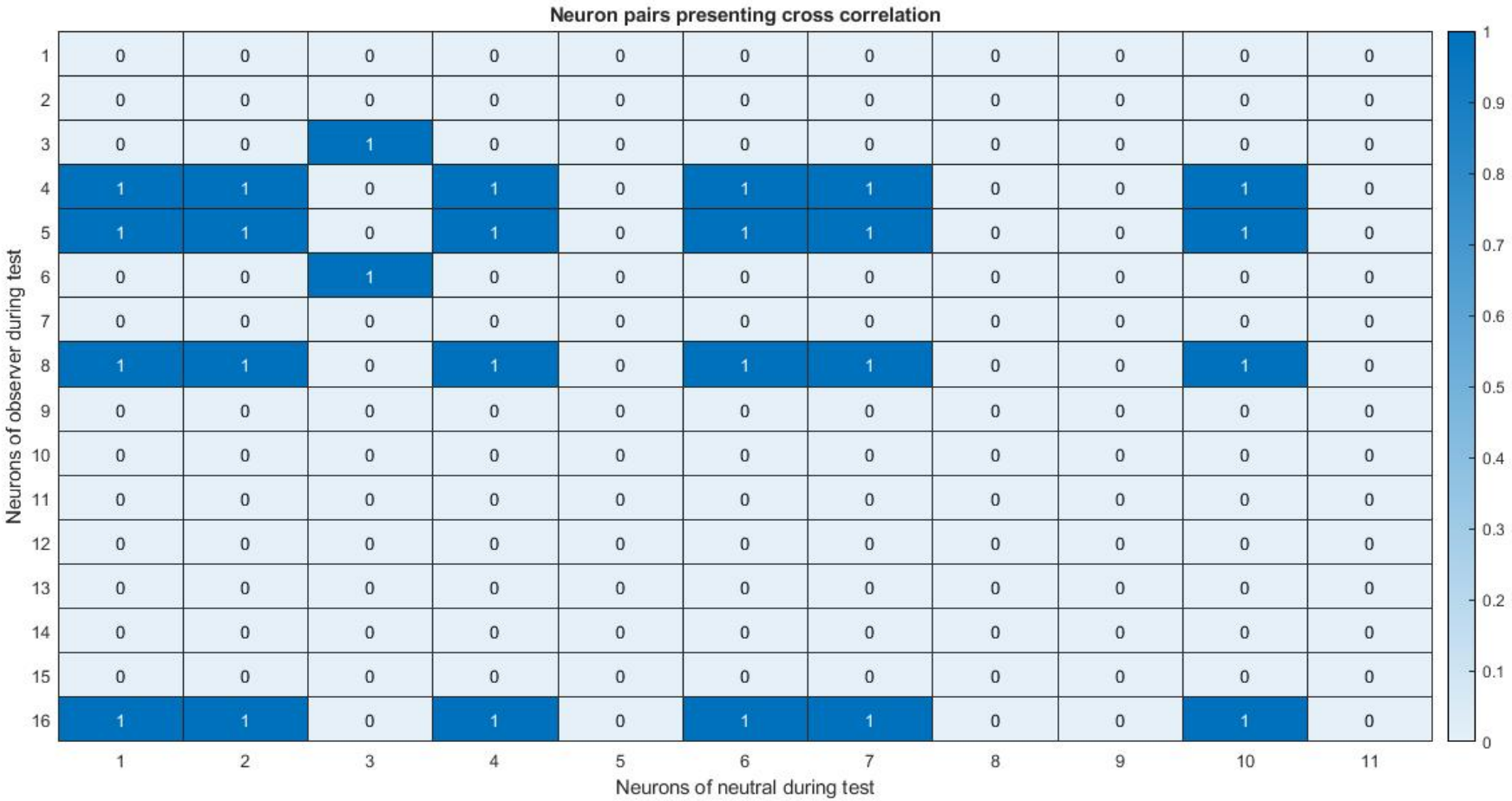
Third dataset: pairs correlation with stressed during habituation

Percentage of pairs showing correlation = 1.69%



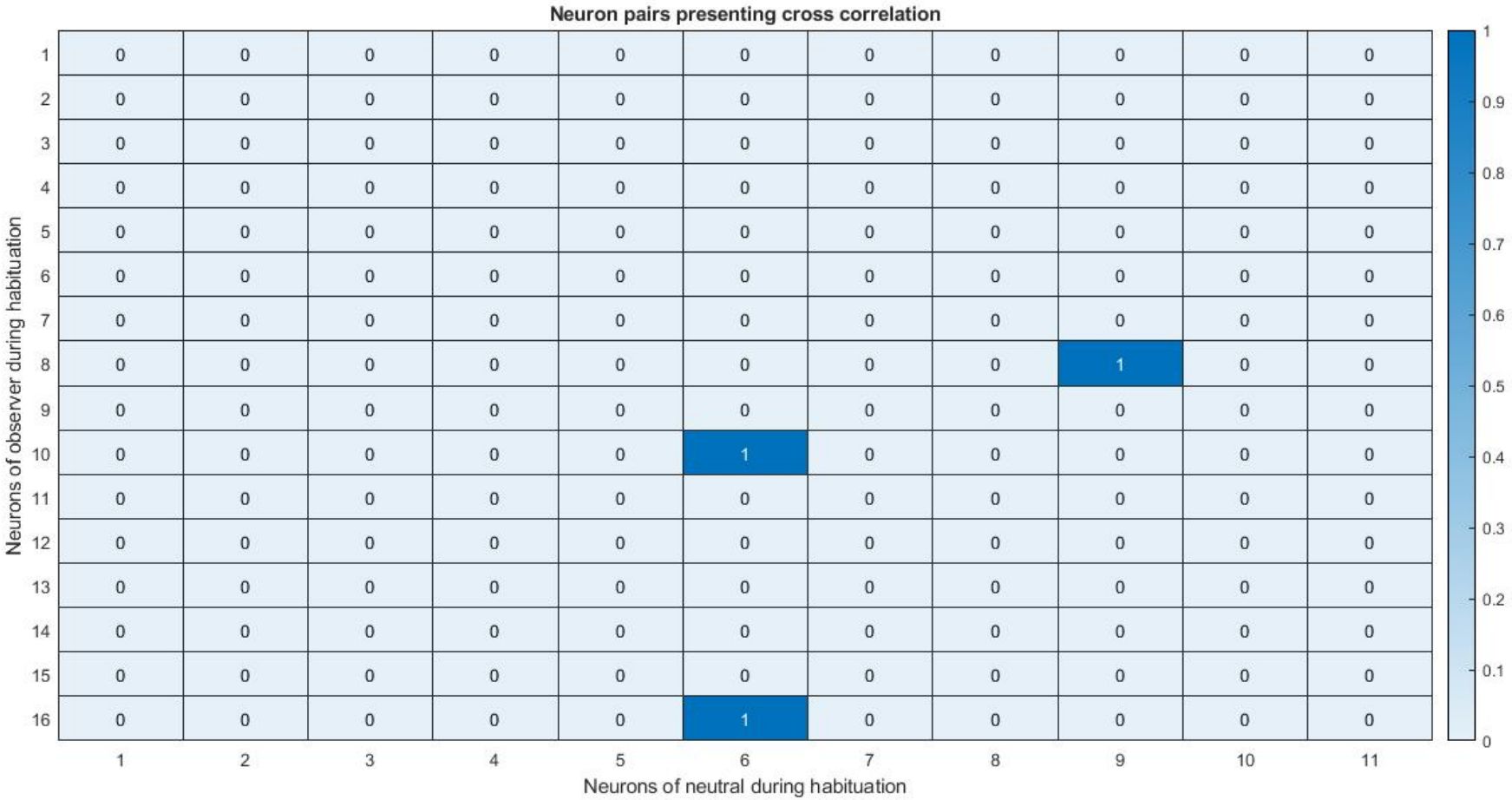
Third dataset: pairs correlation with neutral during test

Percentage of pairs showing correlation = 14.7%



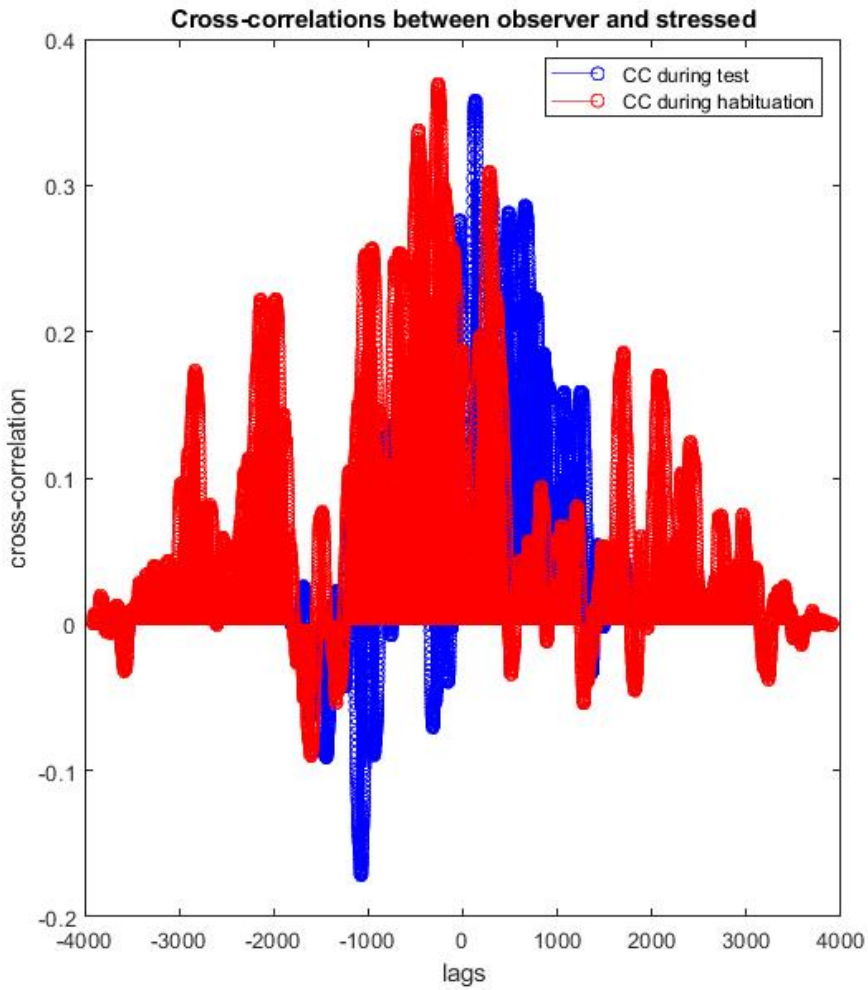
Third dataset: pairs correlation with neutral during habituation

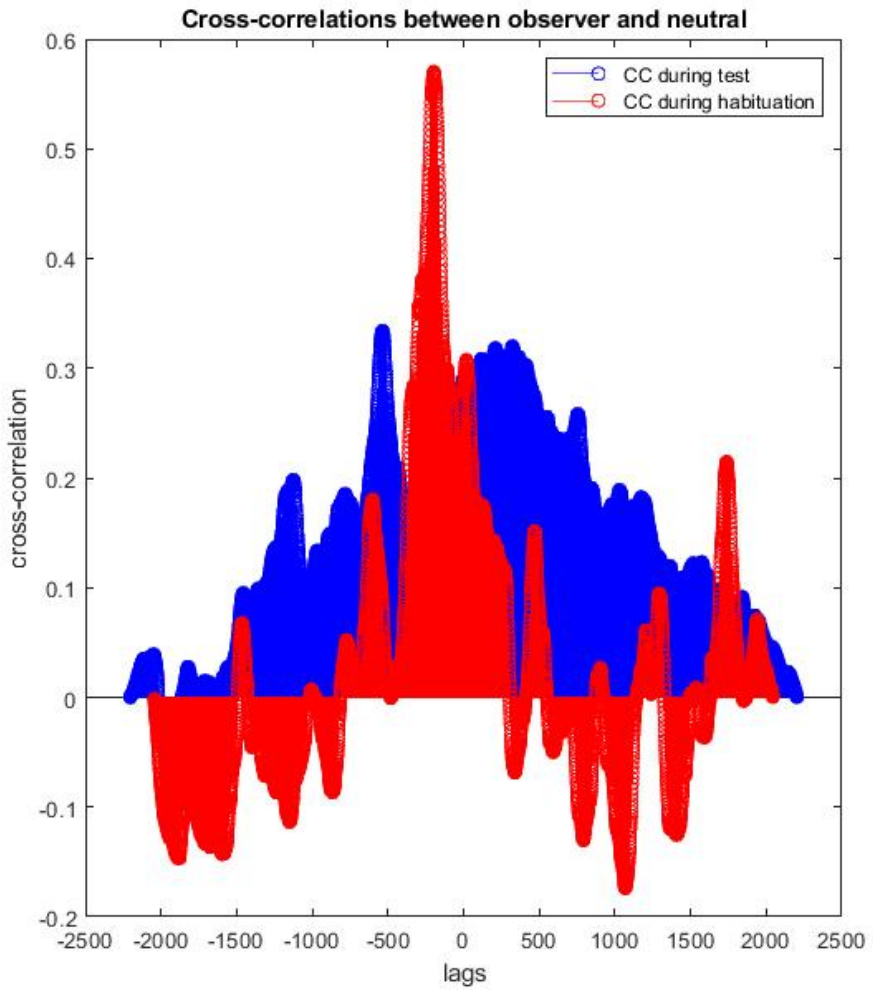
Percentage of pairs showing correlation = 1.7%



