

Pre-activations of neural representations of sensory events bias perceptions towards anticipated stimulus

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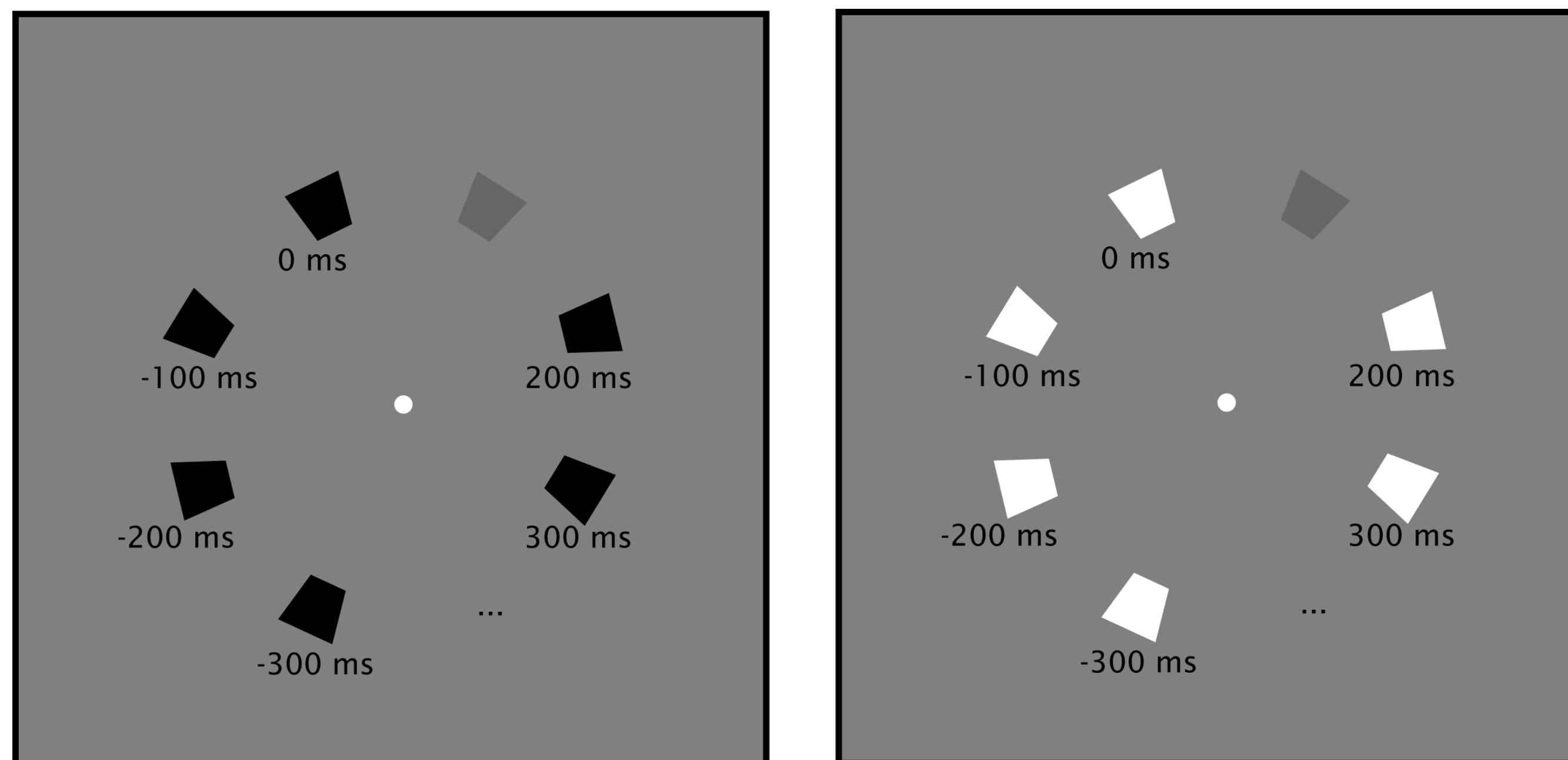


Introduction

- Predictions can drive neural representations of sensory events, even **without sensory information** from those events, and **ahead of the incoming sensory information** that would ordinarily activate them.
- This might allow the visual system to **compensate for its own temporal constraints**.
- But, **do these pre-activations actually influence conscious awareness or subsequent behavior?**

Methods

- **Apparent motion paradigm** previously used to reveal pre-activation of neural representations of anticipated visual events.
- Targets presented with **luminance values** either slightly darker or lighter than the gray background, embedded in blocks **with black or white apparent motion sequences**.
- Participants reported whether the target was **dark or light in a 2AFC task**.

