

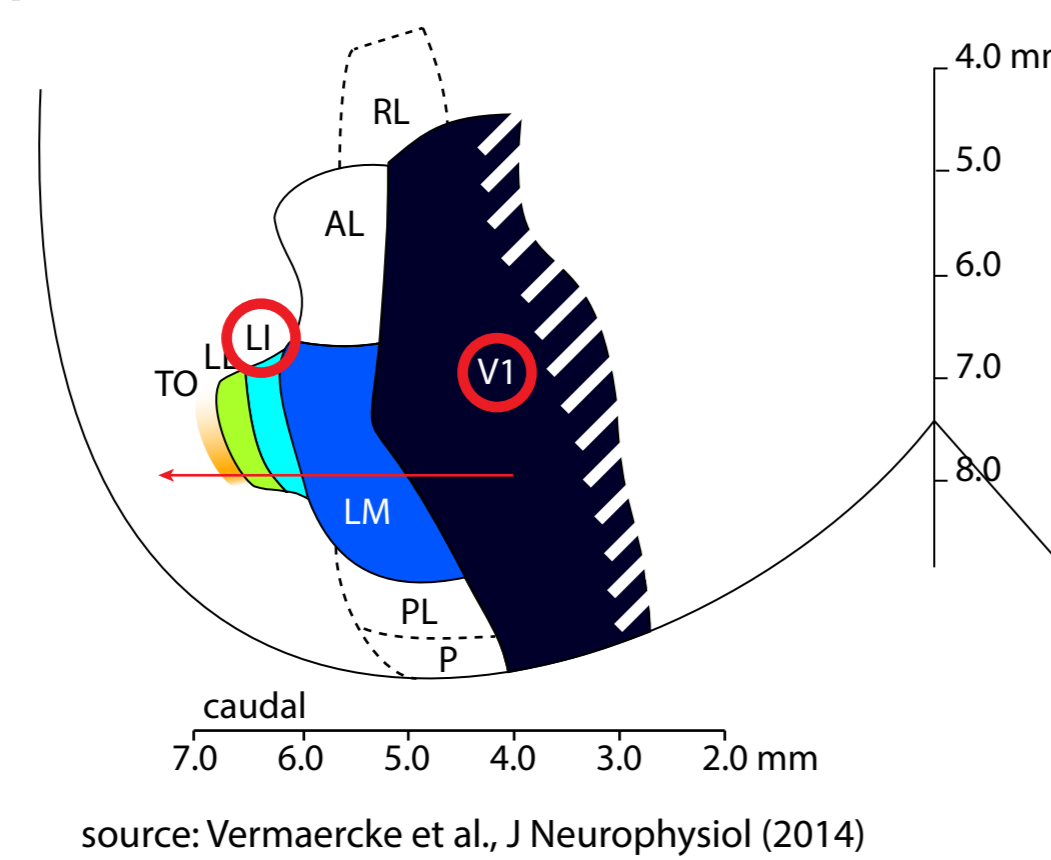
## Introduction

- **Oddball paradigm:** two stimuli are presented with different probability (*deviant* = low probability; *standard* = high probability).
- Used to elicit a **mismatch negativity** (MMN): a stronger response to deviant compared to standard.
- **Stimulus-specific adaptation** (SSA) underlies this effect in (monkey) higher visual cortex [1].
- We used the oddball paradigm to investigate SSA and possible response enhancement in **rat V1** and **extrastriate area LI**.

