Decoding Feature-Independent Visual Working Memory Load from Human EEG

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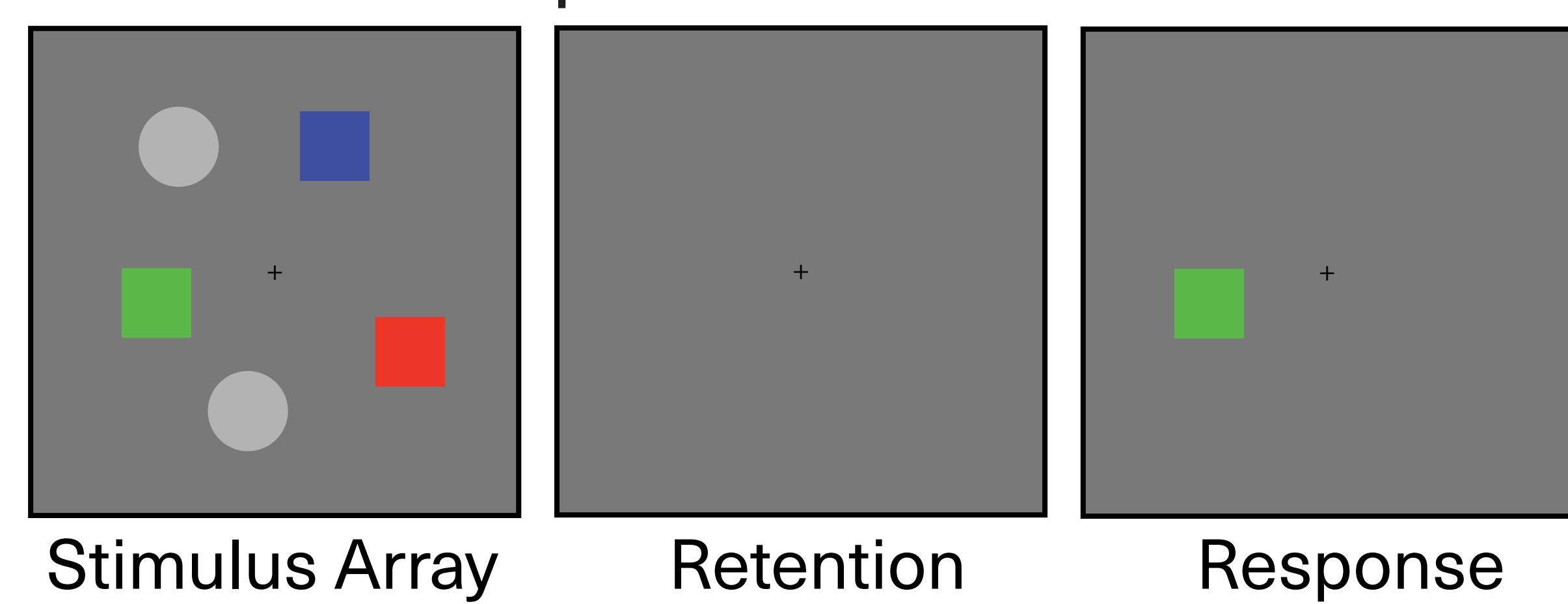
Introduction

Working memory load can be decoded from raw EEG on a single-trial basis (Adam et al, in prep)

If load decoding tracks the number of feature-independent pointers, it will generalize across feature values and feature loads
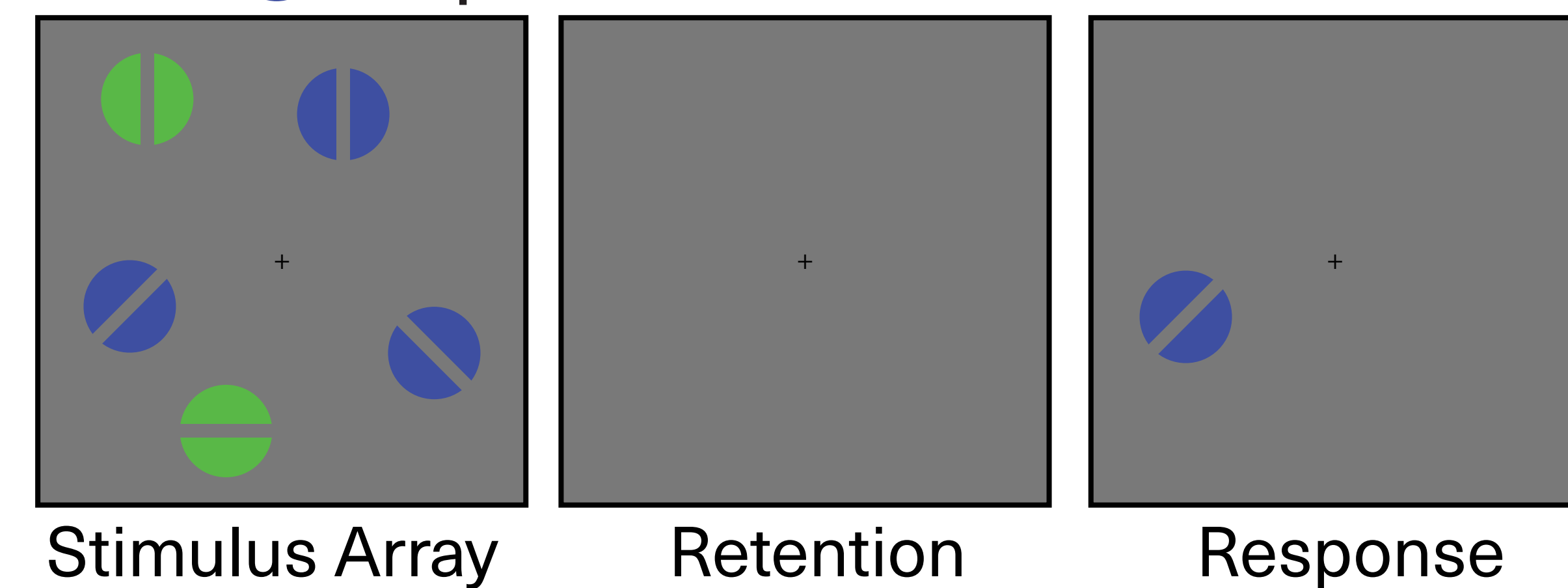
Task Design

