# Transcranial alternating current stimulation affects motion adaptation in V1 and MT neurons in awake, behaving macaques

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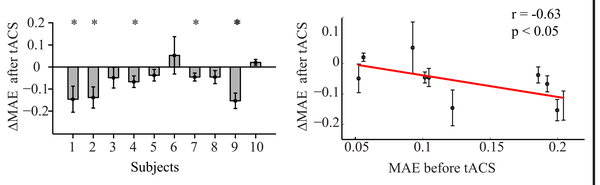
## Introduction

**Previous Observation:**

tACS reduces motion aftereffect (MAE) in human subjects.



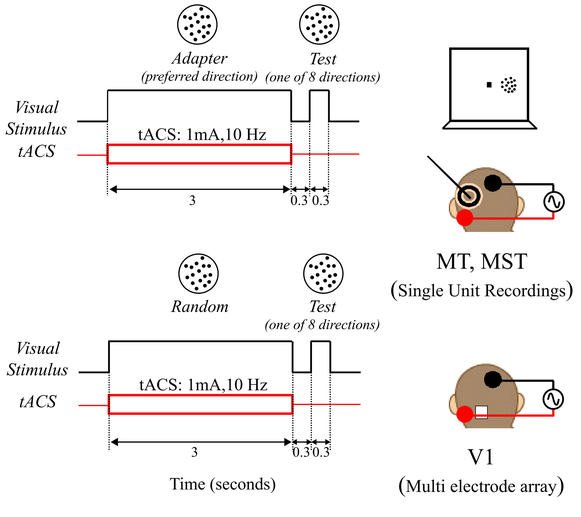

**Current Hypothesis:**

Subthreshold rhythmic membrane voltage modulations produced by tACS reduce adaptation in motion selective neurons.

**Current Approach:**

To explicitly test this hypothesis, we recorded from neurons in area MT (n=69; 55+14) and V1 (n = 66; 35+31) in awake, behaving macaques while applying tACS.

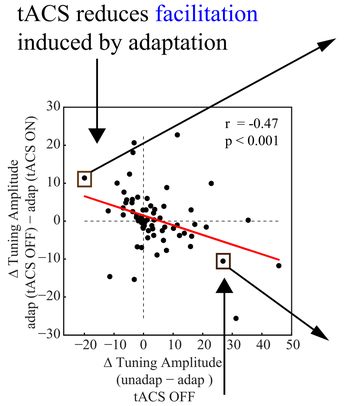
## Electrophysiology Design

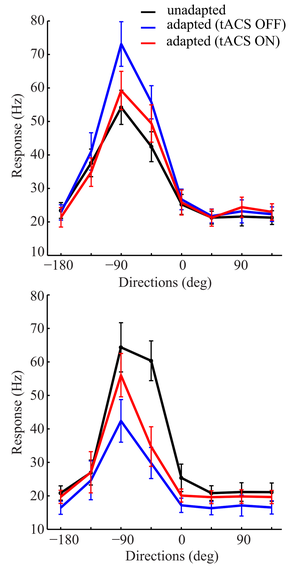



## Effect on MT cells

### Tuning Amplitude (TA)

tACS reduces facilitation induced by adaptation

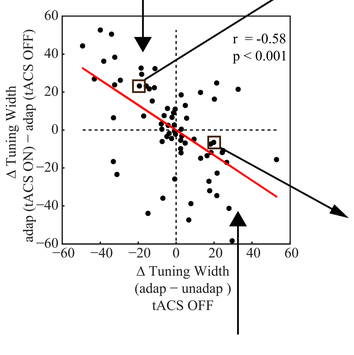


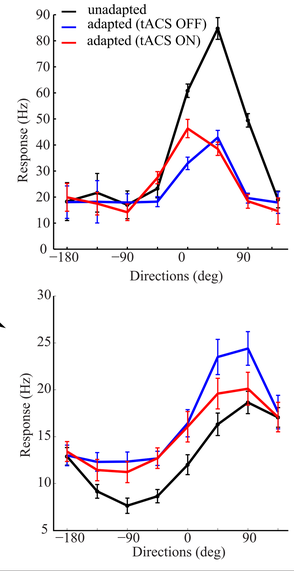




tACS reduces suppression induced by adaptation

### Tuning Width (TW)

tACS reduces sharpening induced by adaptation

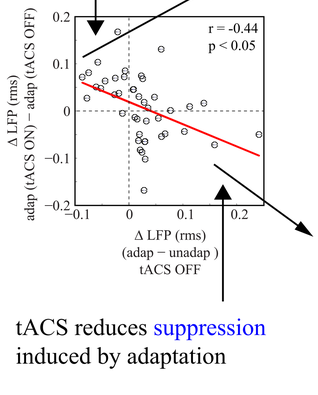


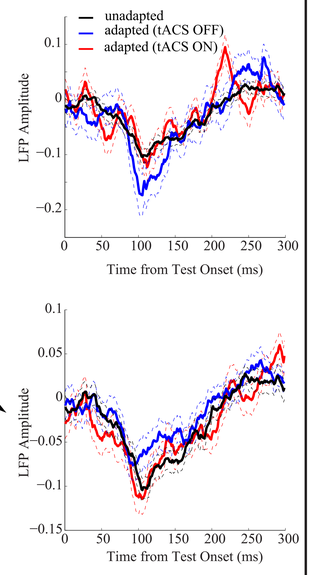




tACS reduces broadening induced by adaptation

## Evoked LFPs in MT

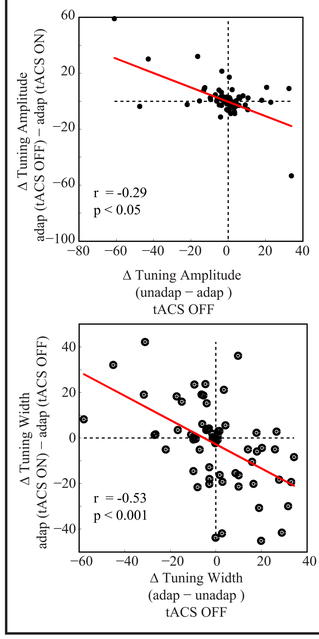
tACS reduces facilitation induced by adaptation




tACS reduces suppression induced by adaptation

## Effect on V1 cells



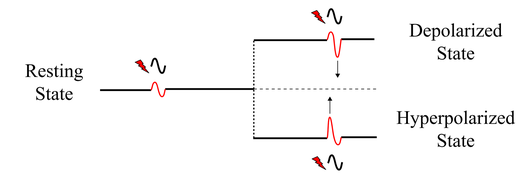

### Tuning Amplitude

TA changes in V1 are similar to MT.

### Tuning Width

TW changes in V1 are similar to MT.

## Proposed Mechanisms




The alternating current asymmetrically drives the membrane towards its resting potential.

## Take-Home Messages

### Human Psychophysics

tACS mitigates the effects of motion adaptation measured behaviorally[1].

### Macaque Electrophysiology

tACS mitigates changes in tuning amplitude and width in motion adapted MT and V1 neurons.

## References

1. Kar et al., Journal of Vision (2012). VSS Abstracts

2. Van Wezel et al., J Neurophysiology (2002).

3. Fernandez et al., J Neuroscience (2011).

## Acknowledgements

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