## Methods

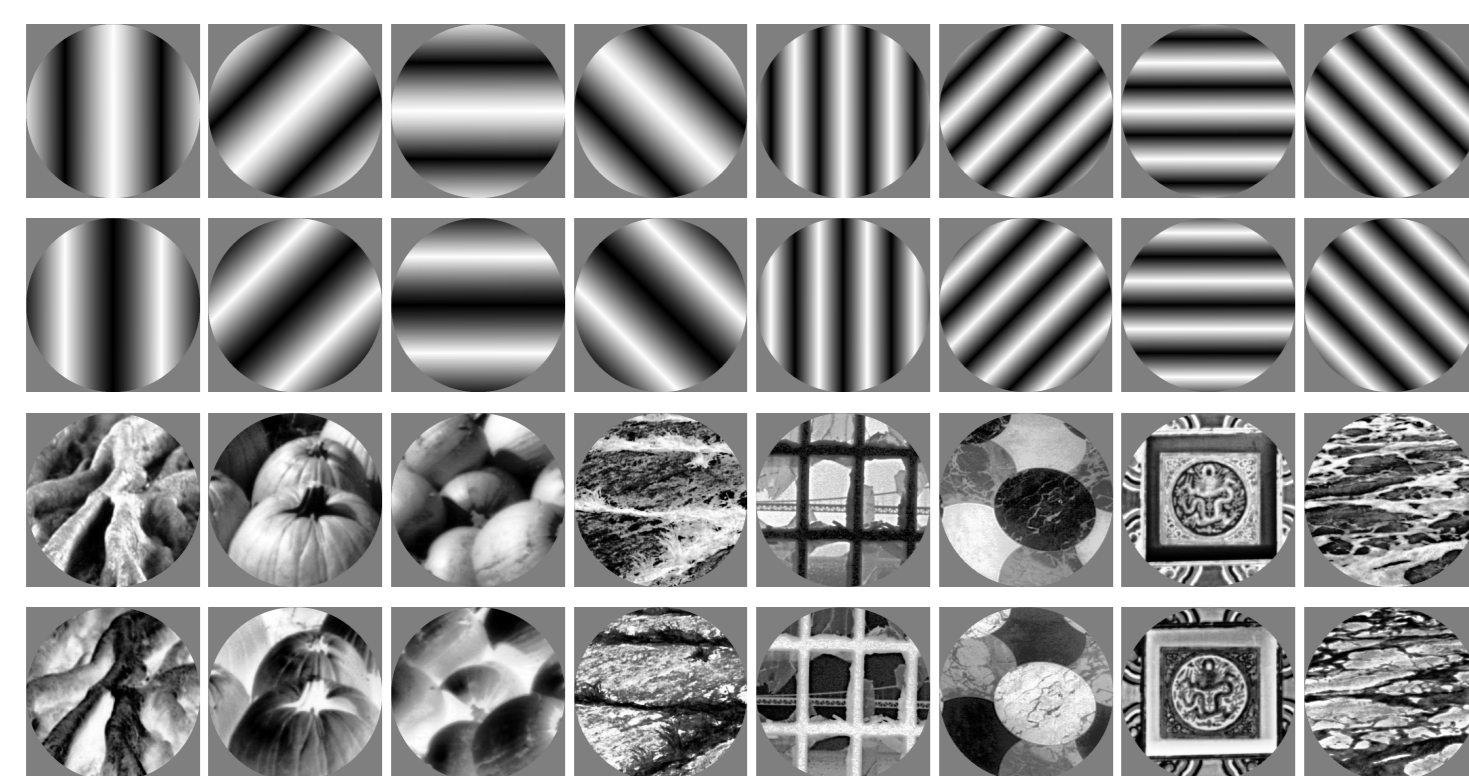
### Recordings

- Single unit (SU) and multi-unit (MU) activity in awake rats.
- Experiment 1:  
**V1** (71 SU, 56 MU, 2 rats),  
**LI** (56 SU, 48 MU, 2 rats).
- Experiment 2:  
**LI** (22 MU, 1 rat)



### Stimuli & experiment

- Rats were awake but passively viewing stimuli

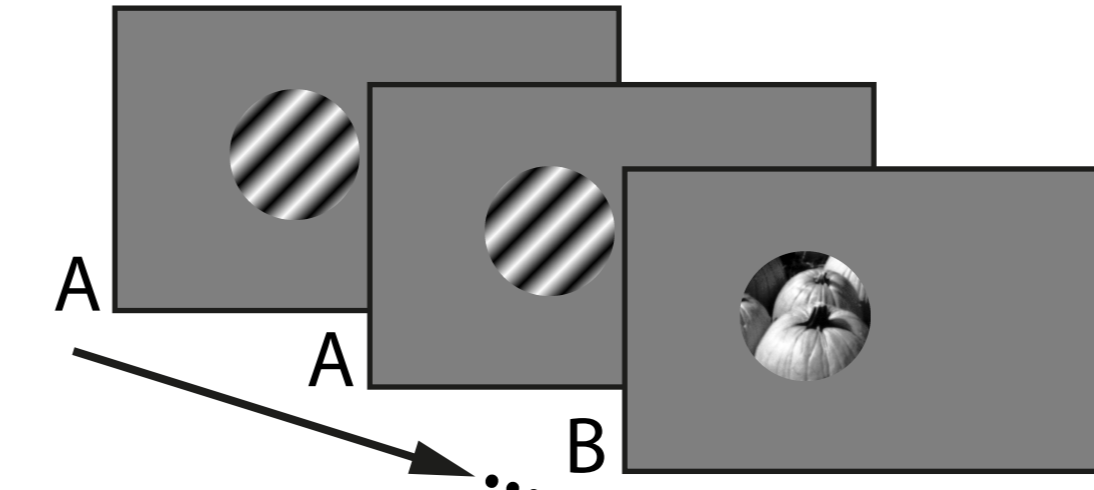


source textures: <http://vismod.media.mit.edu/pub/VisTex/>

- **Oddball block:**
  - 2 stimuli (say A and B)
  - 100 presentations
  - **90% A and 10% B** (e.g. AAA B AAAAAA B A...)
- **Equiprobable block** (reference):
  - 10 stimuli (A, B, and 8 randomly selected stimuli)
  - 100 presentations
  - **10% each** (e.g. C A B DDFH A GC B E...)

