



# Does volitional attention operate the same across domains?

## An investigation of willed attention to color

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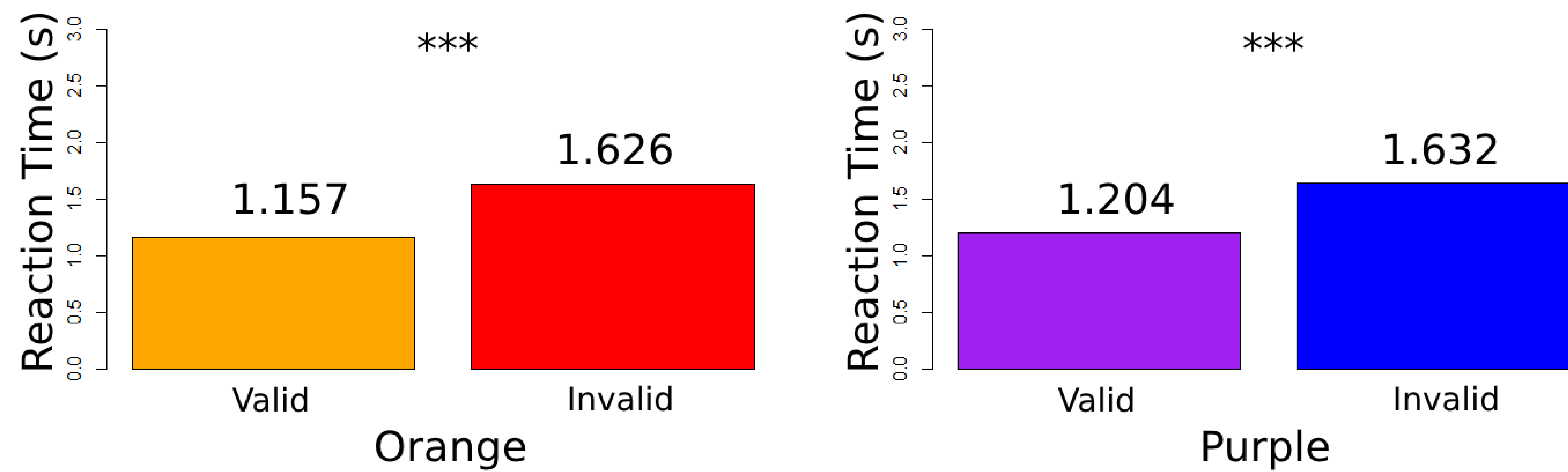
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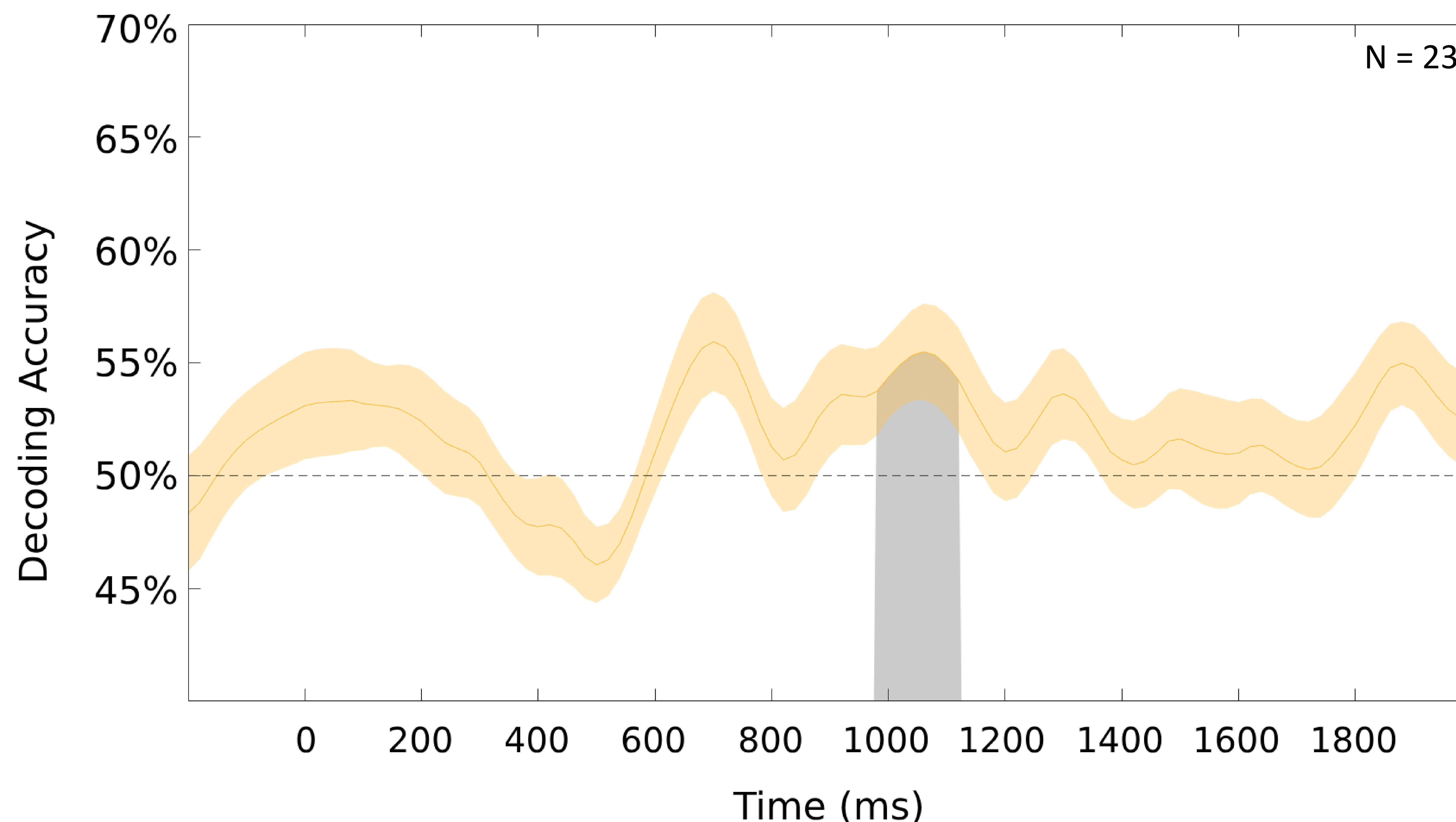
### Introduction