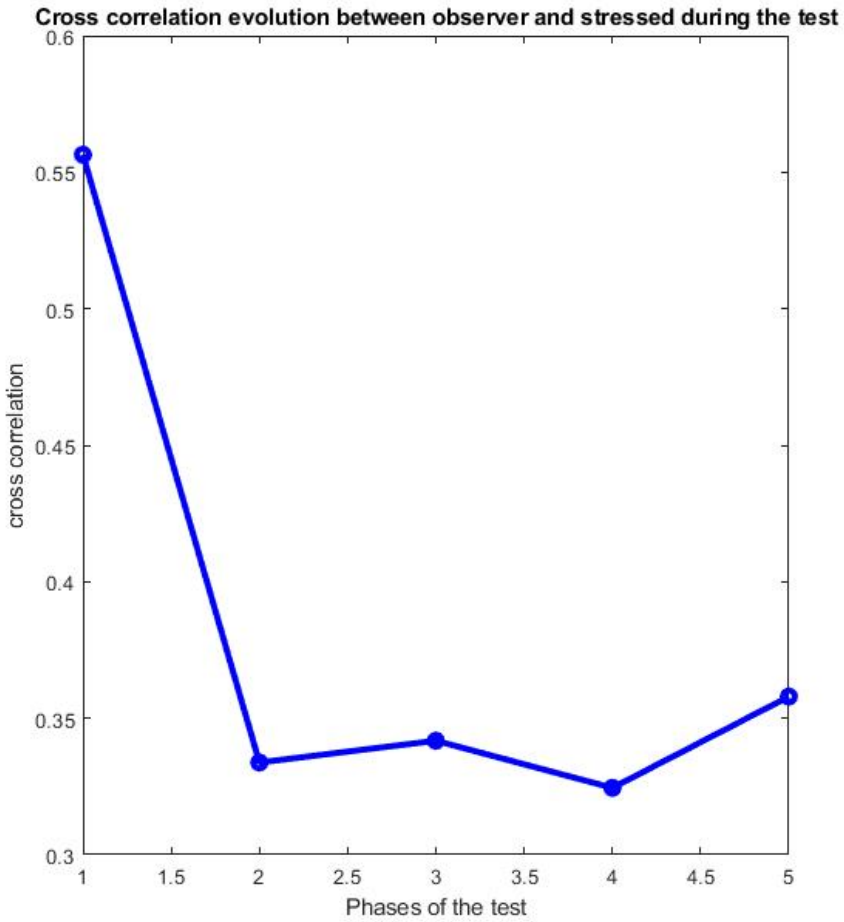
Fourth dataset: observer vs stressed and neutral

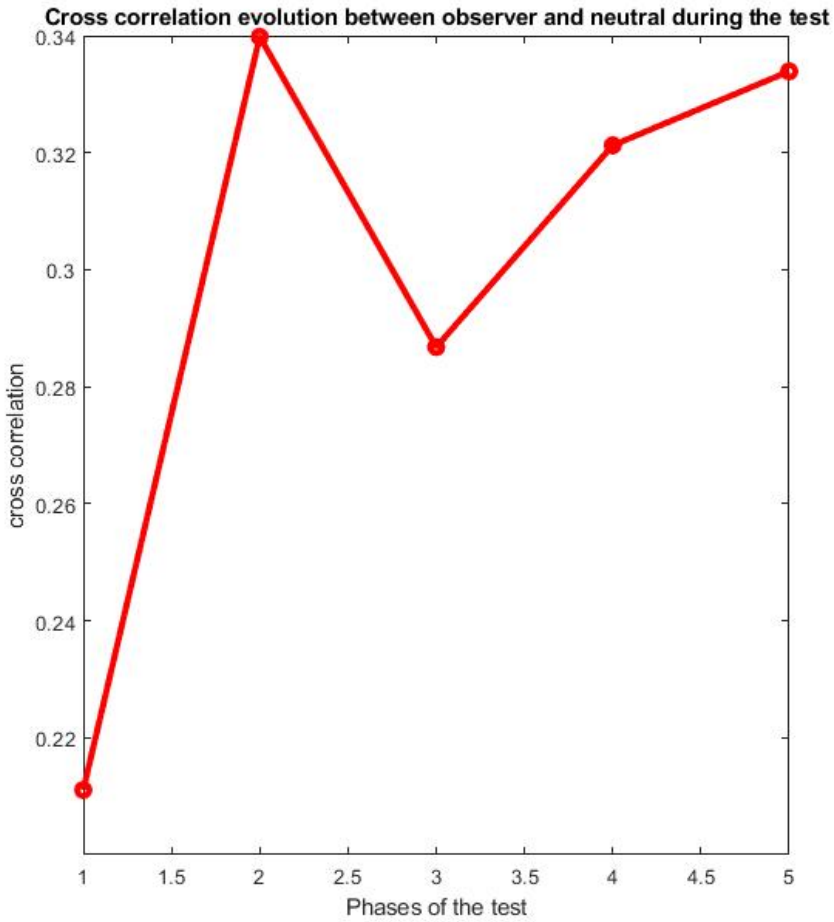
Observer 105 has been stressed for 30 minutes.





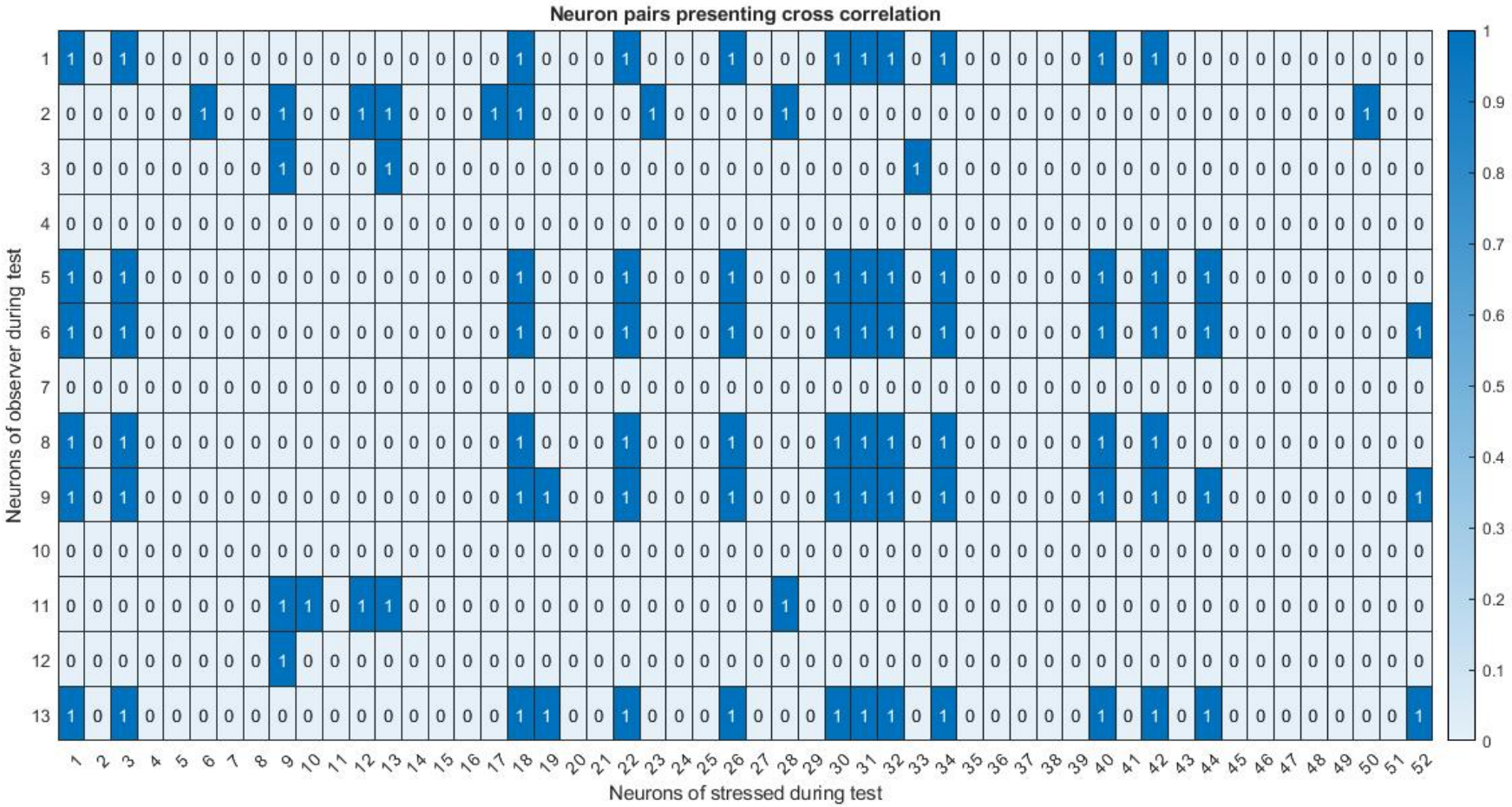
Fourth dataset: correlation behaviour through time





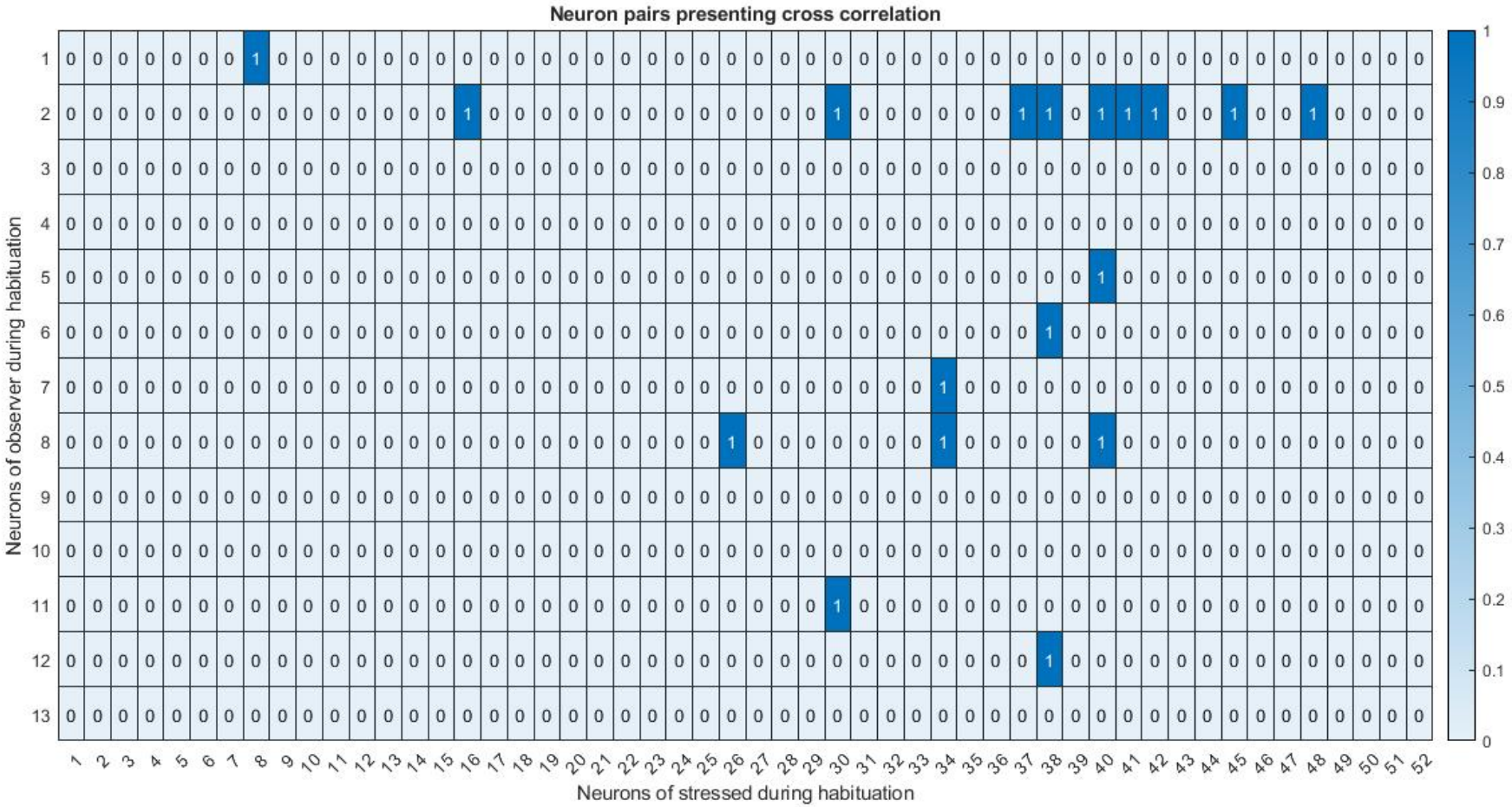
Fourth dataset: pairs correlation with stressed during test