## Experiment 1

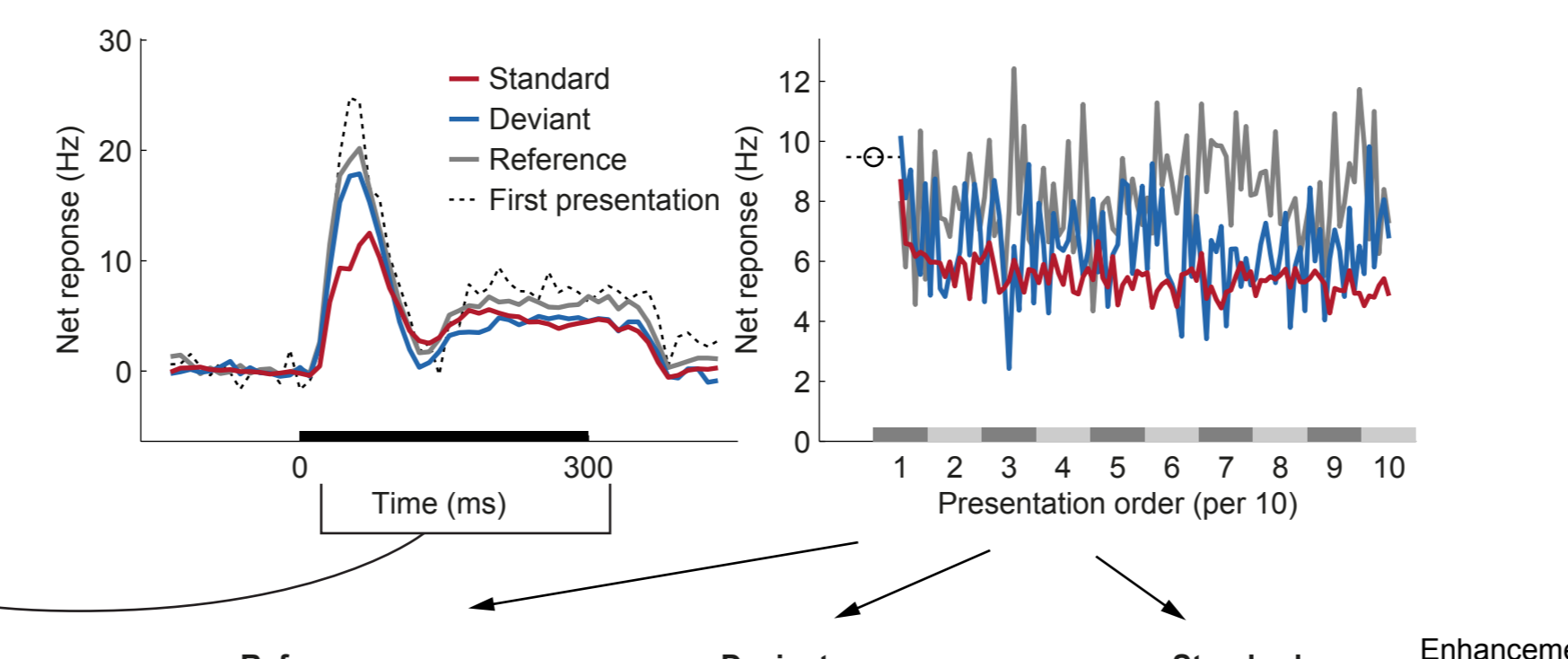
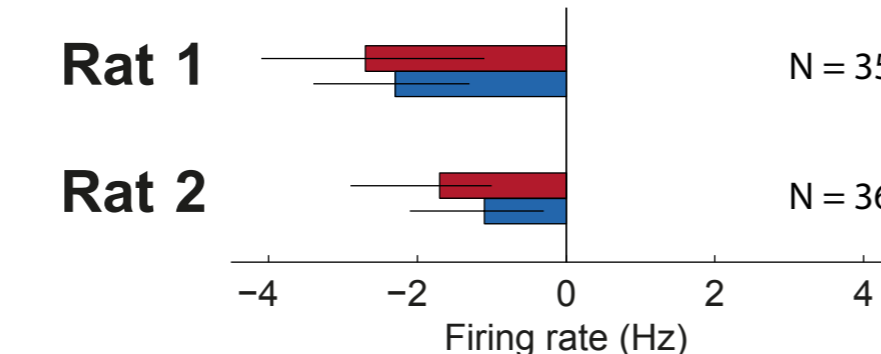
- 2 different stimuli (+ 8 for equiprobable blocks)
- Presented at same location



### V1

#### Single Units (71)

- Adaptation of both **standard** and **deviant** (errorbars = 95% CI)

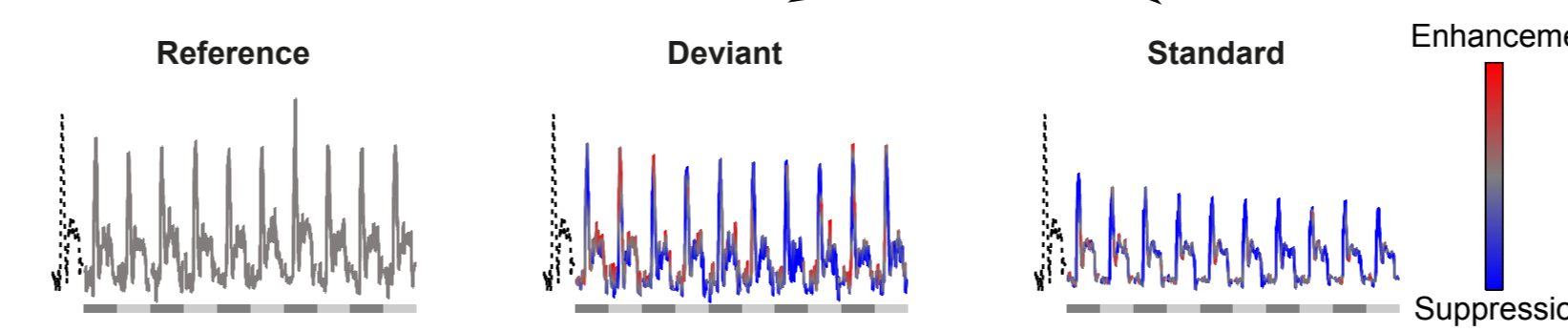


Not clearly stimulus specific:

- Rat 1: -4 Hz (95% CI [-1.6 .7], p = .496)
- Rat 2: -6 Hz (95% CI [-1.2 .2], p = .115)