Whole field change detection task with luminance- and area-balanced displays across set size and experiment
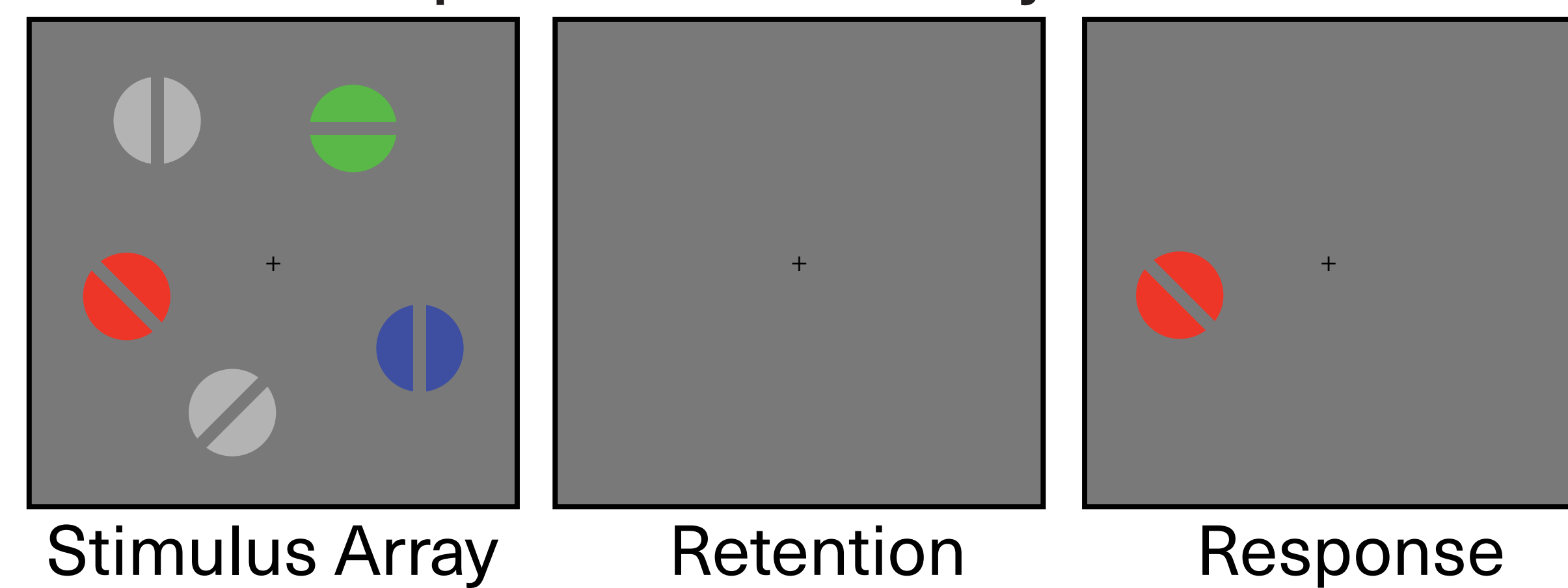
Experiment 1: Color   n = 30