Percentage of pairs showing correlation = 13.76%



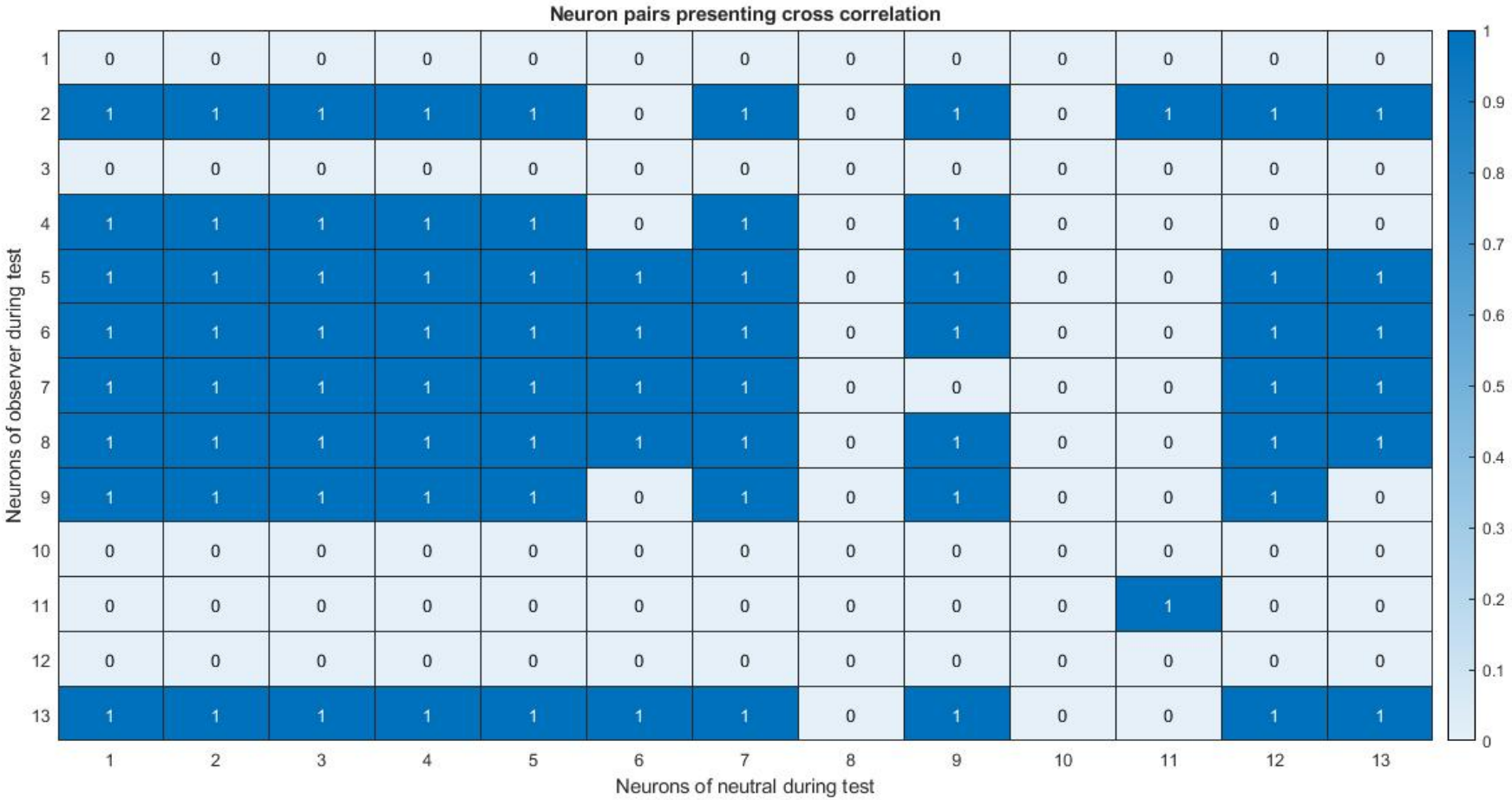
Fourth dataset: pairs correlation with stressed during habituation

Percentage of pairs showing correlation = 2.66%



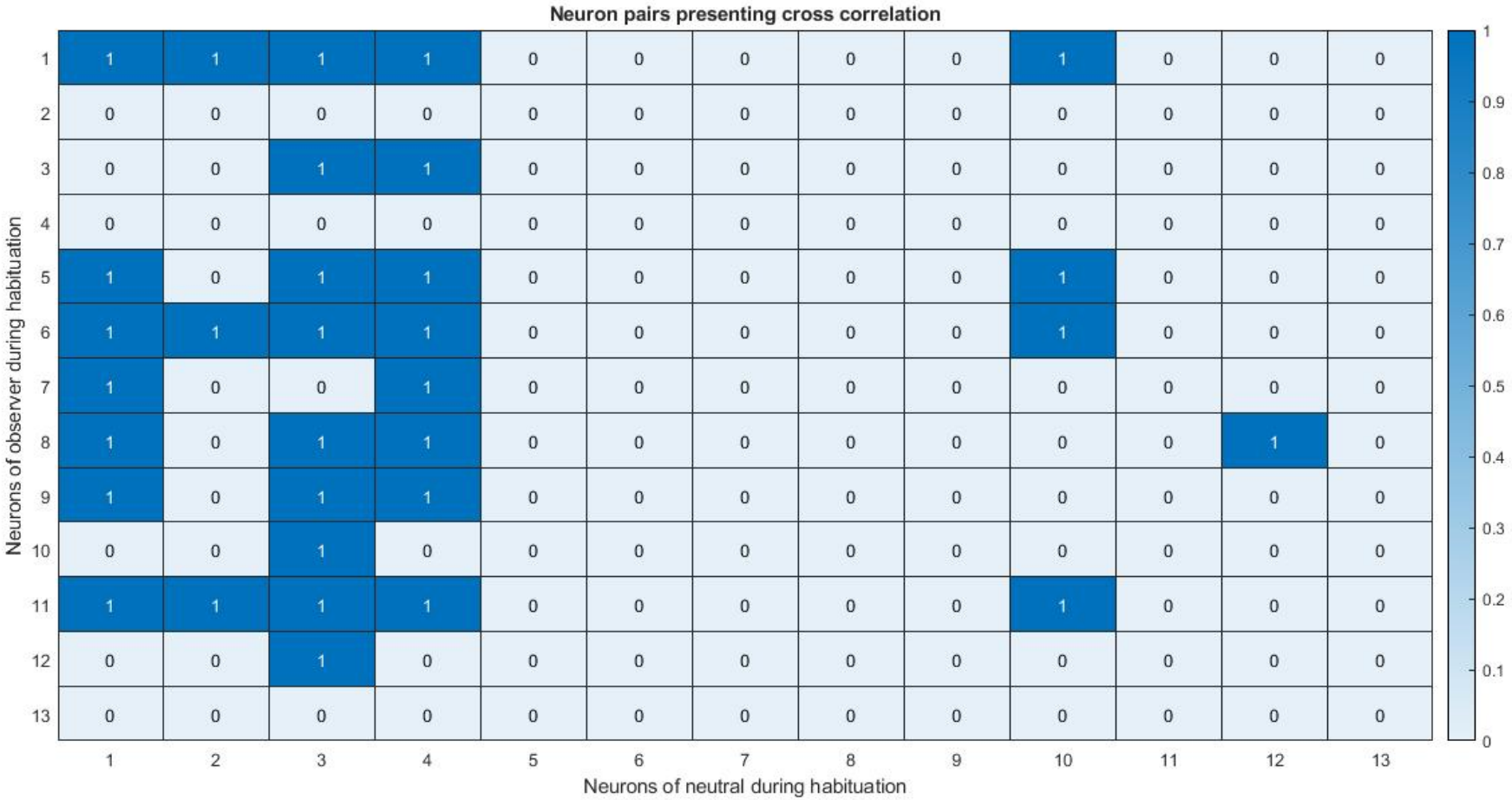
Fourth dataset: pairs correlation with neutral during test

Percentage of pairs showing correlation = 44.3%



Fourth dataset: pairs correlation with neutral during habituation

Percentage of pairs showing correlation = 18.9%



Conclusion on third and fourth datasets

- Considering the overall interaction periods, for stressed observers the correlation between mice is not particularly different in the test compared to the habituation, in contrast with first and second datasets
- However, especially for the third dataset, there is still higher correlation if we consider the first part of the interaction, i.e. stressed observers seem to have ”shorter memory”
- Highest correlation is still obtained when considering the sniffing period
- Good correlation in the test rather than the habituation is still obtained if we consider single neuronal pairs

Average statistics on all datasets

In the following, summarizing statistics (computed as average of all datasets) are provided.
Other informations about similarity between signals can be also obtained from the following quantities:

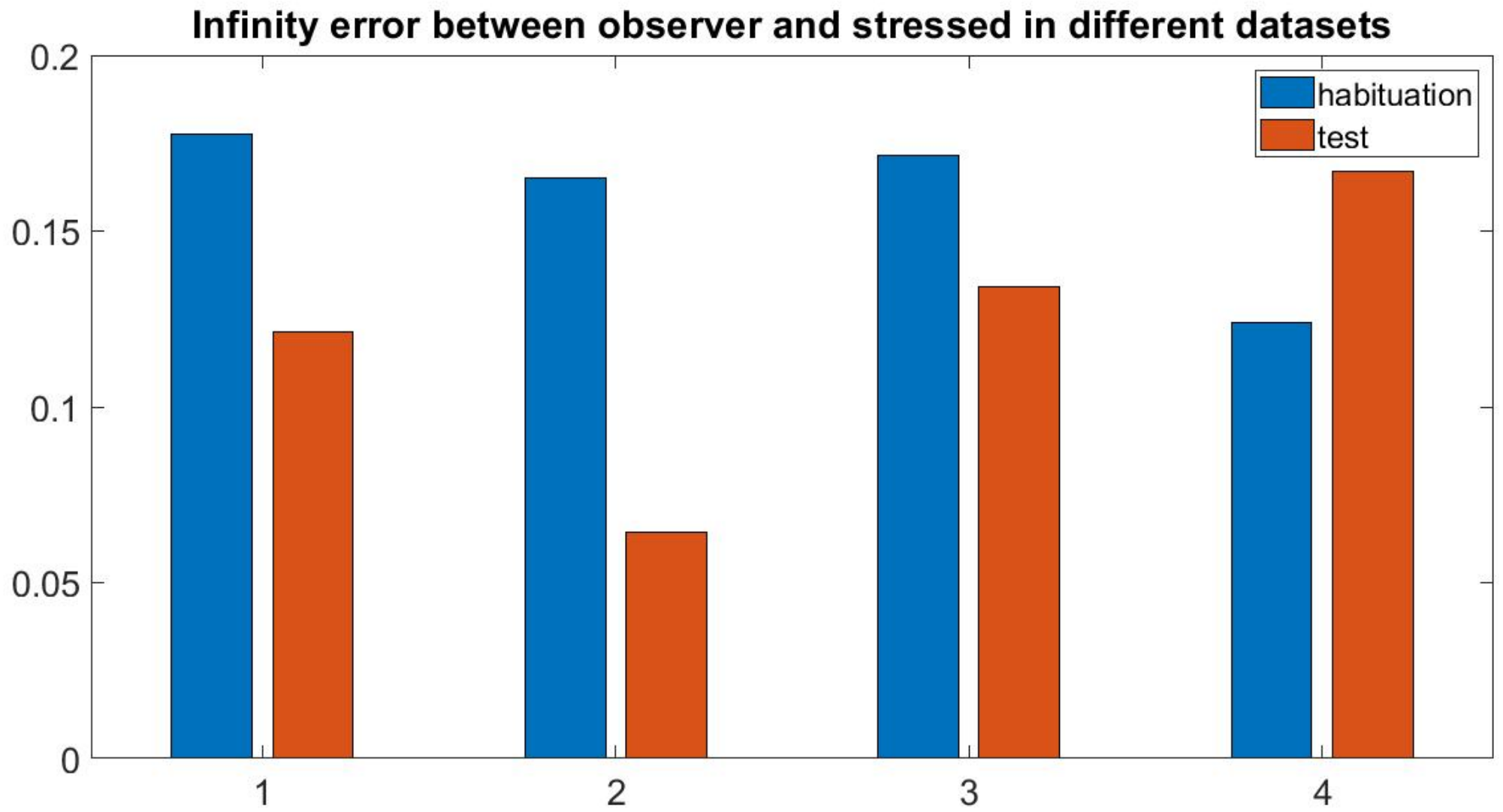
- **Infinity error**:

$$||f(t) - g(t)||_\infty = sup\{|f(t) - g(t)| : t \in [t_1, t_2]\}$$

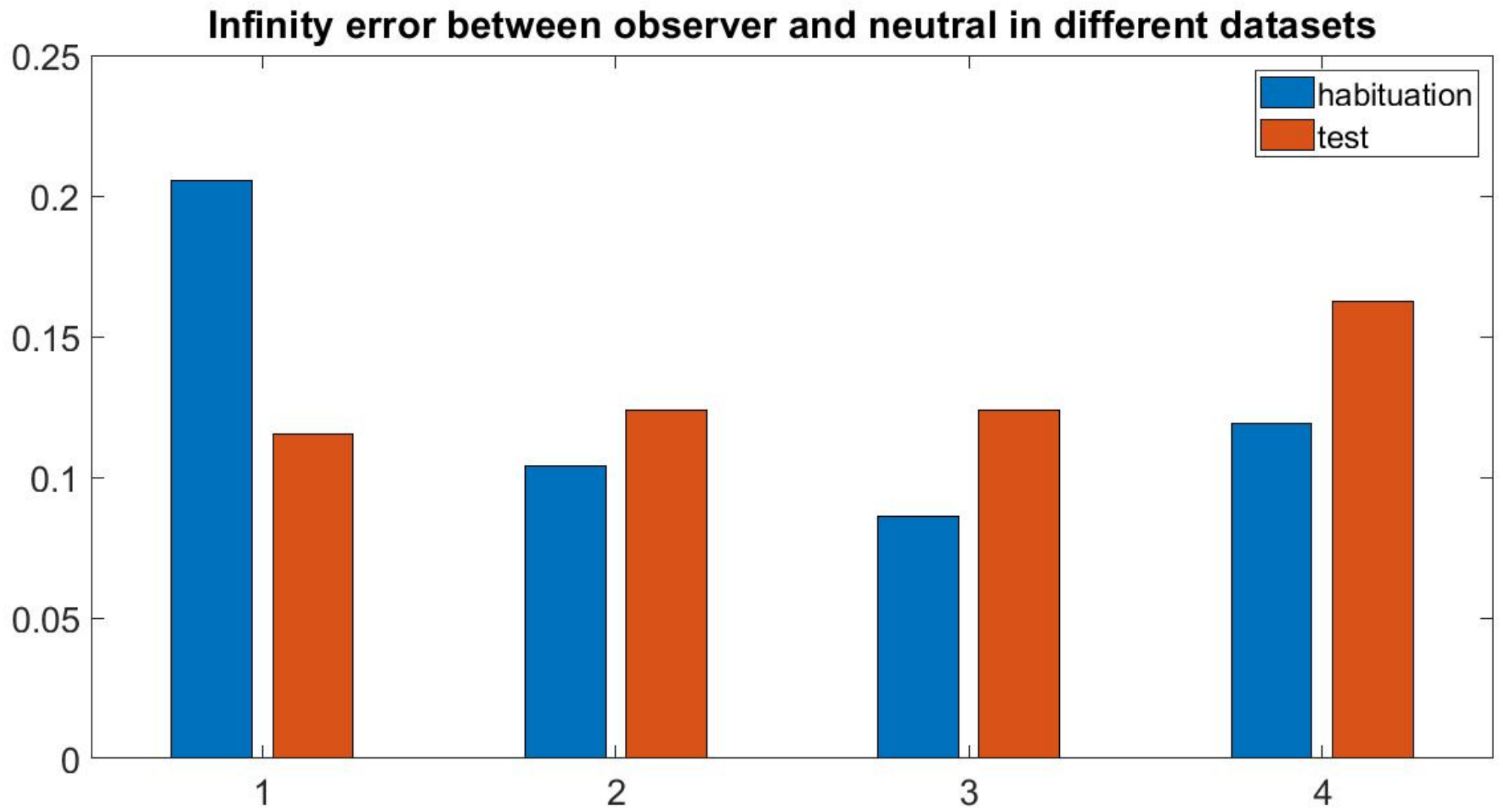
- L^2 **error**:

$$||f(t) - g(t)||_{L^2} = \int_{t_1}^{t_2} |f(t) - g(t)|^2 dt$$

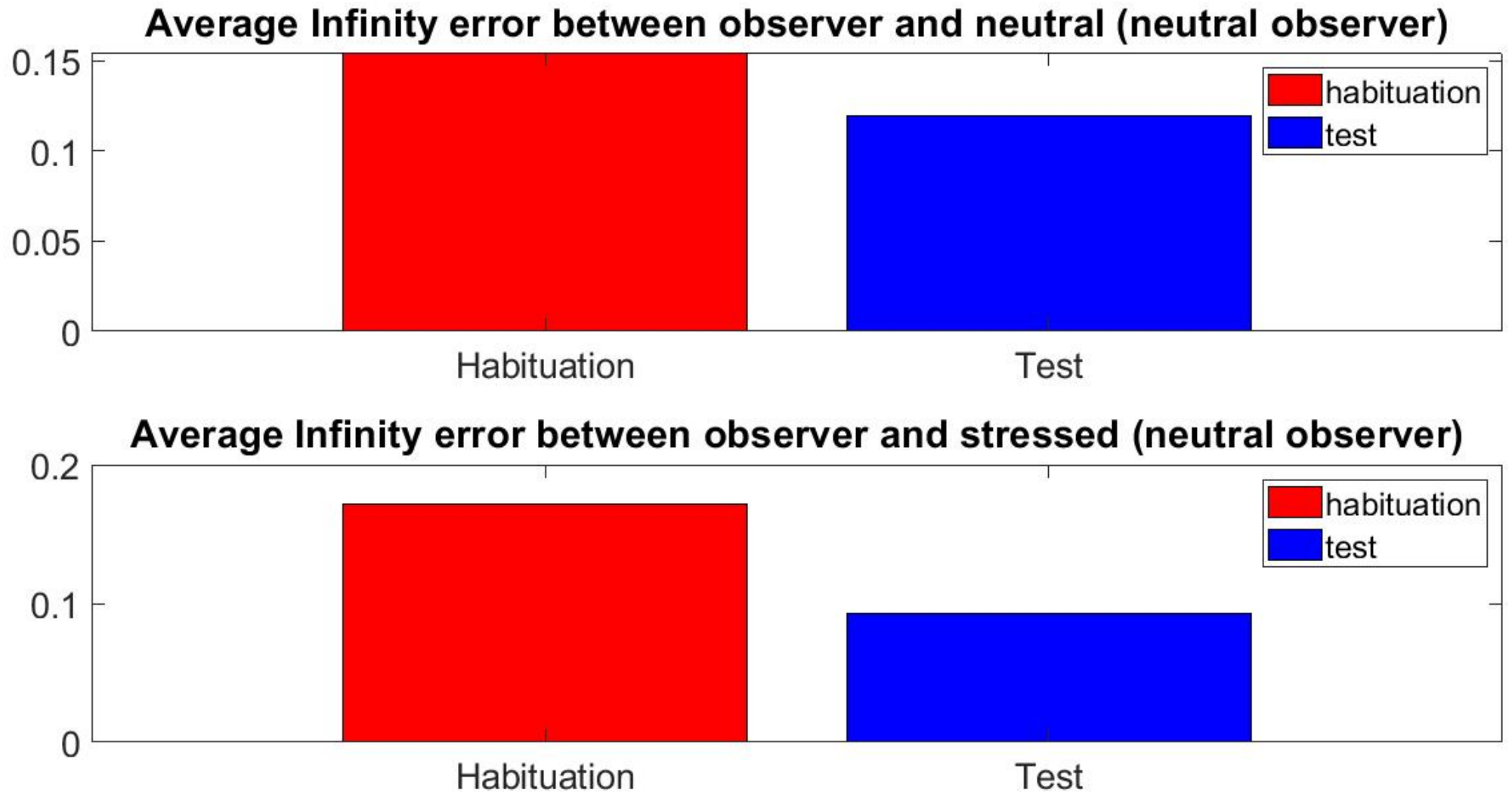
Infinity errors between observer and stressed



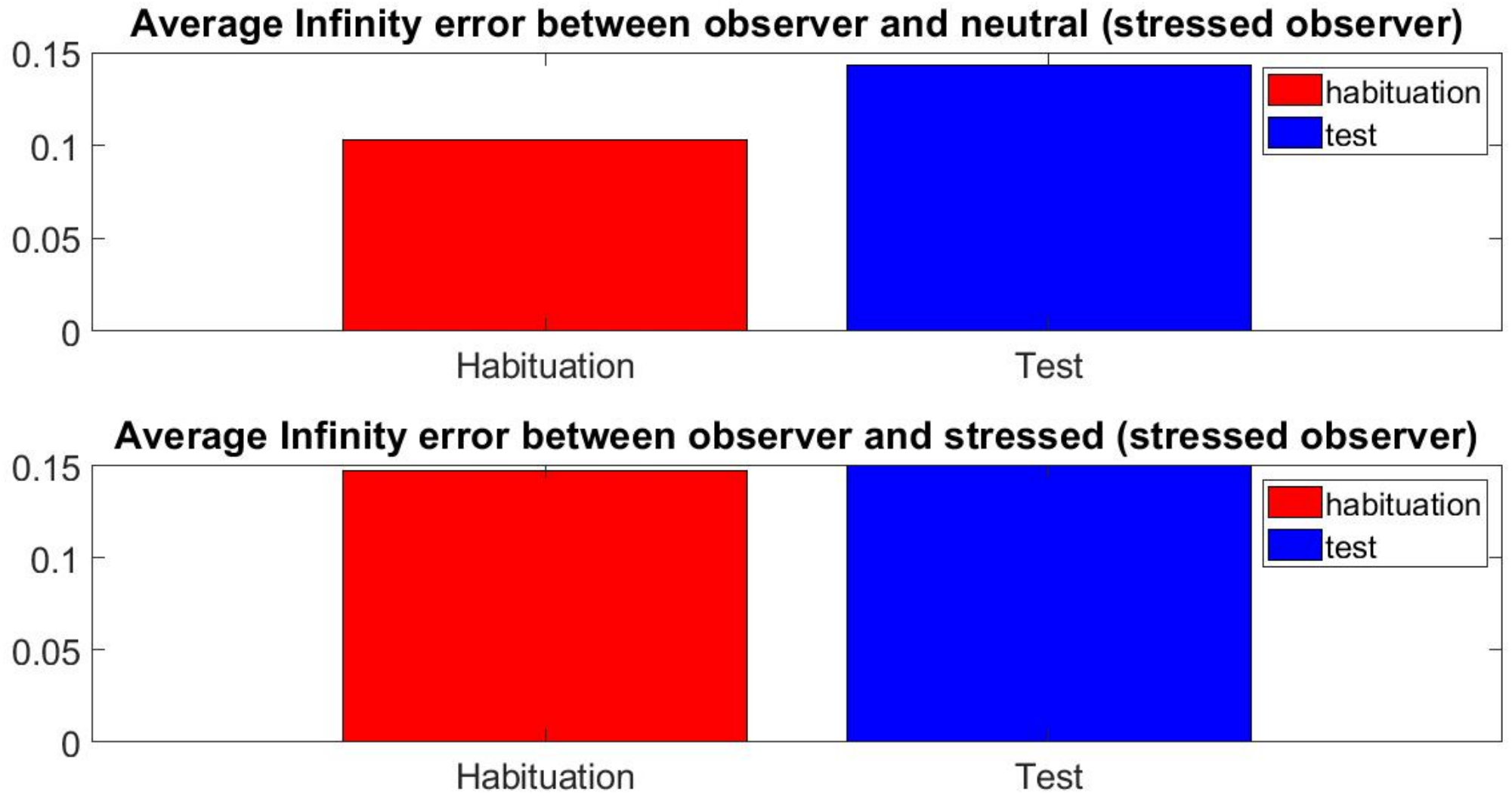
Infinity errors between observer and neutral