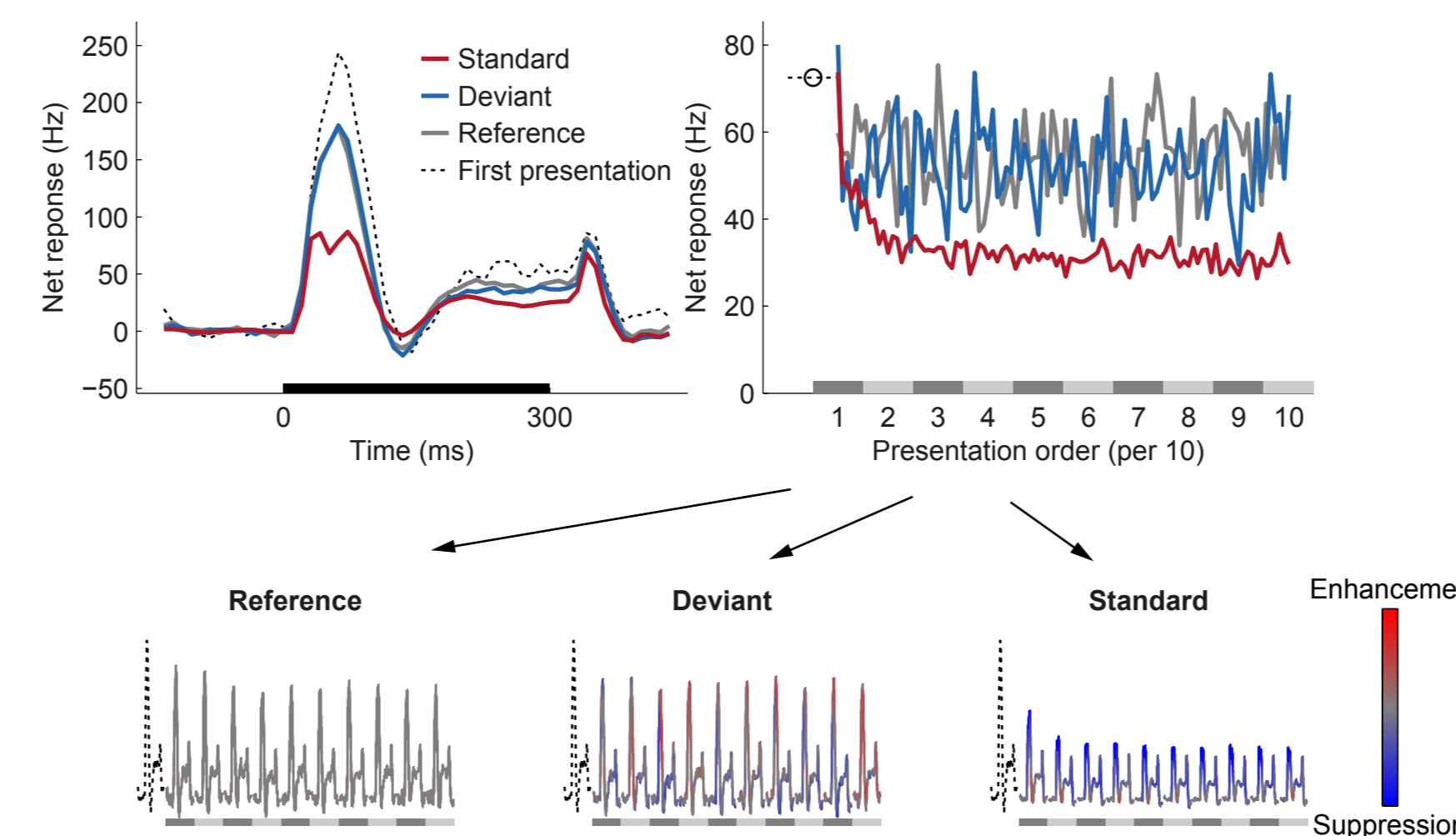
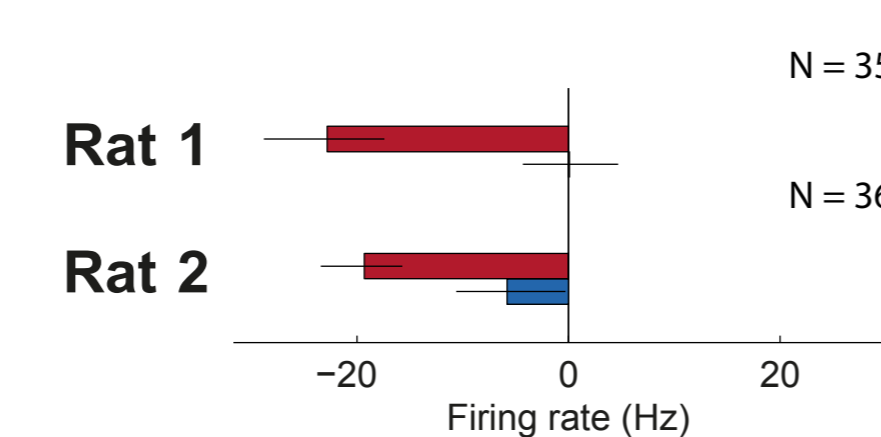
But clearly so for the first 100 ms of the response:

- Rat 1: -3.5 Hz (95% CI [-4.7 -2.4], p < .001)
- Rat 2: -3.2 Hz (95% CI [-4.9 -1.8], p < .001)