Stimulus Array   Retention   Response

Block Cue

Experiment 2: Orientation   n = 31

Stimulus Array   Retention   Response

Experiment 3: Conjunction   n = 20

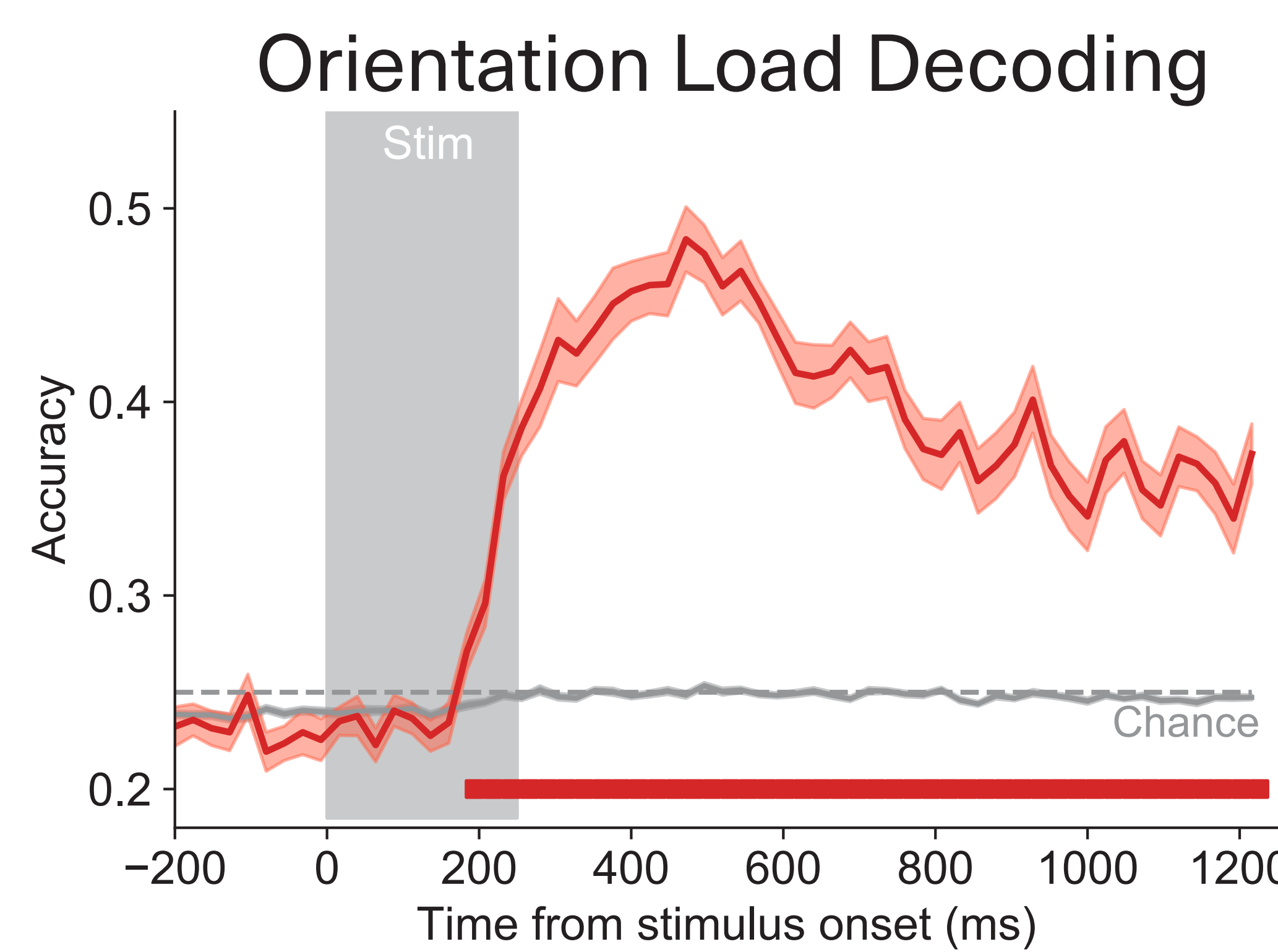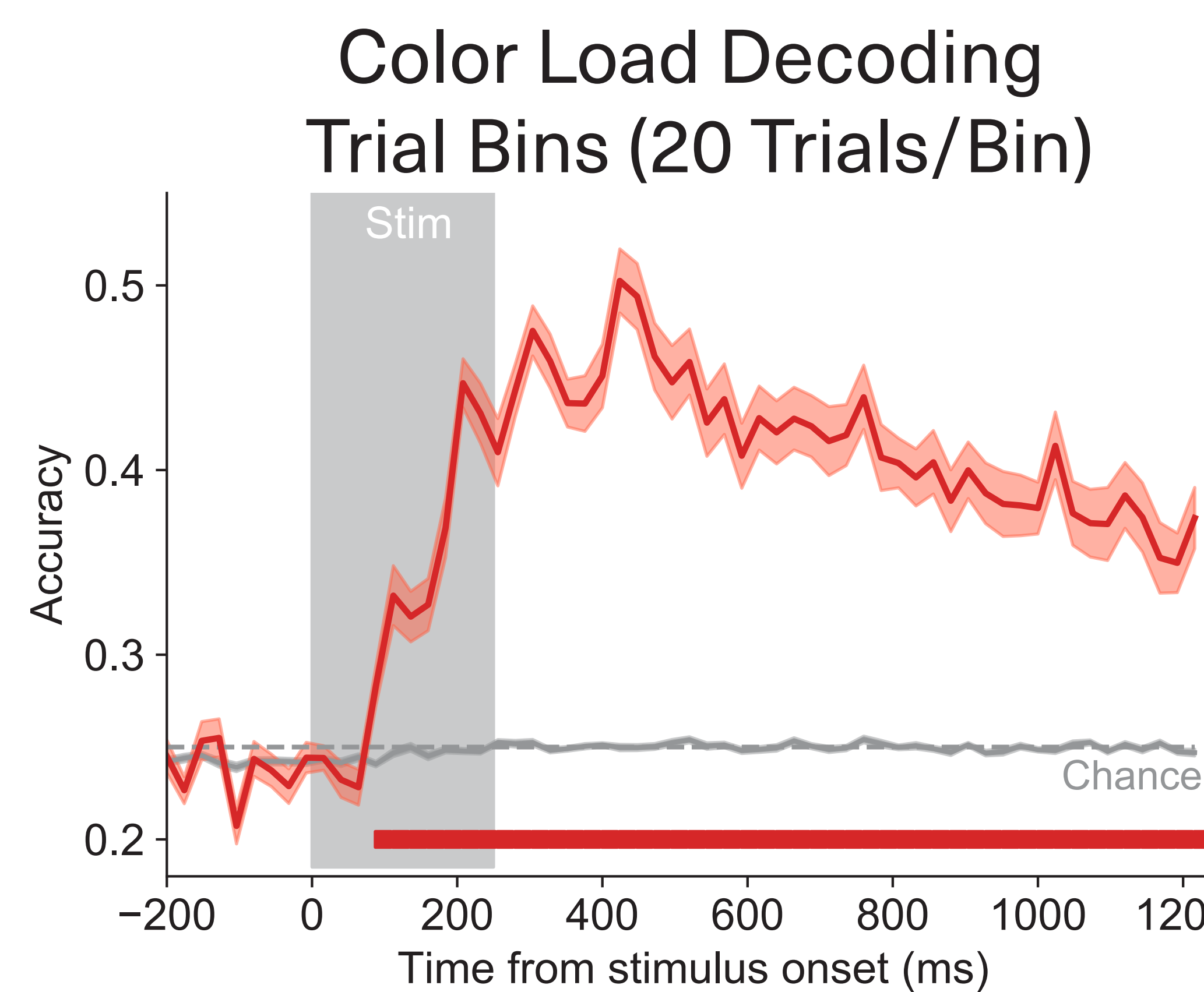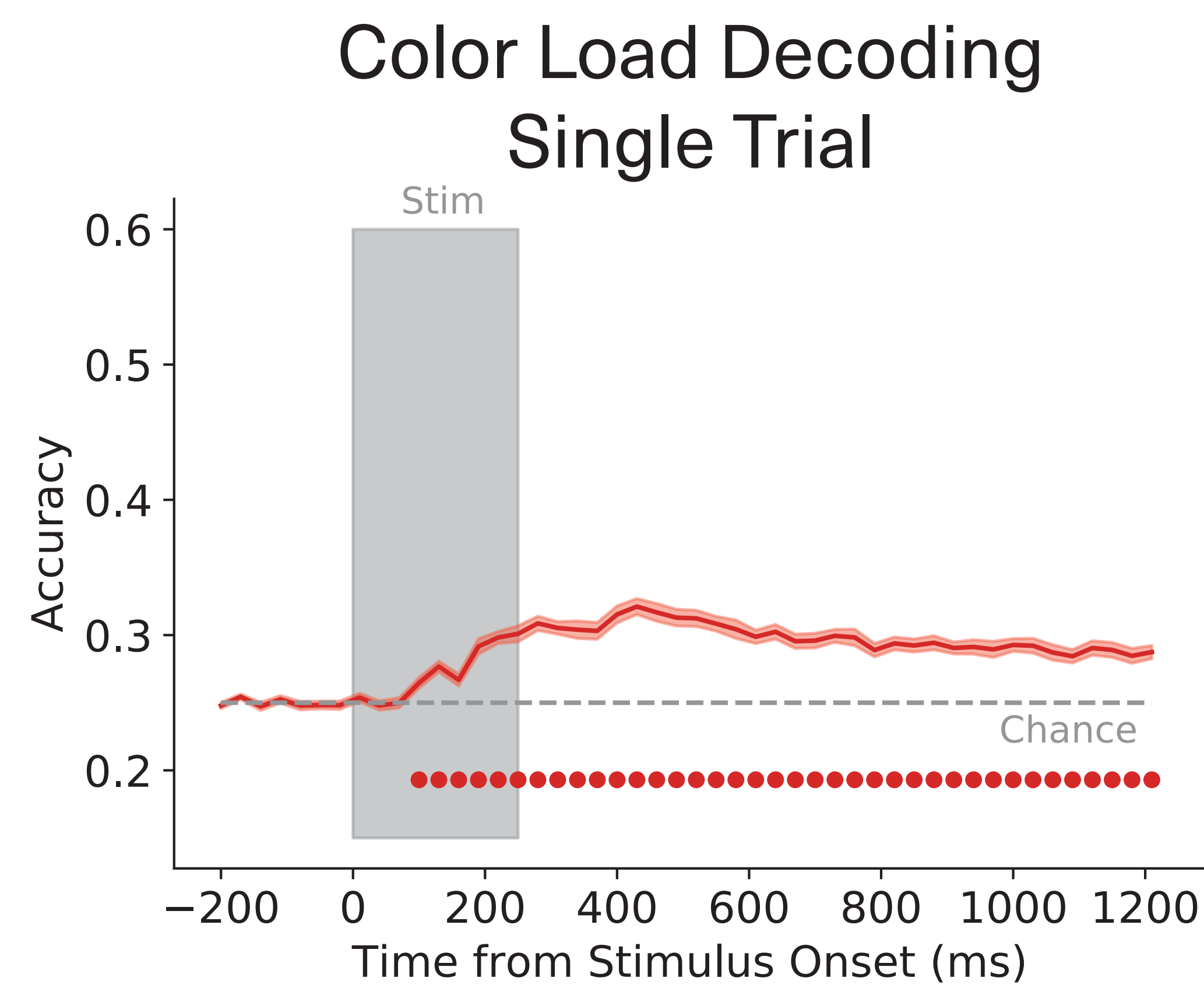Stimulus Array   Retention   Response