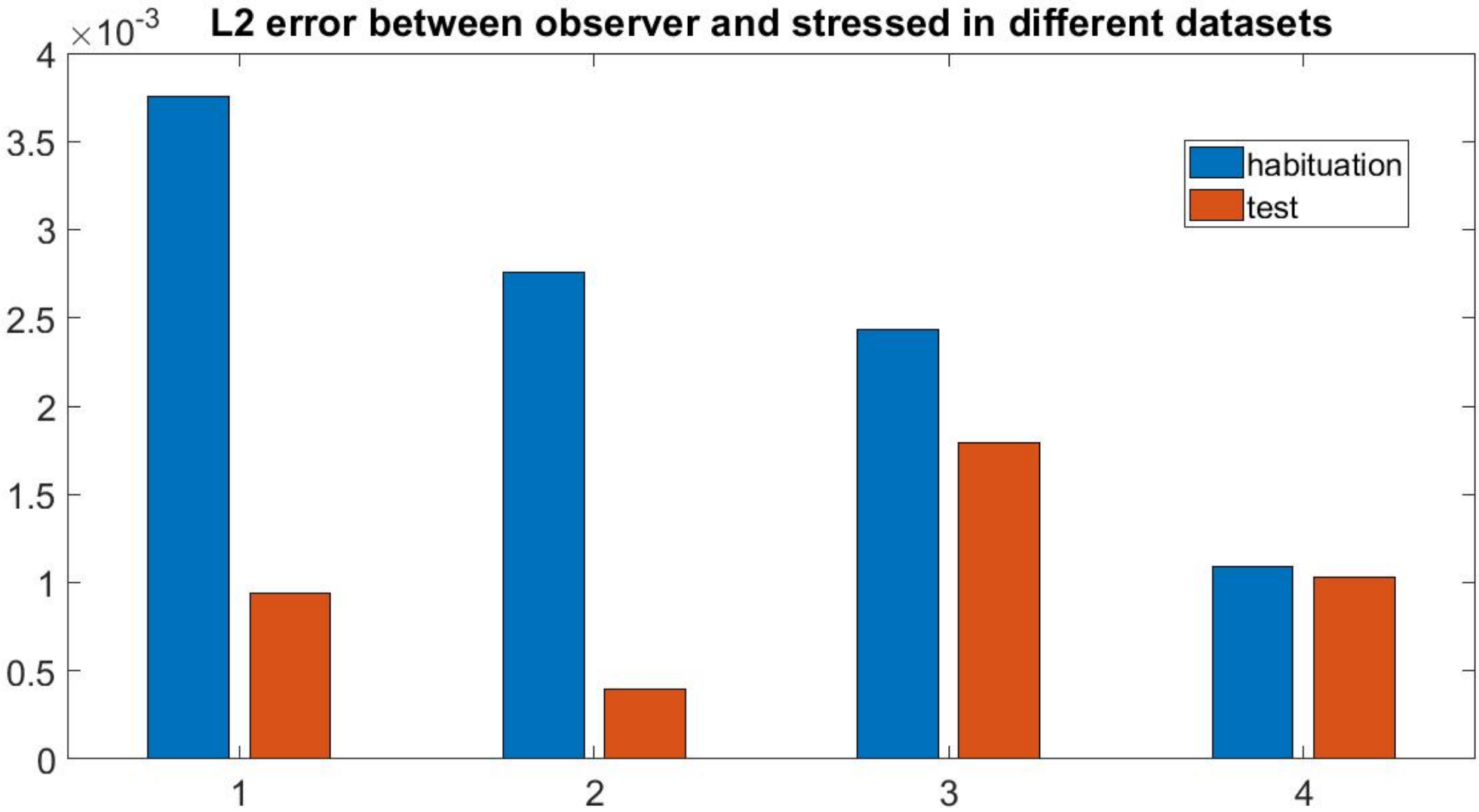
Average Infinity errors with neutral observer



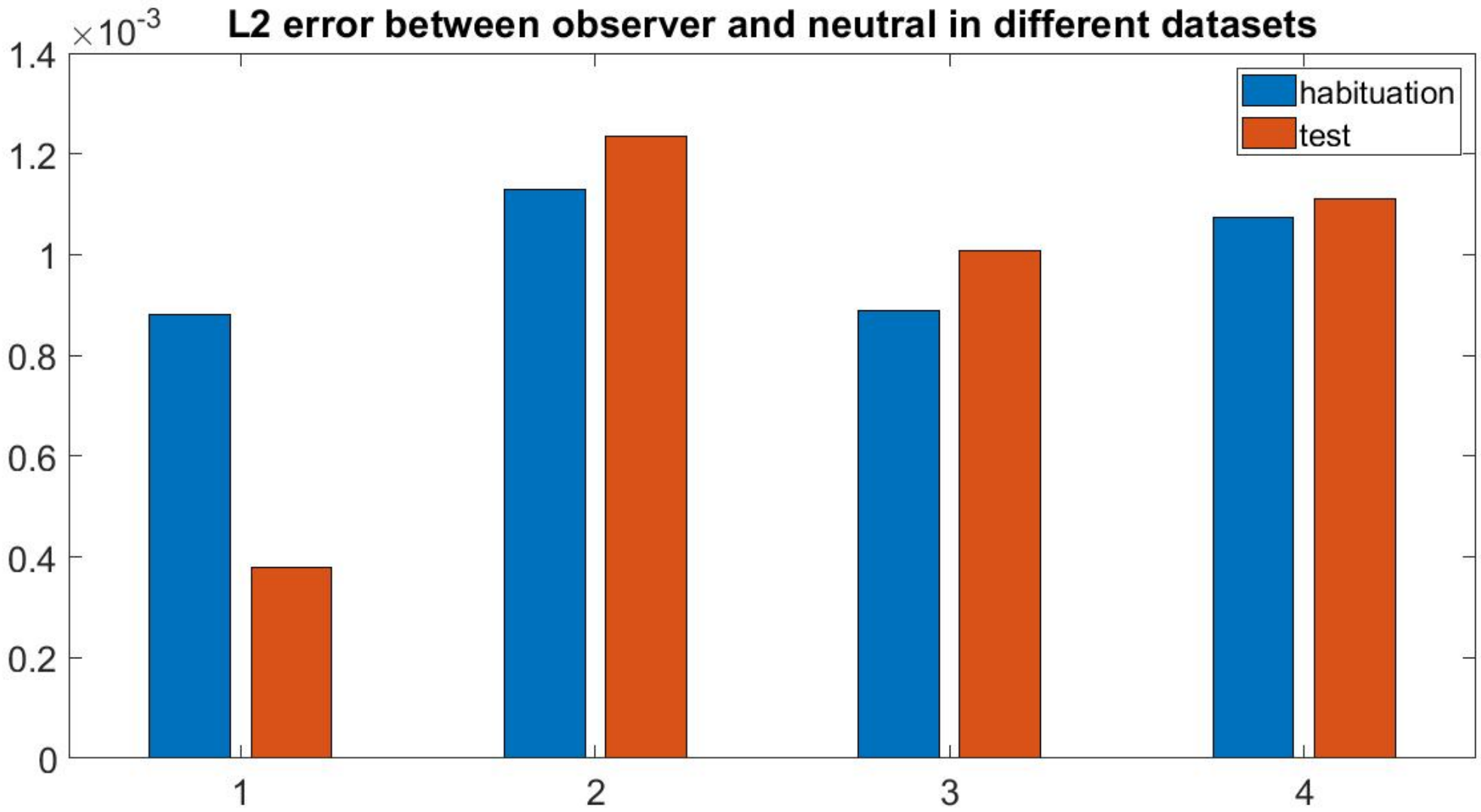
Average Infinity errors with stressed observer



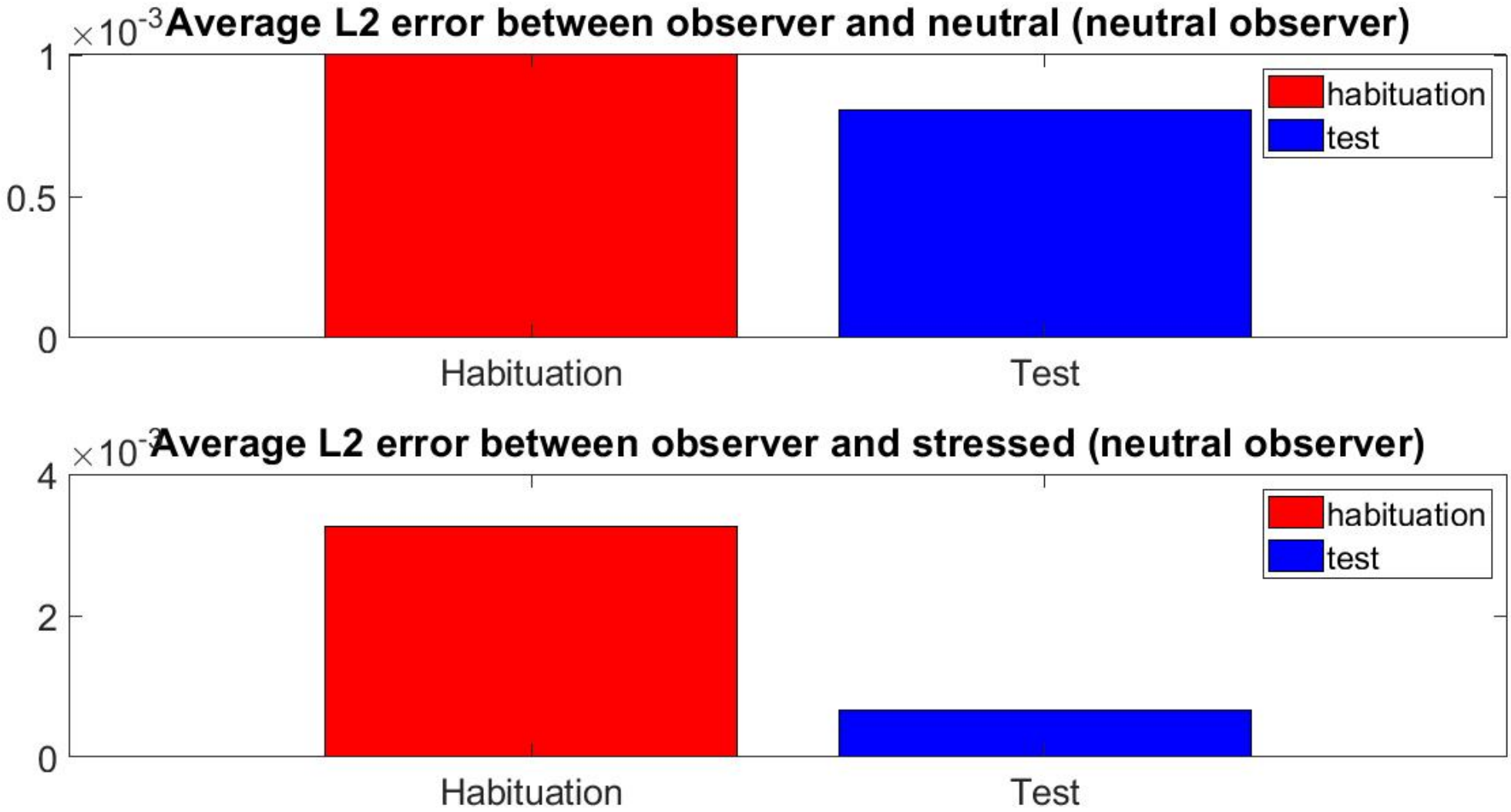
L^2 errors between observer and stressed