#### Multi Unit Sites (56)

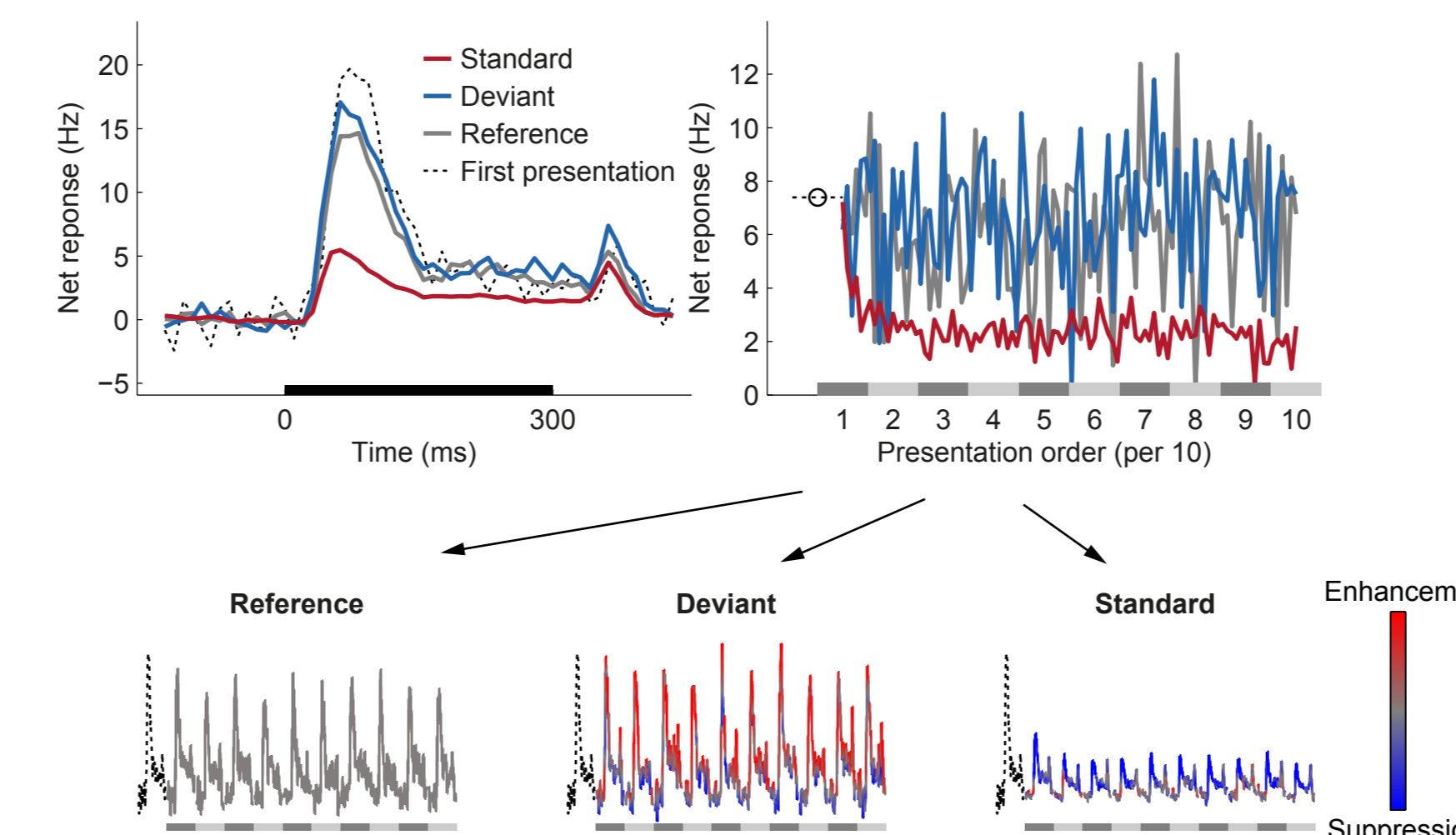
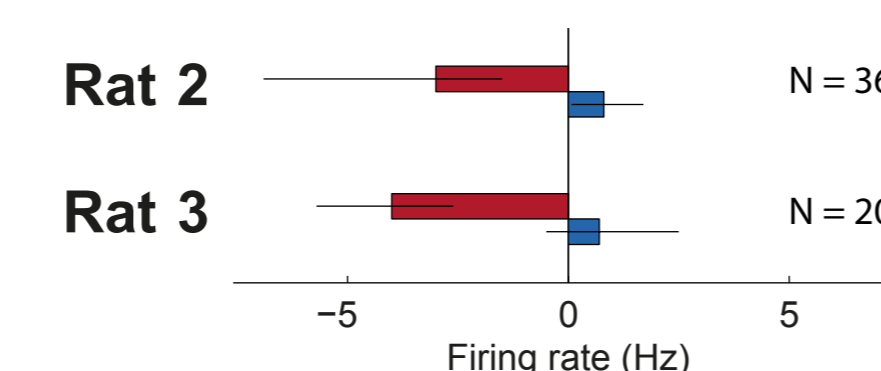
- Adaptation of **standard** and little to no effect on **deviant** (errorbars = 95% CI)