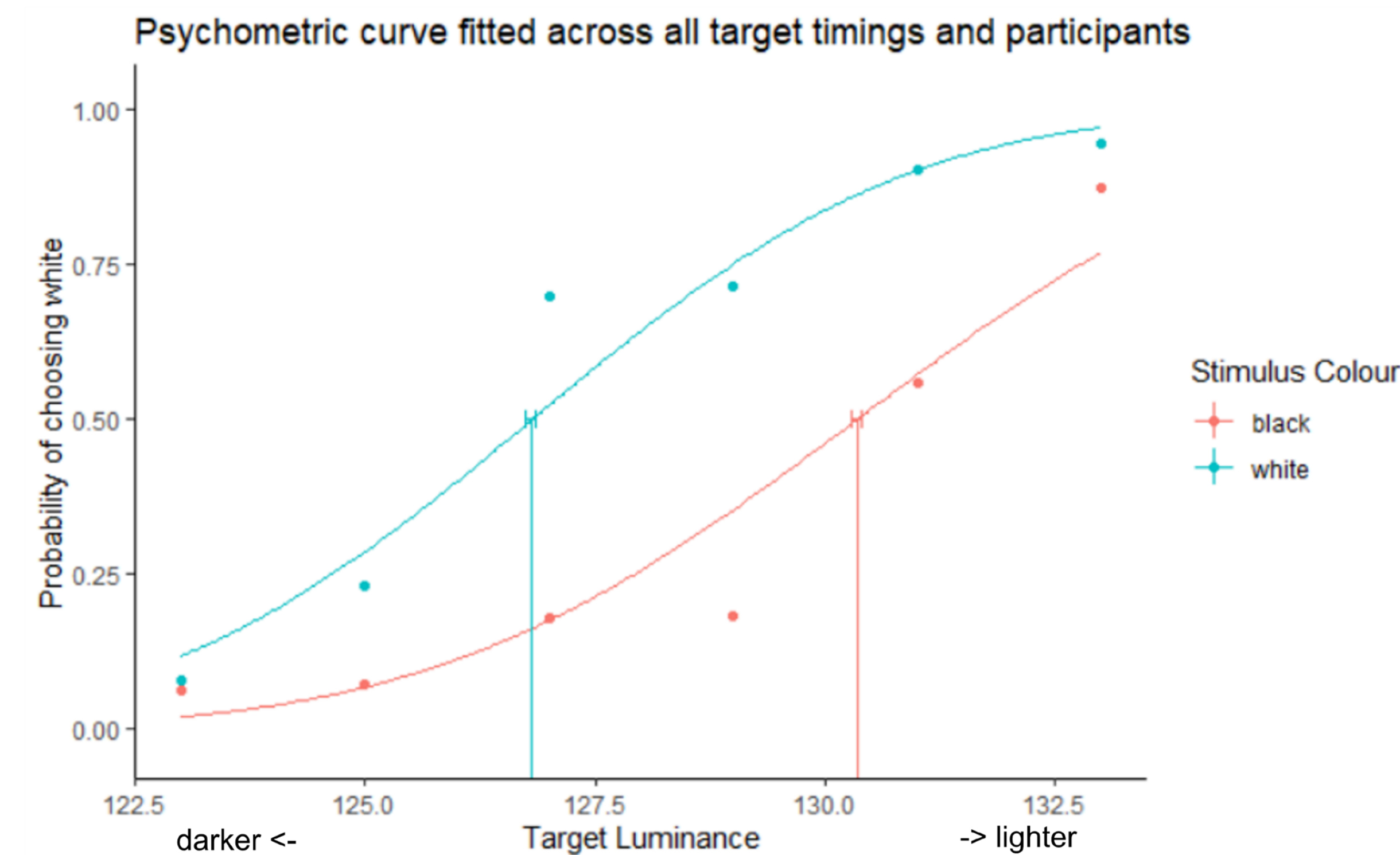


Stimulus display: Apparent motion stimuli were presented for 33 ms with an ISI of 66 ms. Targets with varying luminances were presented at 25, 50, 75, 100, 125, 150 and 175 ms.