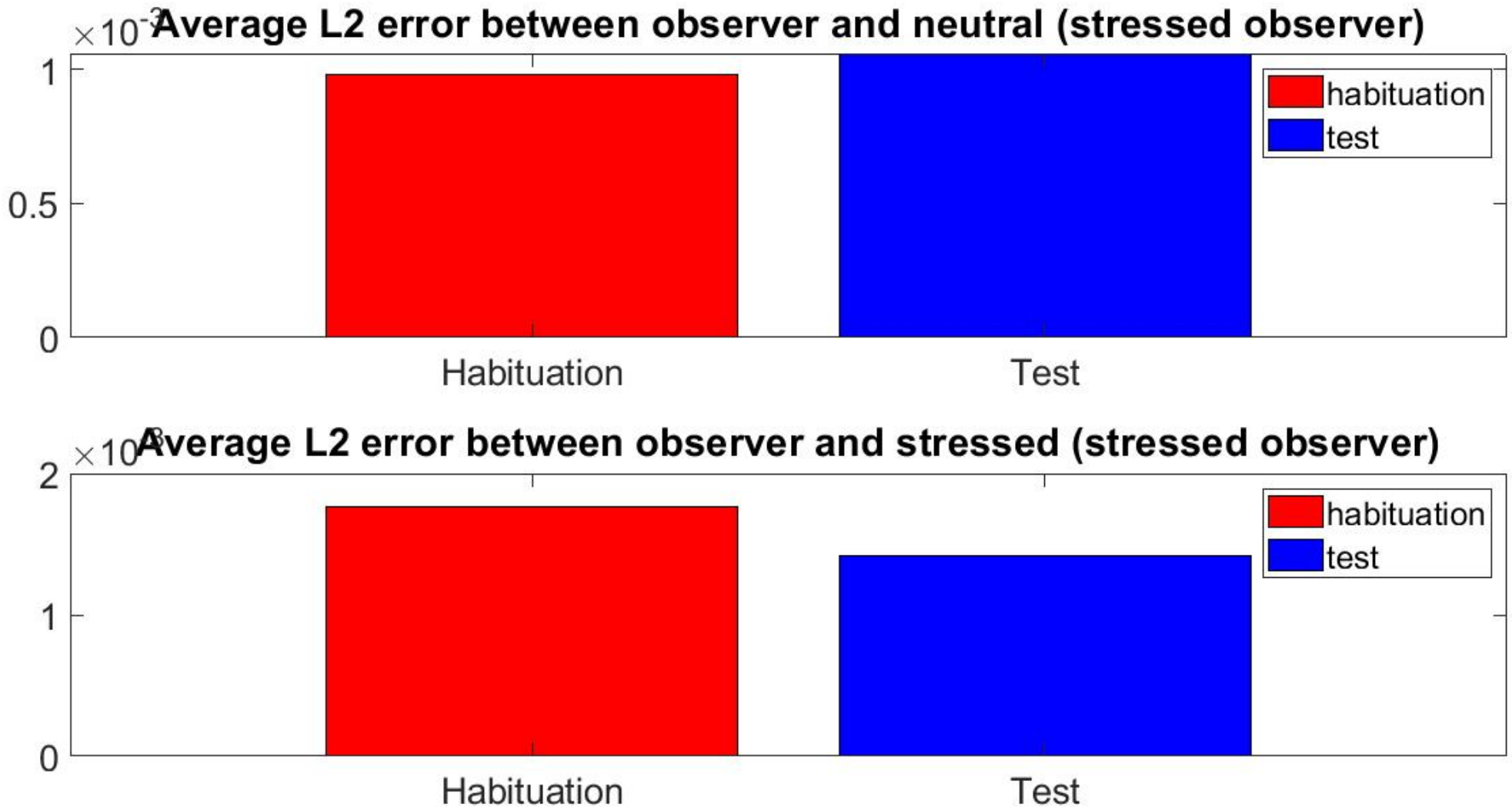
L^2 errors between observer and neutral



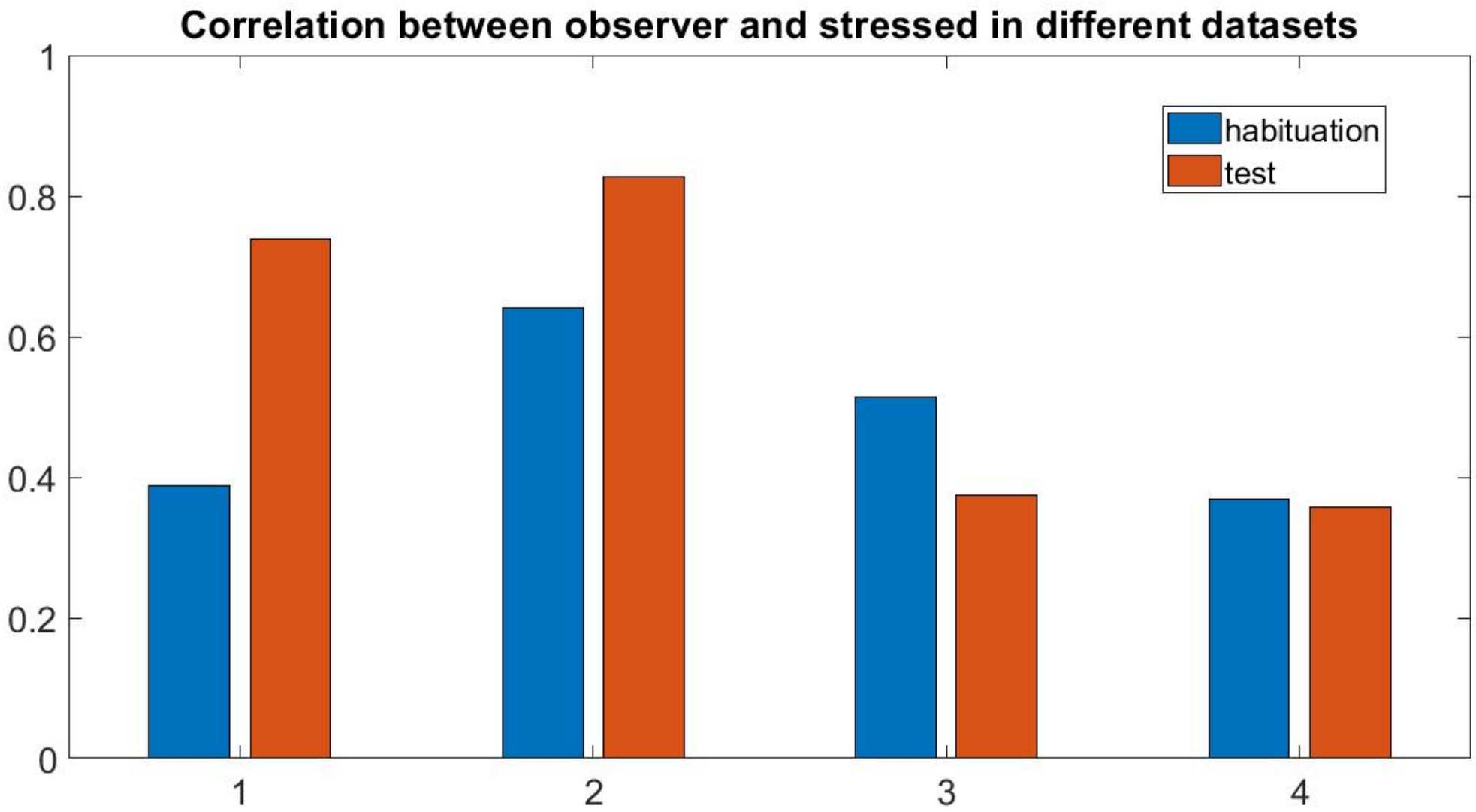
Average L^2 errors with neutral observer



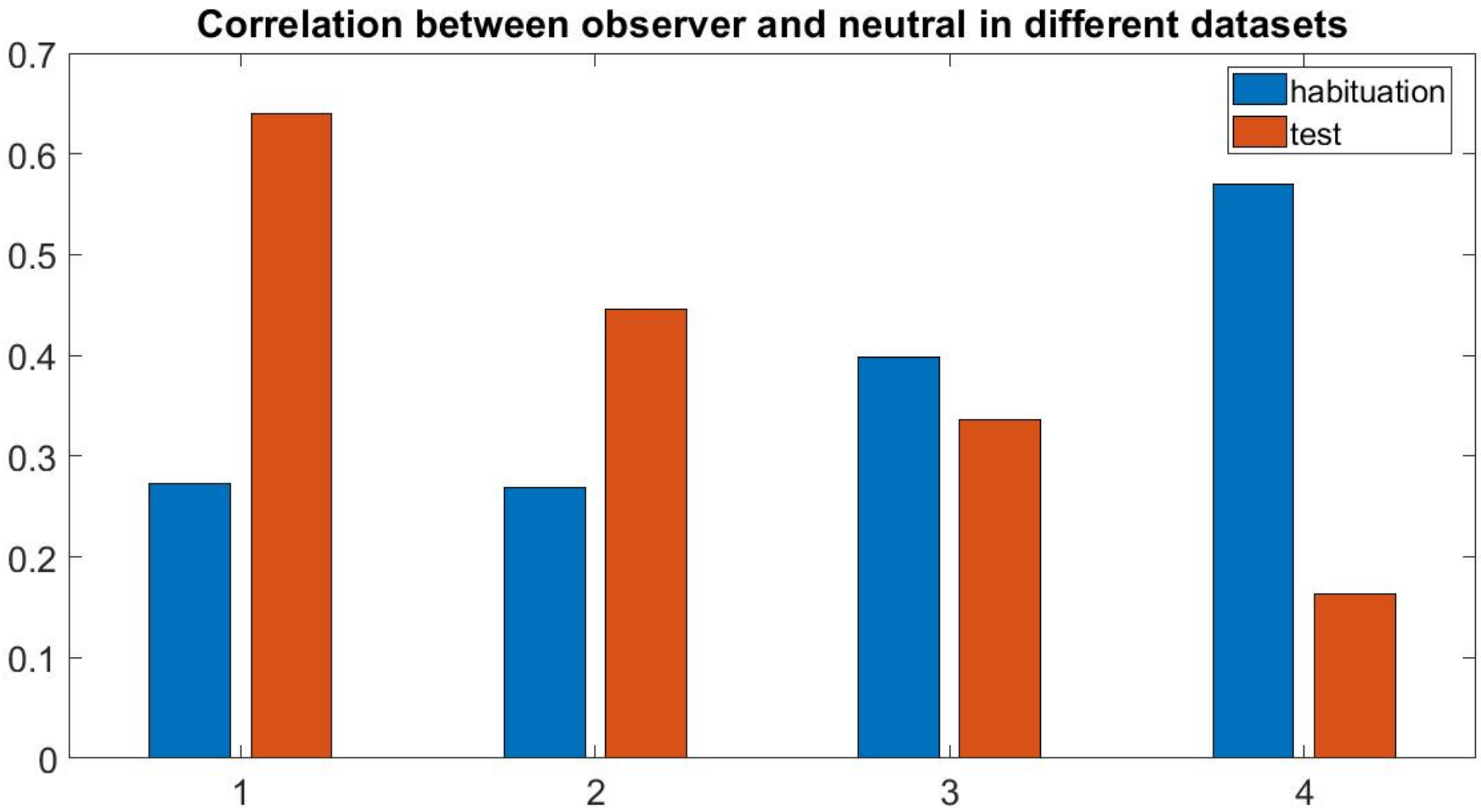
Average L^2 errors with stressed observer



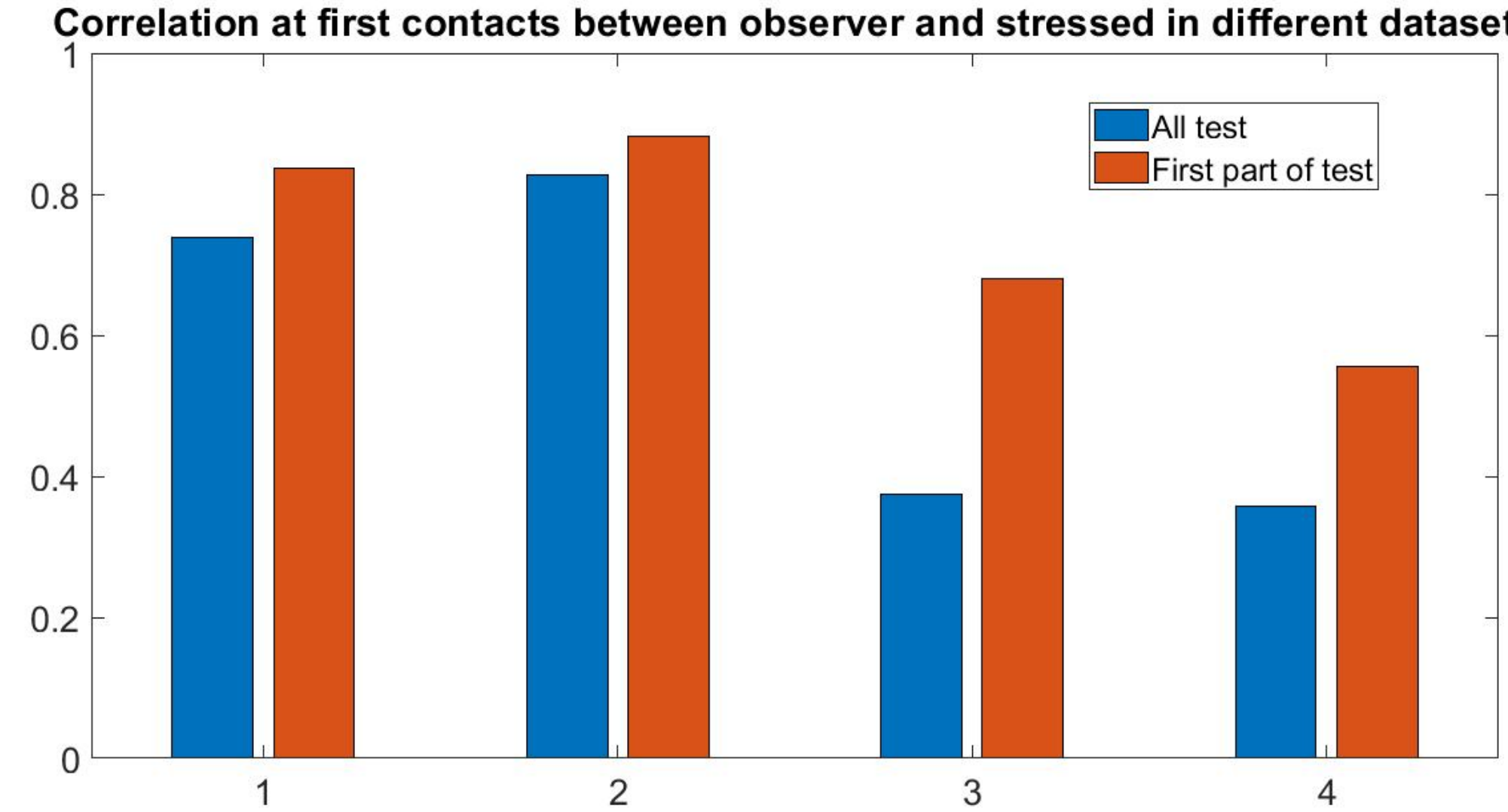
Correlations between observer and stressed