24 subjects completed both exp. 1 and 2. 20 subjects completed all three. Cross-training is within-subject.

Single Feature Load Decoding
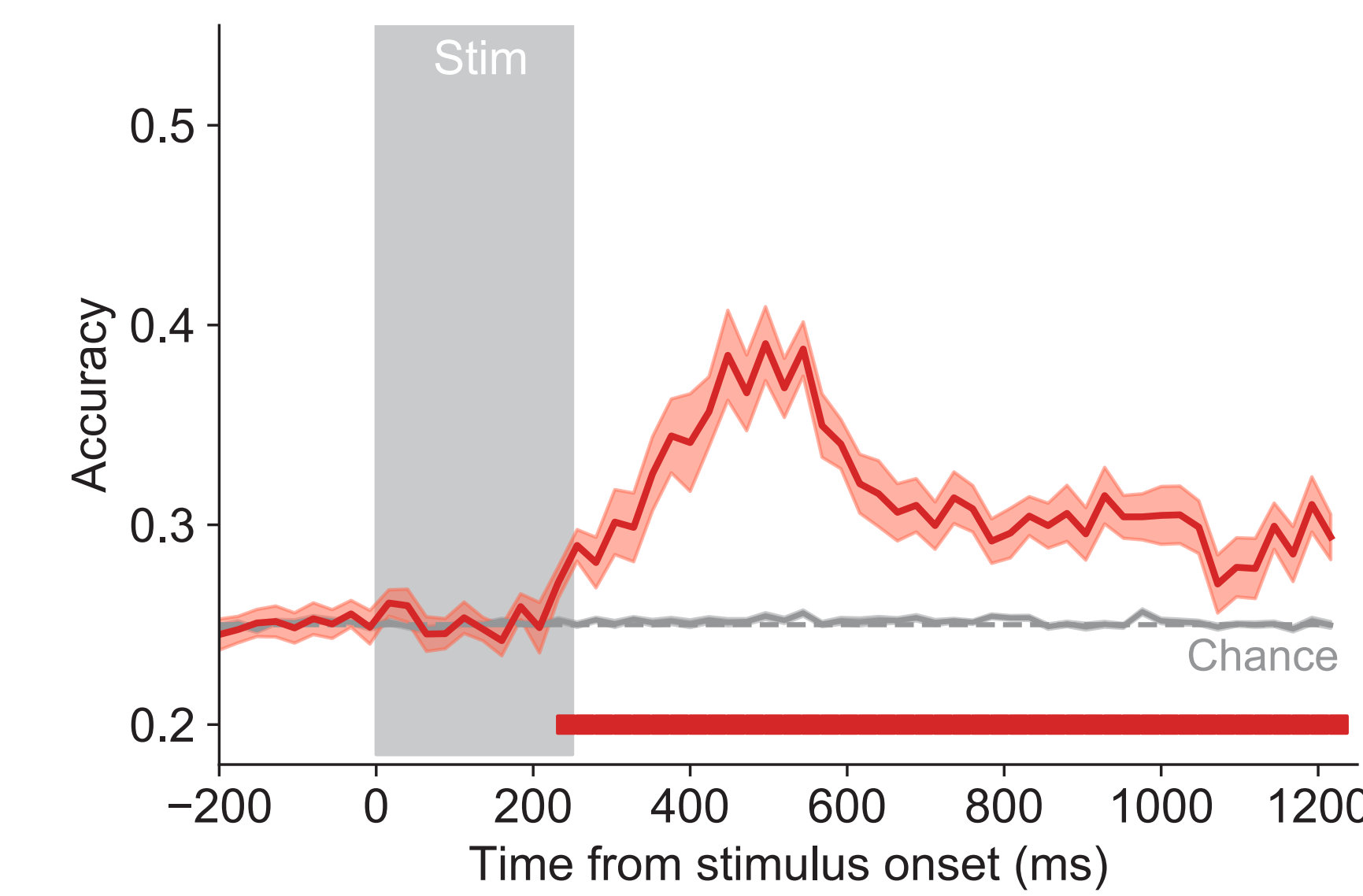
Can we decode load while balancing displays?