### LI

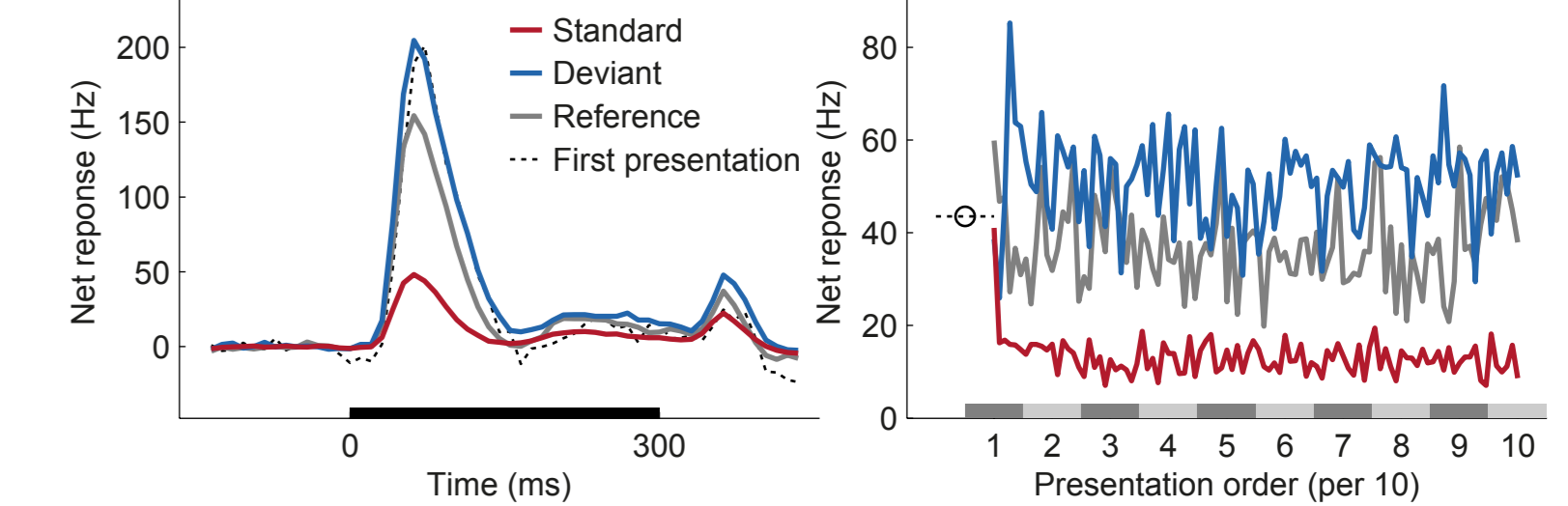
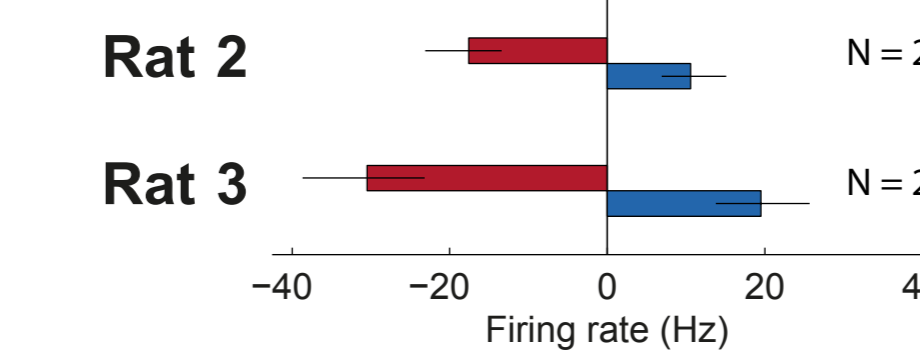
#### Single Units (56)

- Stimulus-specific adaptation of **standard** and insignificant enhancement of **deviant** (errorbars = 95% CI)

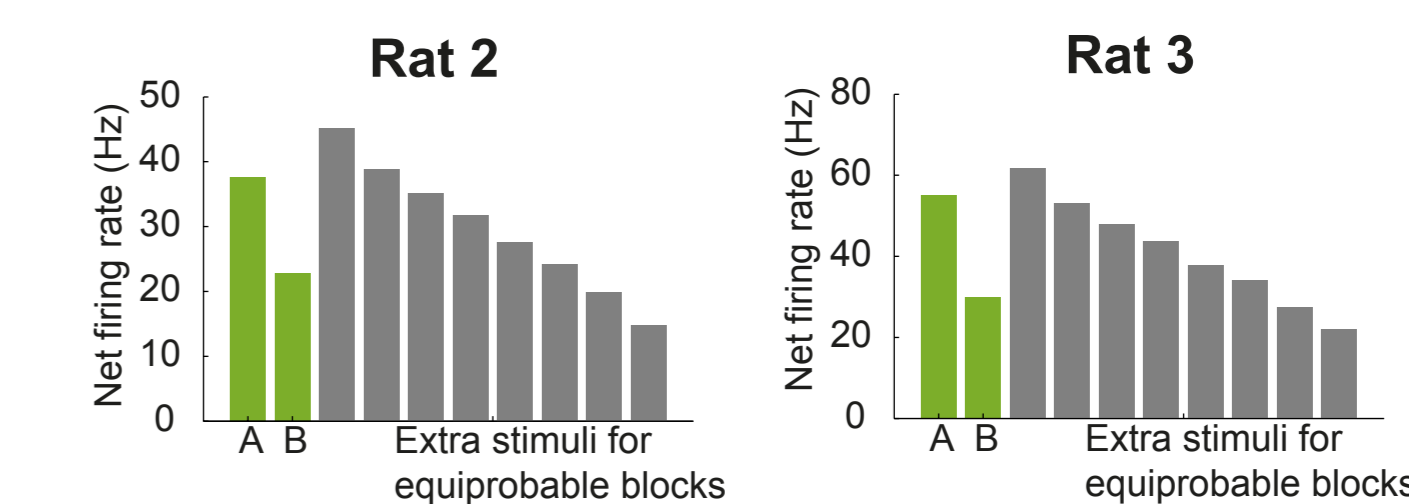


## Multi Unit Sites (48)

- Stimulus-specific adaptation of **standard** and "enhancement" of **deviant** (errorbars = 95% CI)