Attention without external constraints ('willed attention') has been studied in covert attention, with novel brain networks recruited specifically for willed attention in comparison to instructed attention. Here, we have conducted an EEG analysis on how willed attention operates when color is the domain of interest. The EEG dynamics provide novel insights into attentional control in the visual system and allow a greater understanding of how visual attention is guided with minimal external influence.

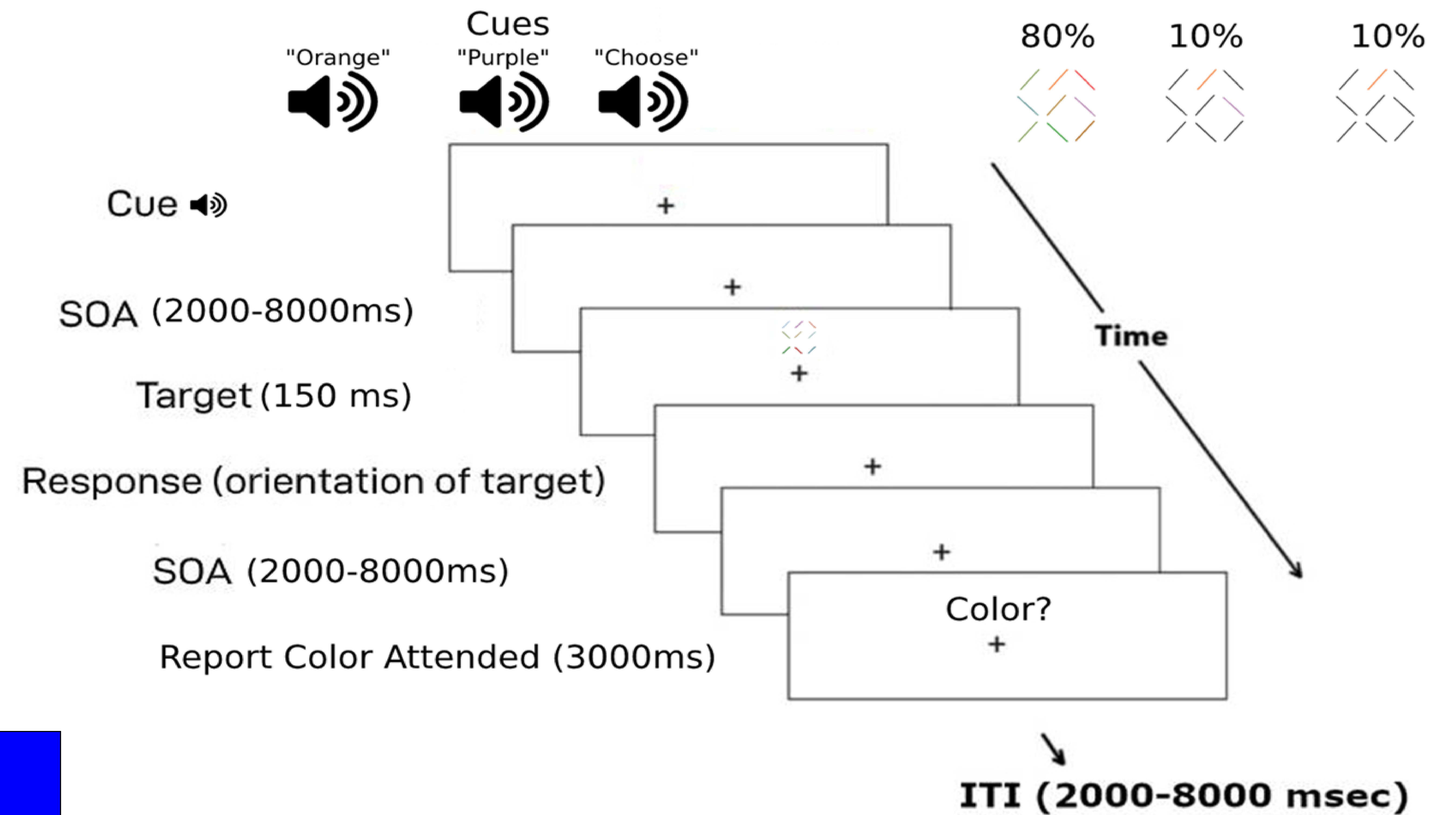
**Figure 2.** Reaction times showing attention validity effect ('only one color' condition)



**Figure 3.** Support Vector Machine decoding after the auditory 'choose' cue.



**Figure 1.** The color willed attention paradigm.



### Methods

Participants were presented with one of three cues, either the verbal words "Orange", "Purple" or "Choose" with the former two cues acting as instructions to shift attention to the cued color, and the third option acting as a prompt to willfully choose between the two colors. The SVM analysis presented here focuses exclusively on the "choose" cue. The reaction time data shows a condition (10% of trials) where only one color appeared on the screen, contrasting when that color was cued (or chosen) to when it was not.

### Results

We have validated our paradigm by showing an attention effect in reaction time data (Figure 2). Using a support vector machine decoding pipeline that compares two classes over each timepoint, we found that in the alpha band (8-12 Hz) we can decode a willed shift of attention to a color (orange or purple) after a cue prompting a willed choice (Figure 3). These results indicate that we can decode a choice between two colors using an EEG signal in the alpha-band (8-12Hz) in the cue to target period.