- Fit **psychometric curve** on 6 luminance values (3 dark, 3 light) to determine the point of subjective equality.
- Importantly, the **timing of the target** presentations varies from 75 ms before to 75 ms after the anticipated stimulus onset.

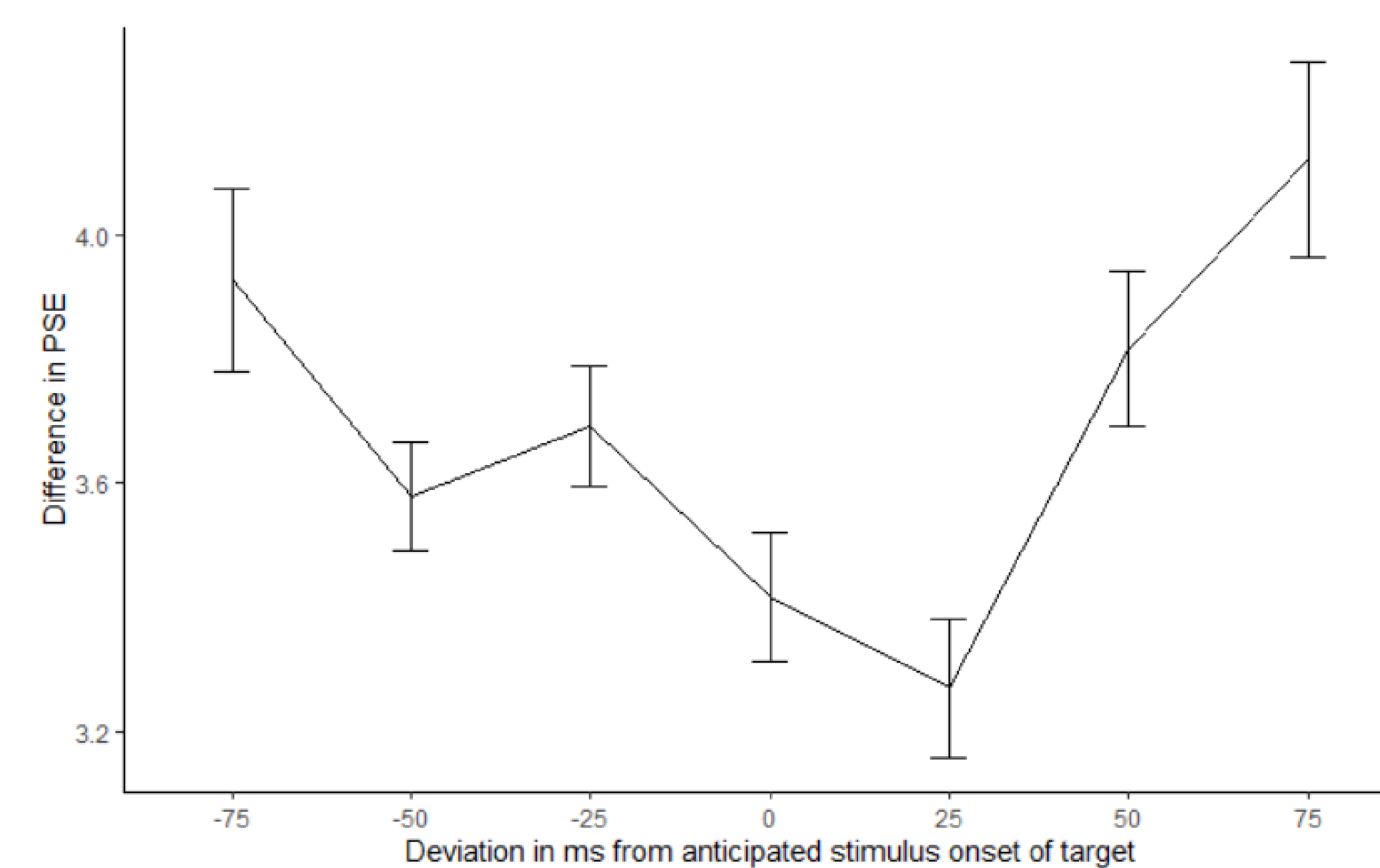
Results

Does the perceived/reported target colour depend on the color of the predictable apparent motion stimulus?