Color Load Decoding Single Trial

Color Load Decoding Trial Bins (20 Trials/Bin)

Orientation Load Decoding

Display imbalances do not solely drive load decoding
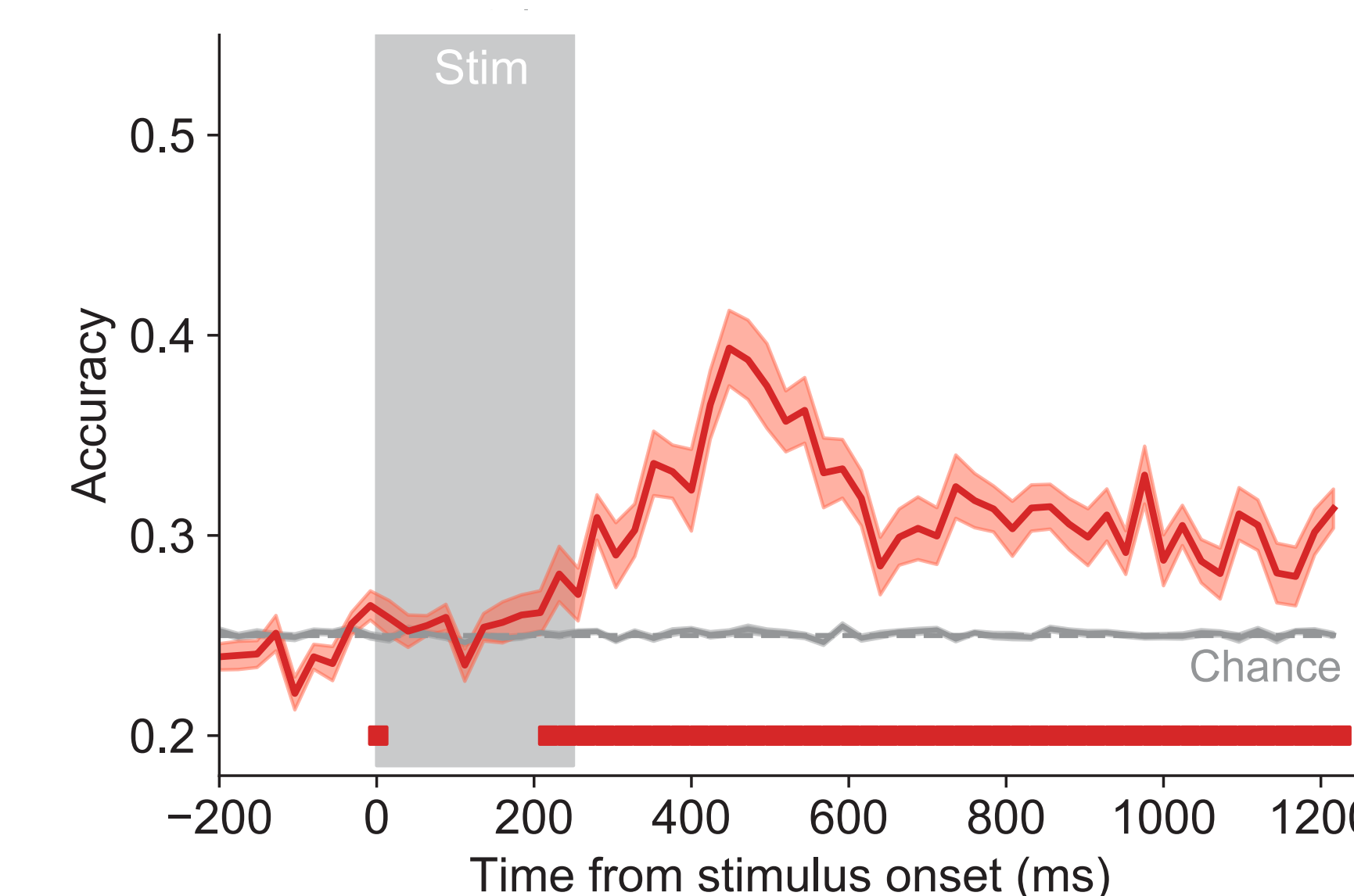
• P < 0.05