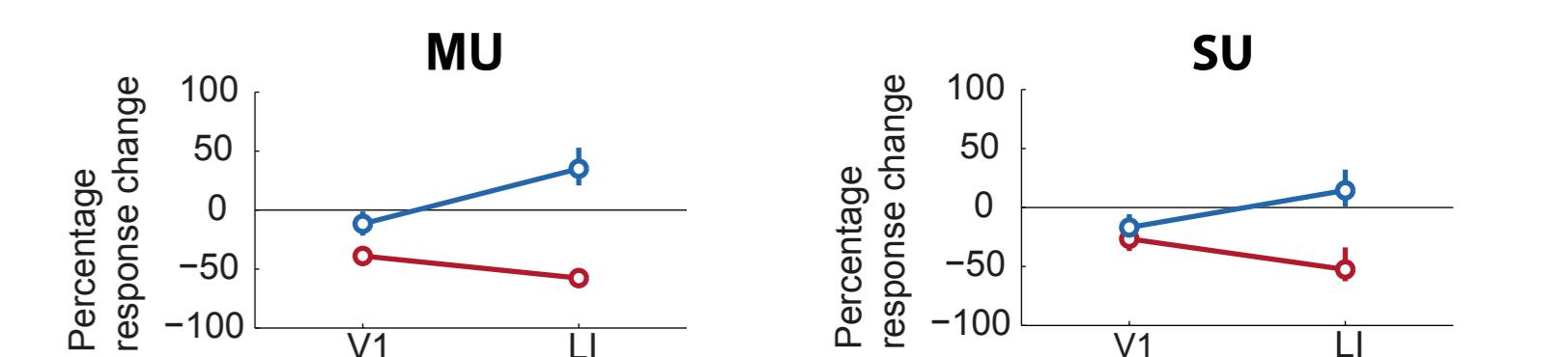


- Could cross-adaptation in the equiprobable reference condition underlie the apparent enhancement of the response to the deviant?



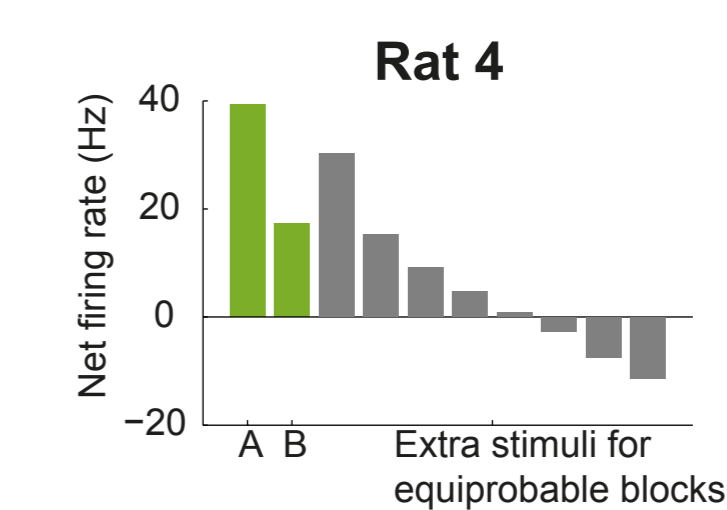
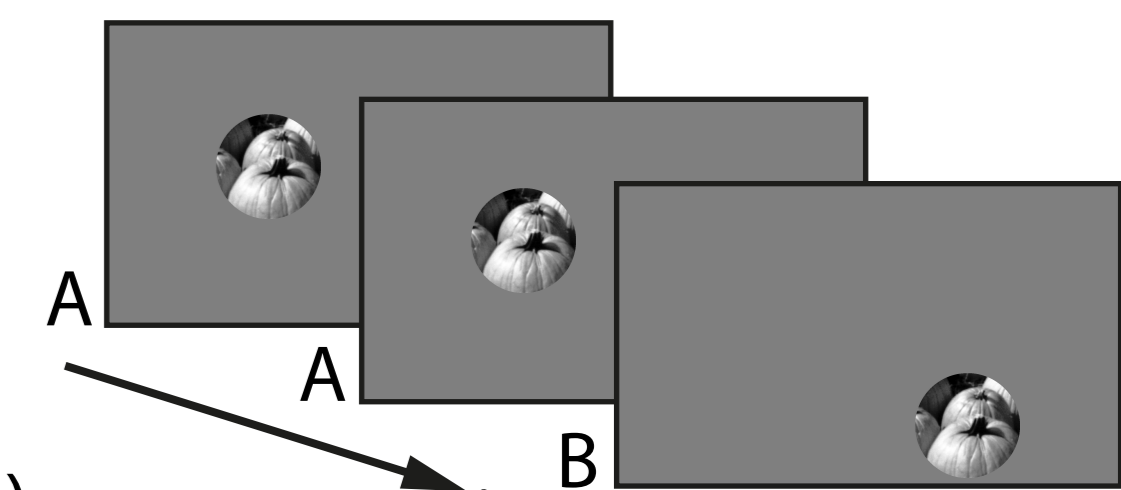
## V1 versus LI

- Stimulus specific adaptation is higher in LI compared to V1. Enhancement is only present in LI responses.