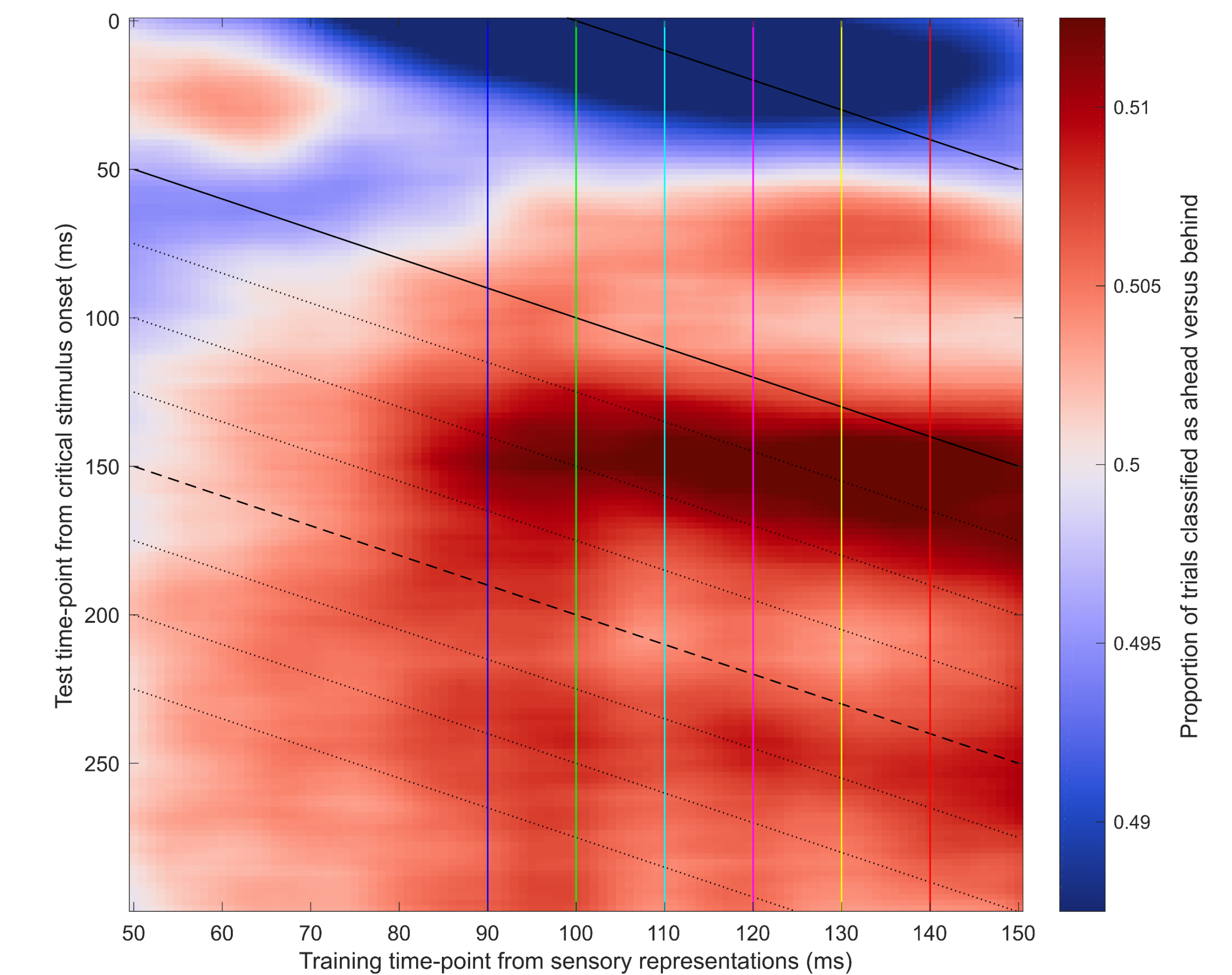
The point of subjective equality (PSE) is shifted darker when the inducer stimulus is white and lighter when the inducer stimulus is black.

Does the size of the predictive effect depend on the time of target presentation and hence the arrival of sensory information?