Decoding Across Features

Does decoding track a feature-independent load signal?
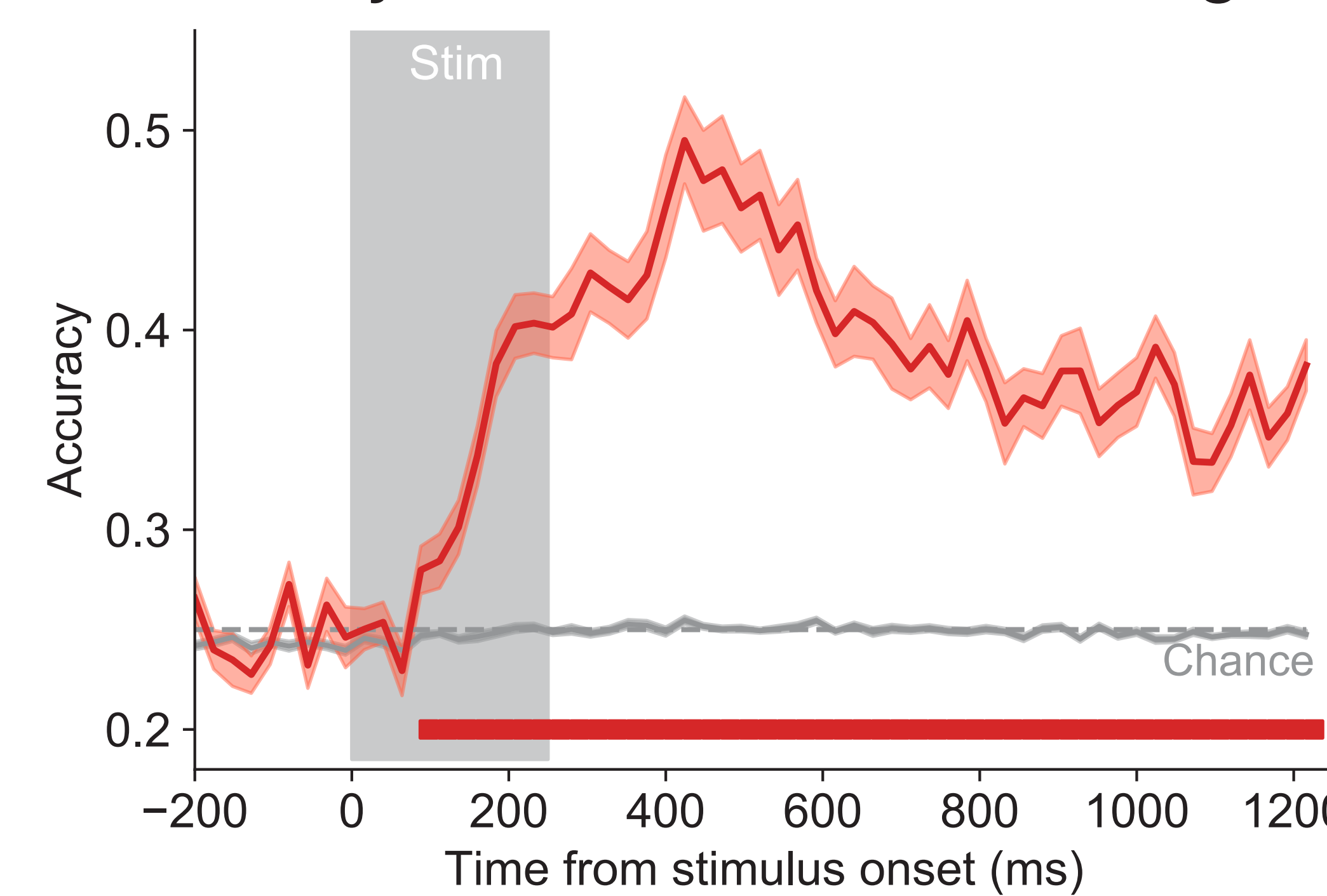