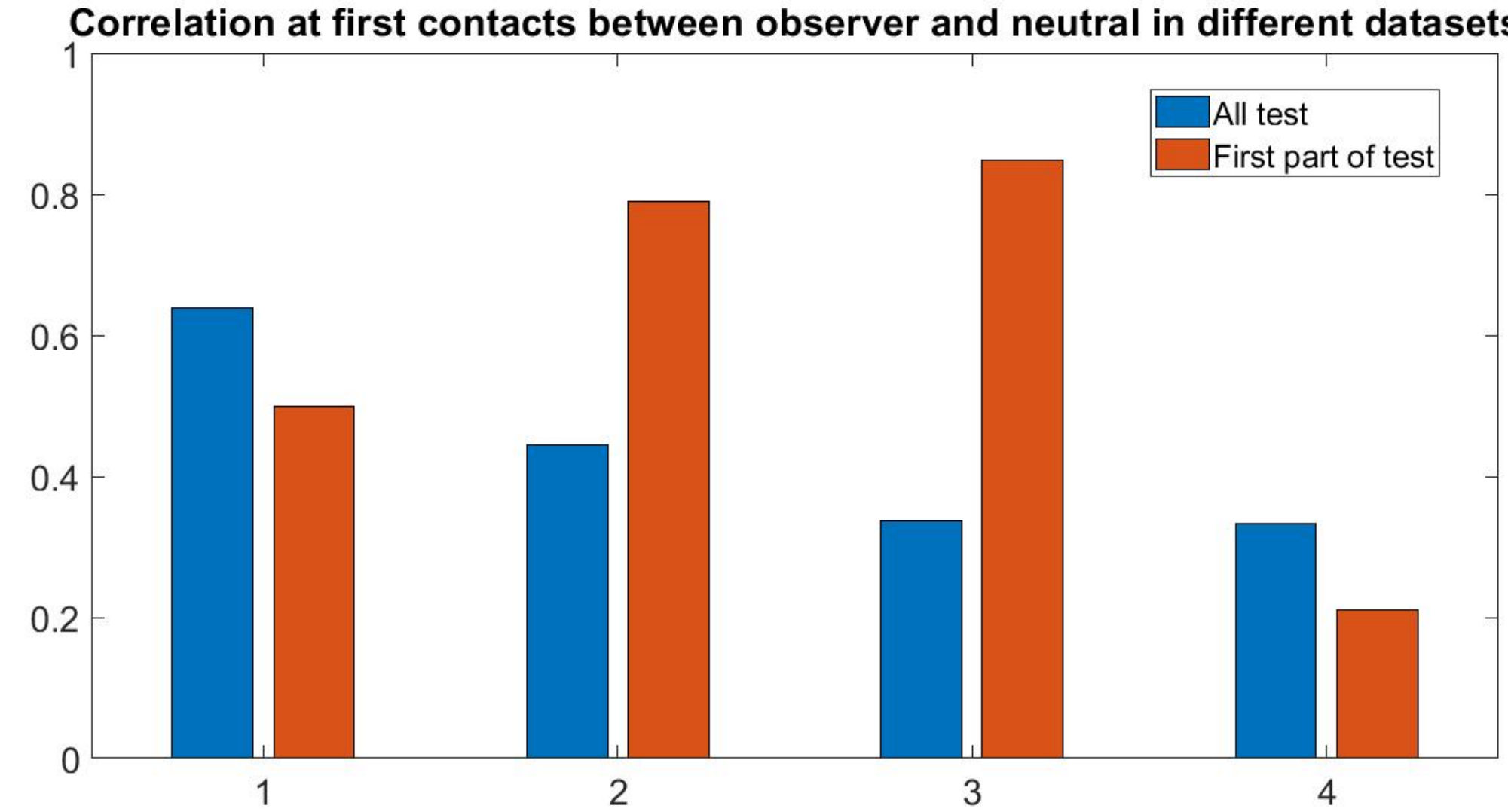
Correlations between observer and neutral



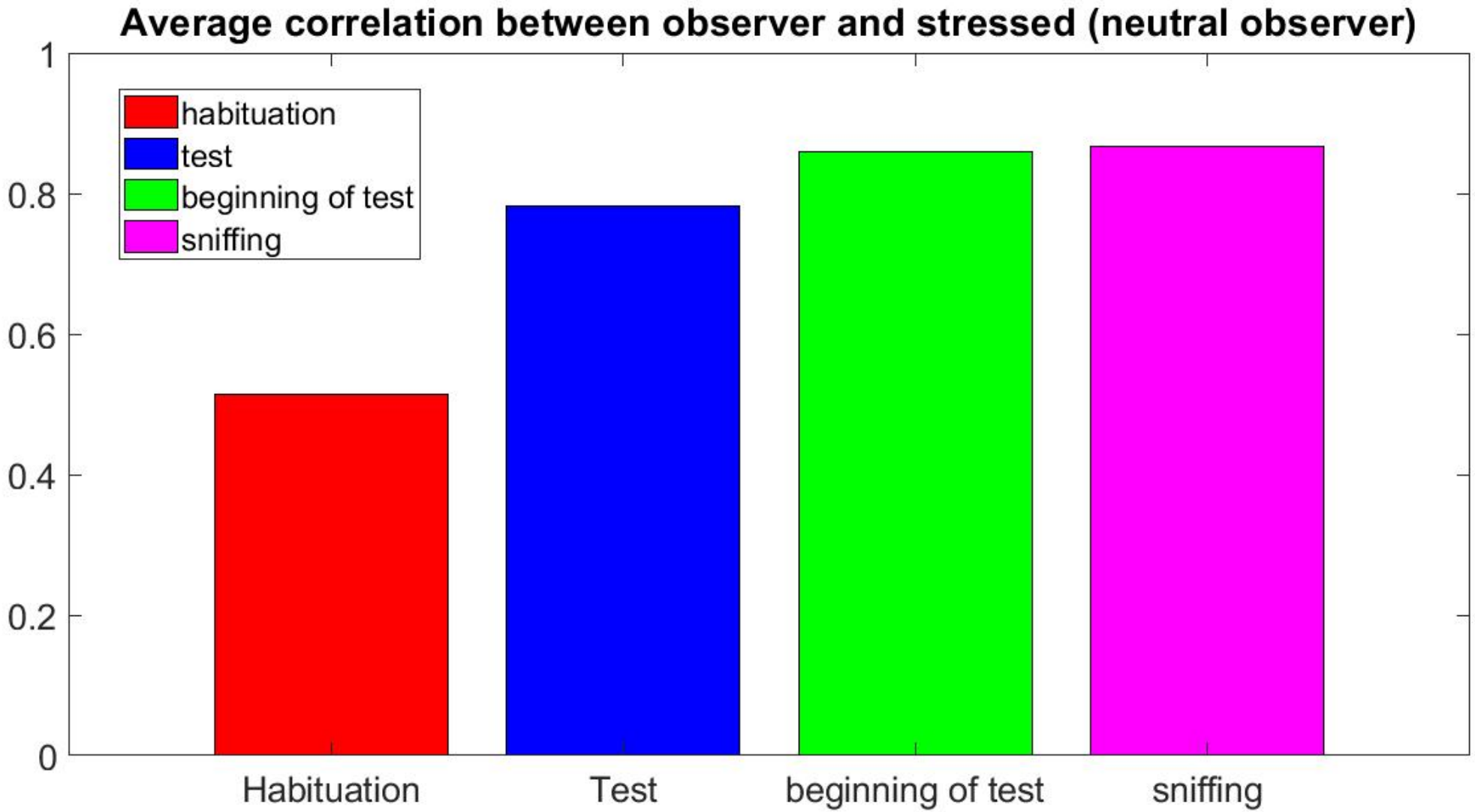
Correlations between observer and stressed during first interactions



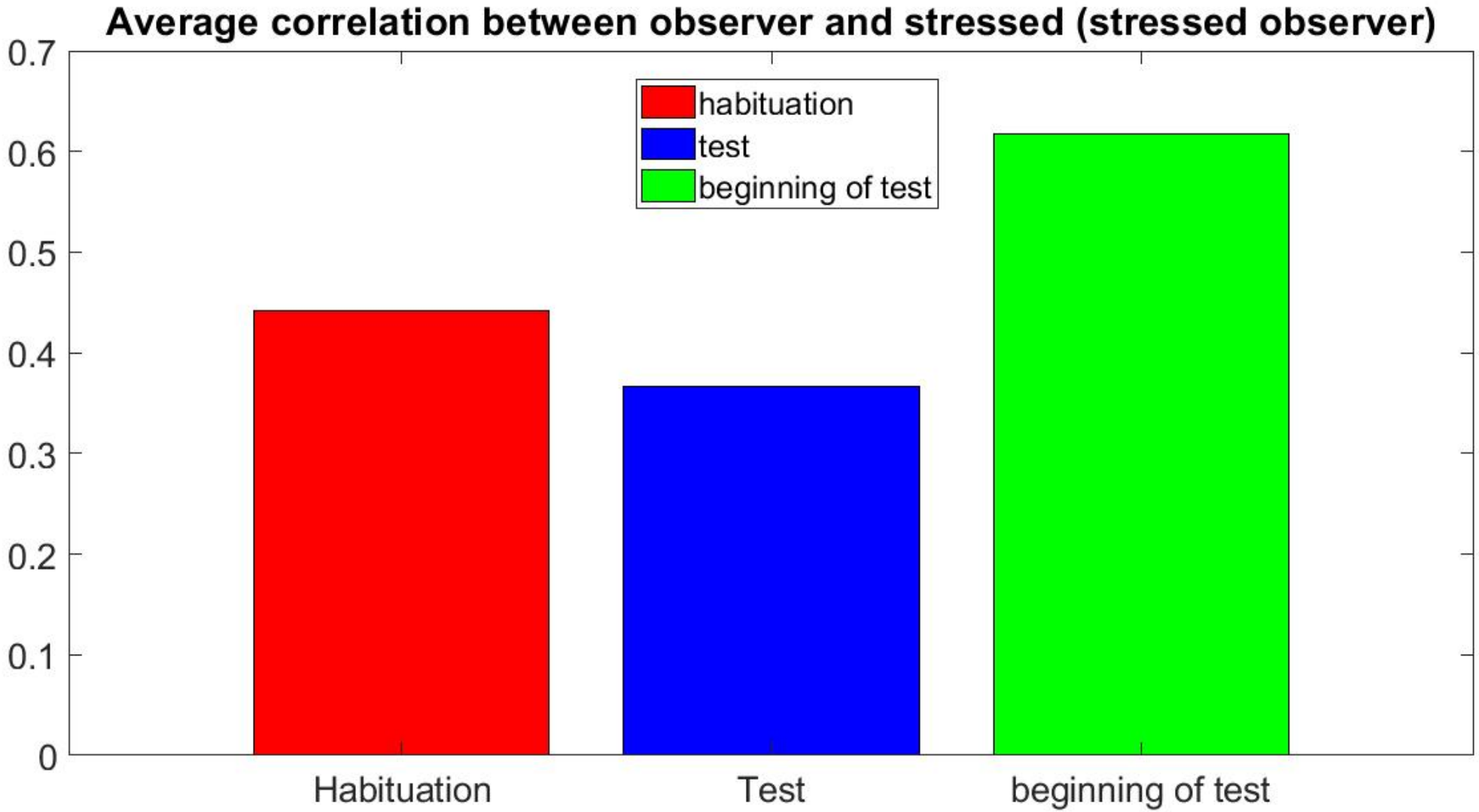
Correlations between observer and neutral during first interactions



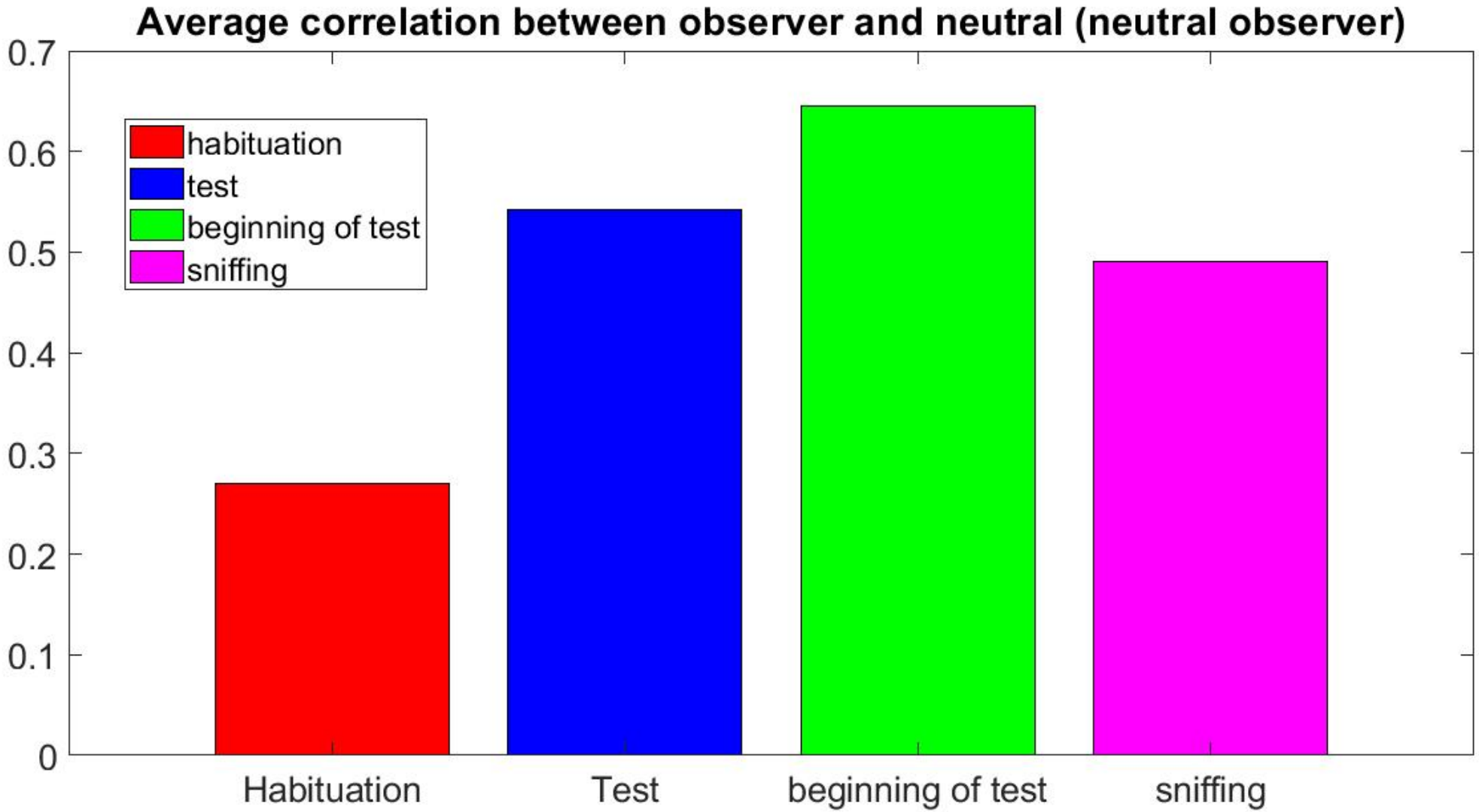
Average correlation between observer and stressed with neutral observer