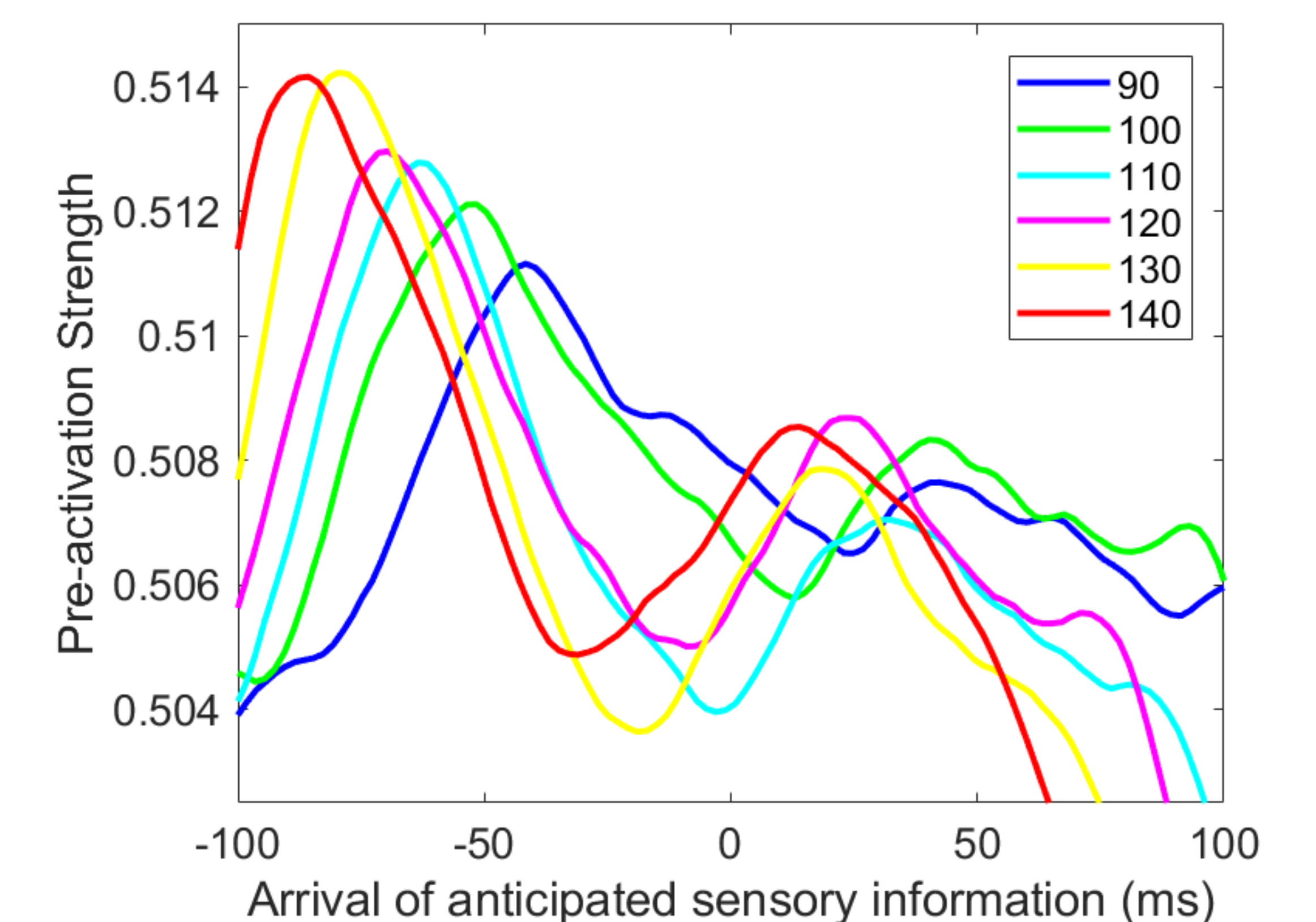


Predictive effects are largest when the timing presentation *before* the predicted stimulus onset and increasingly *after*.

Pre-activation



Pre-activation of anticipated stimulus: Classifiers trained on sensory representations assign trials to the ahead rather than the behind position ahead of the anticipated incoming sensory information. Solid diagonal lines indicate the propagation of information of the two presented stimuli, the dashed line the time-line of the anticipated arrival of sensory information of the stimulus and **the dotted lines the different time-lines at which the targets are presented.**



Strength of pre-activation relative to the anticipated arrival of sensory information per training time-point.

The pre-activation strength of the 100 ms neural representation aligns best with the differences in PSE, with the dip just after the anticipated arrival of sensory information..