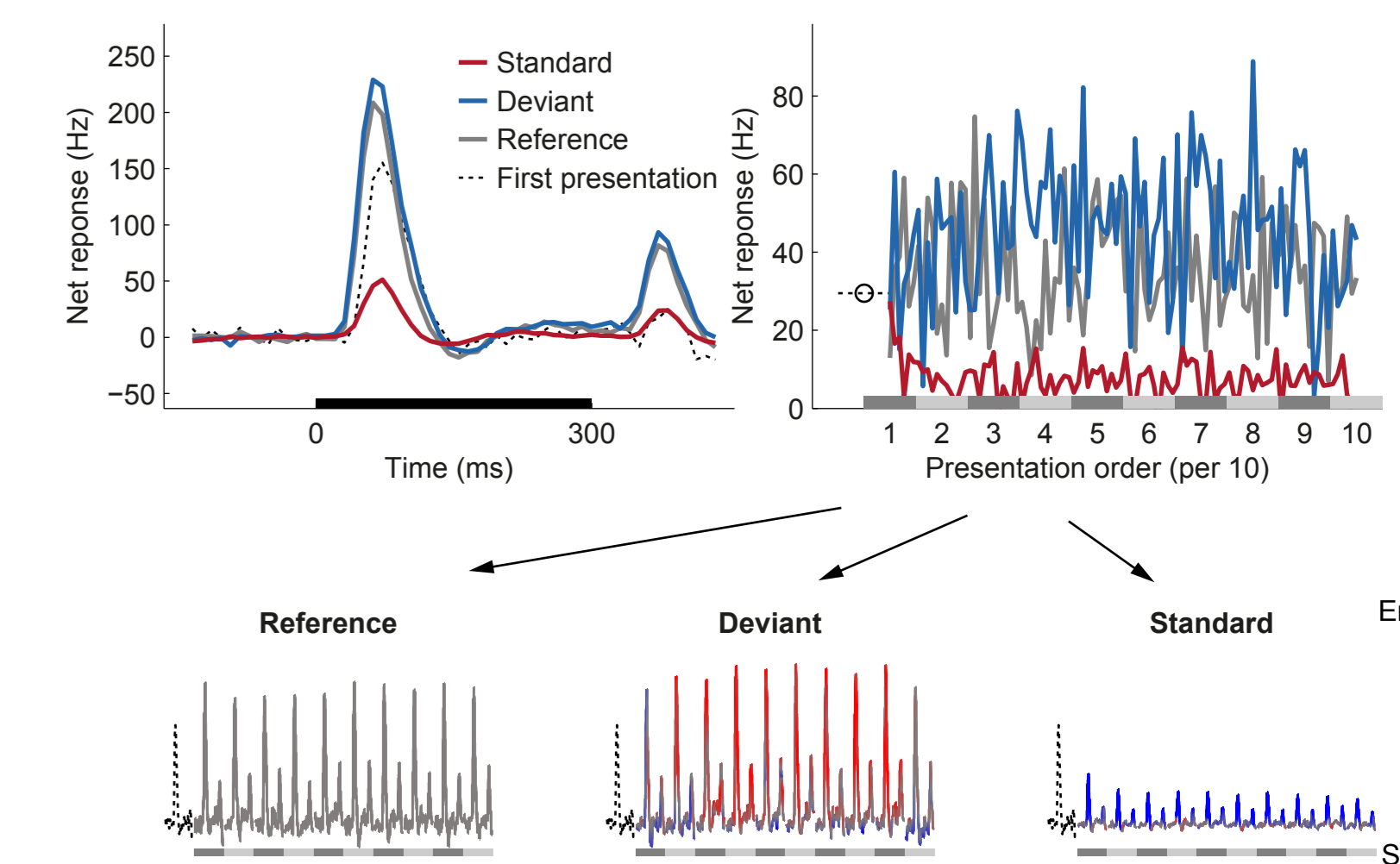
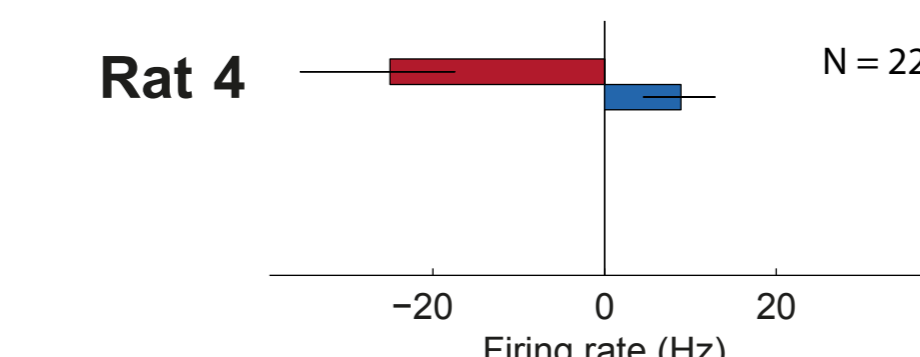
## Experiment 2

- 2 different **locations** (+ 8 for equiprobable blocks)
- Present same stimulus
- Sharper tuning for selected position(s) (A and/or B)



## Multi Unit Sites (22)

- Stimulus-specific adaptation of **standard** and "enhancement" of **deviant** (errorbars = 95% CI)



## Conclusions

- Stimulus-specific adaptation of the standard that is stronger in extrastriate area LI than in V1.
- Enhancement of the response to the deviant relative to an equiprobable condition that is nevertheless much smaller in magnitude than the SSA of the standard.
- This enhancement does not seem to be only the result of cross-adaptation in the reference condition.

[1] Kalitukhovich D a., Vogels R (2014) Neurons in Macaque Inferior Temporal Cortex Show No Surprise Response to Deviants in Visual Oddball Sequences. J Neurosci 34:12801-12815.