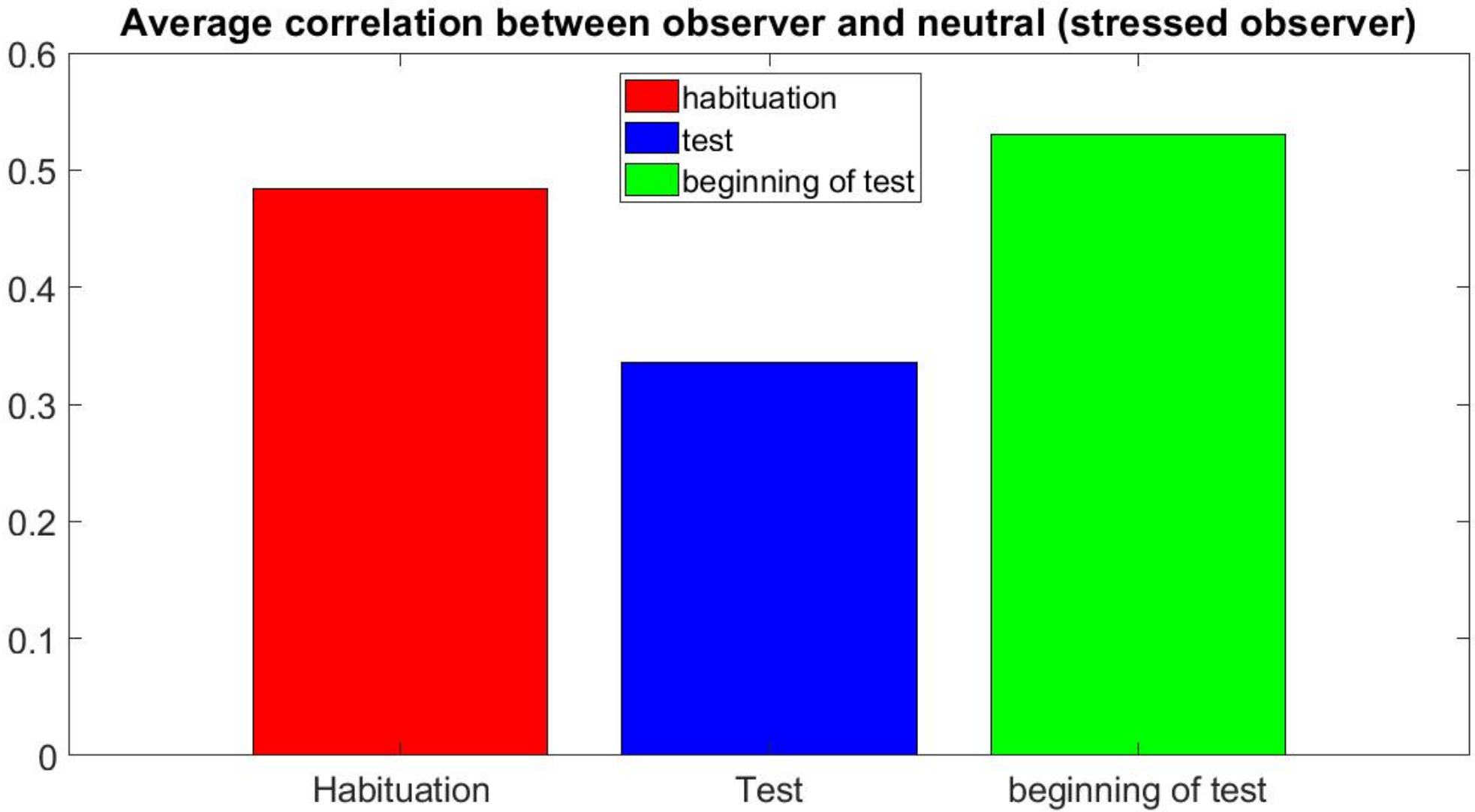
Average correlation between observer and stressed with stressed observer



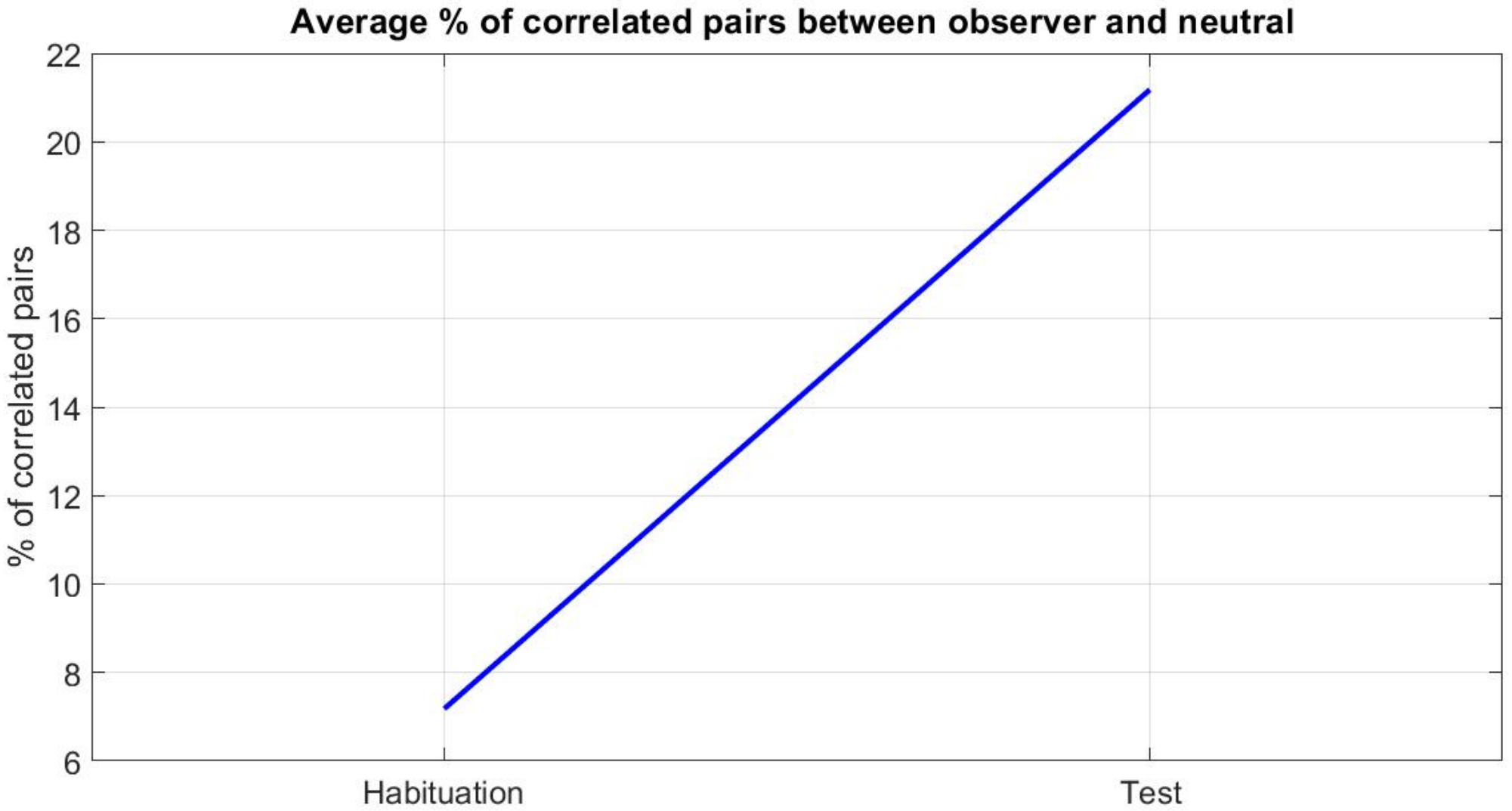
Average correlation between observer and neutral with neutral observer



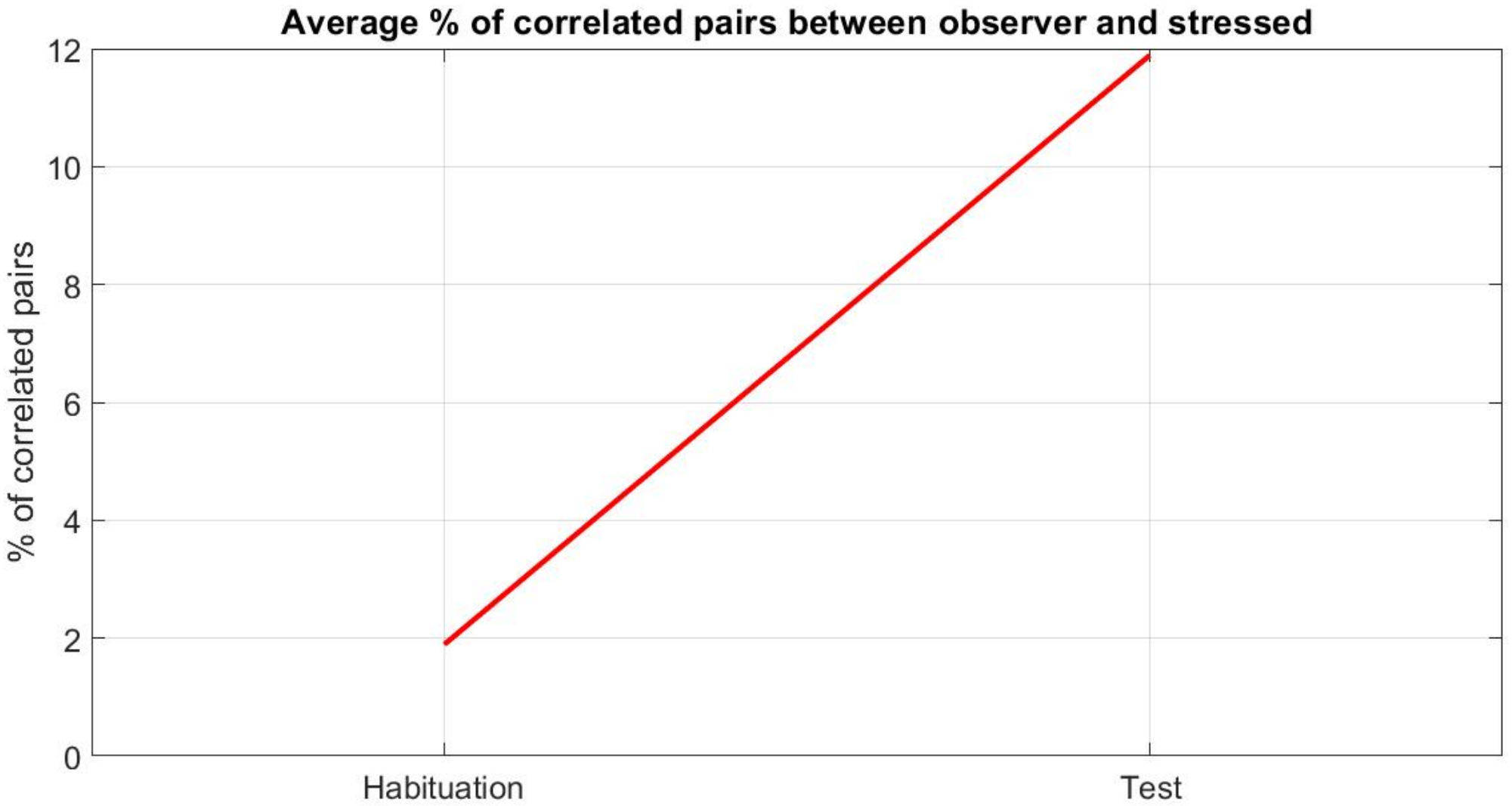
Average correlation between observer and neutral with stressed observer



Average correlation between pairs for observer and neutral



Average correlation between pairs for observer and stressed



Overall conclusions

- The average considerations on all data show an higher cross correlation recorded during the test phase than during the habituation, for both pairs observer/stressed and observer/neutral, with higher value in the first
- Such correlation is even higher if we restrict the analysis at the first part of the interactions
- Regarding the reciprocal sniffing activity between mice, for the pair observer/stressed we have the highest correlation recorded
- L^2 and infinity errors between the recorded activities are in average smaller during the test for the pair observer/stressed
- The percentage of correlated neurons for both pairs of mice is higher in the test