Train on Color, Test on Orientation

Train on Orientation, Test on Color

Load decoding generalizes across distinct features
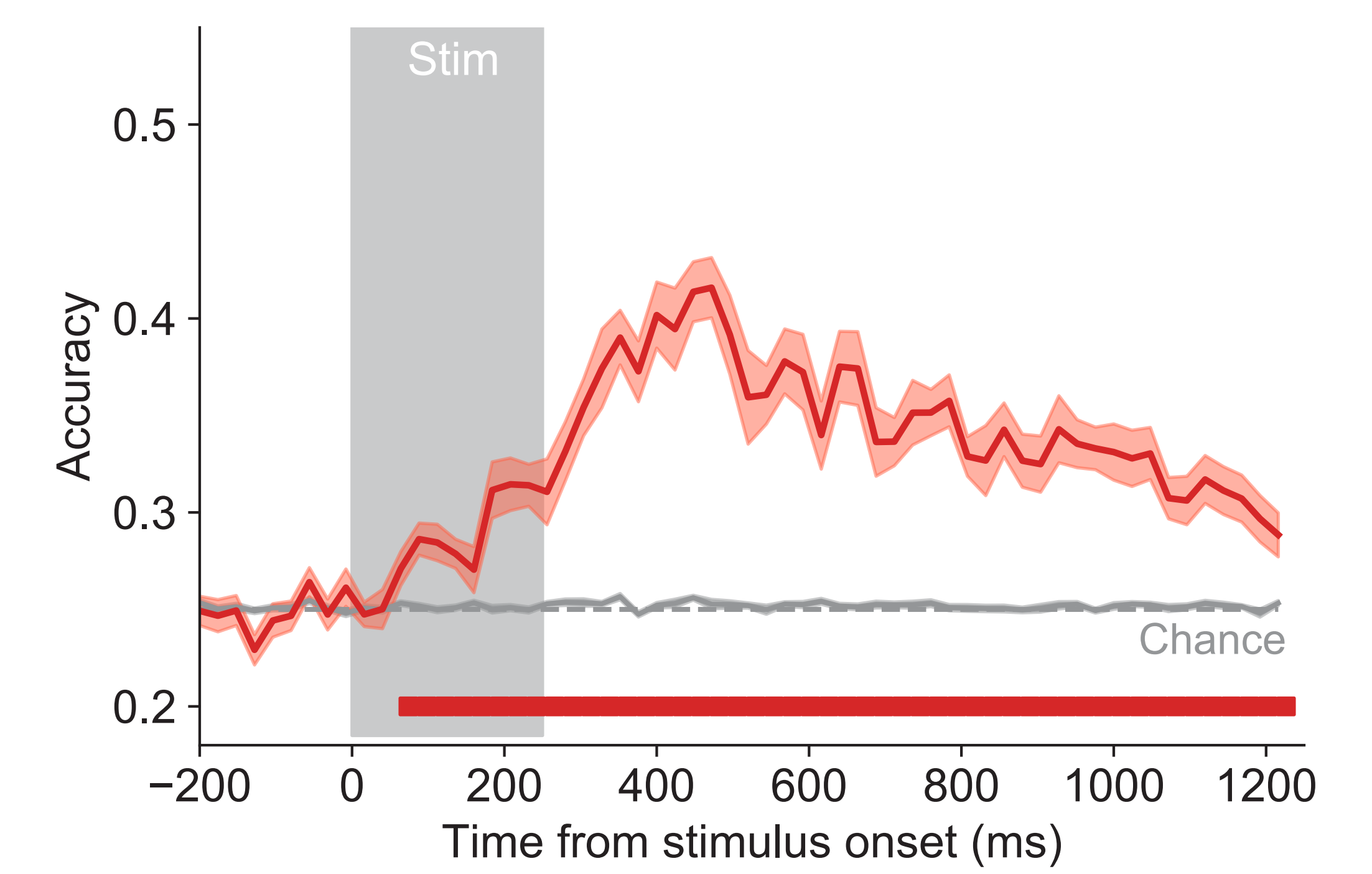
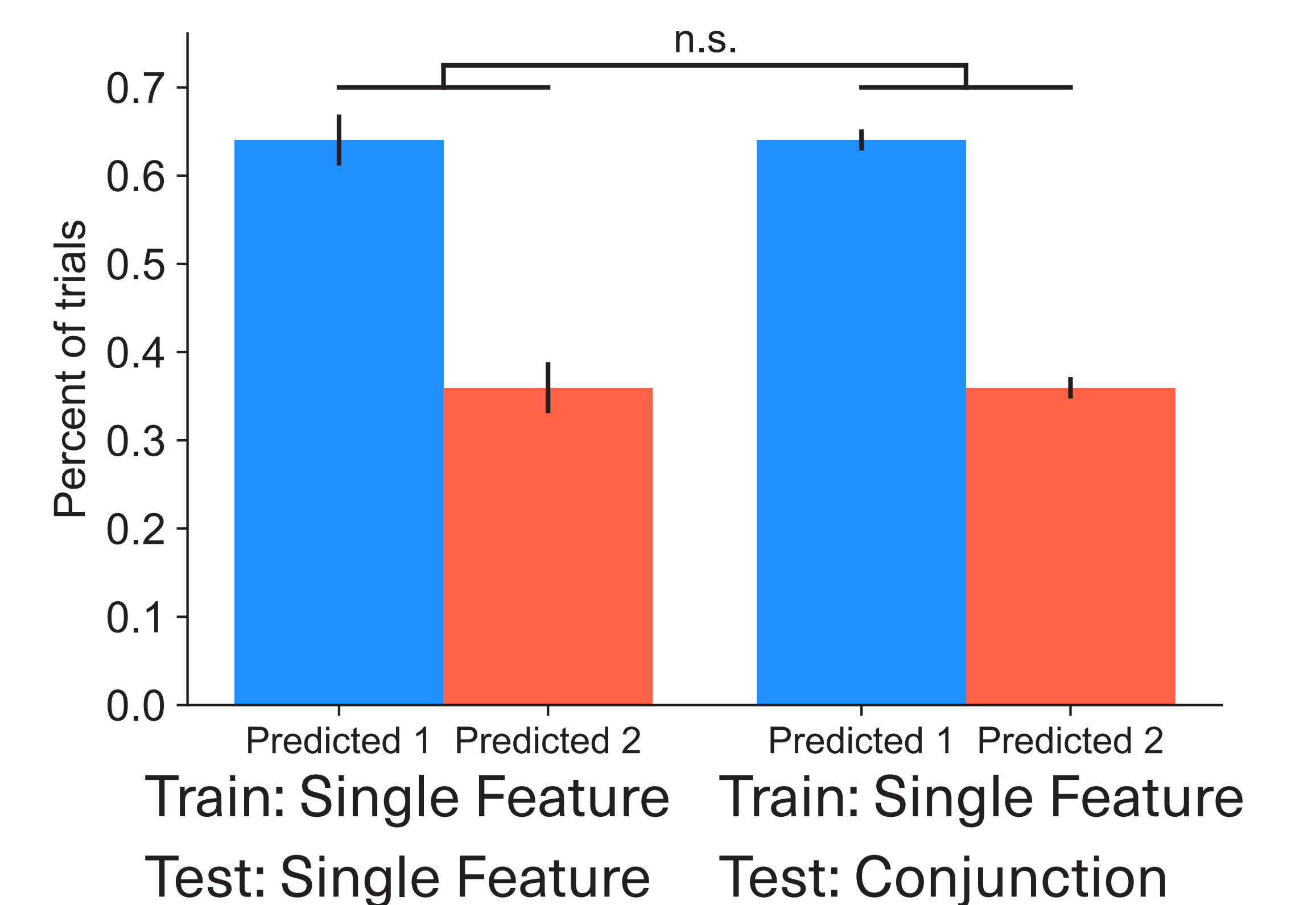## Conjunction Load Decoding

Conjunction Load Decoding

Load decoding works for items with multiple features

Single Feature to Conjunction

Color and Orientation to Conjunction

Load Predictions for Set Size 1 Trials

Load decoding tracks pointers, regardless of featural content

Conclusions

Load decoding generalizes across items with distinct feature values and feature loads

These results suggest that feature-independent pointers are the currency of visual working memory