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Scene context influences gaze orientation on objects in peripheral vision.

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Context

The ability of the visual system to efficiently recognise the environment is based on the extraction of a rudimentary representation of the scene, known as the gist (Oliva, 2005), associated with prior knowledge about the environment. Together, they could also be used to generate predictions about the objects it contains (Bar, 2007; Kauffmann et al., 2014).

Previous studies suggest that categorization of objects in central vision is improved by predictions generated from peripheral vision (Faurite et al., 2024; Roux-Sibilon et al., 2019; Trouilloud et al., 2022).

However, visual perception is a dynamic phenomenon which alternates between ocular fixations on an object of interest, and saccades towards the periphery to fixate new objects of interest.

This study aimed to investigate how predictions based on the scene context in peripheral vision influence gaze orientation on objects in peripheral vision.

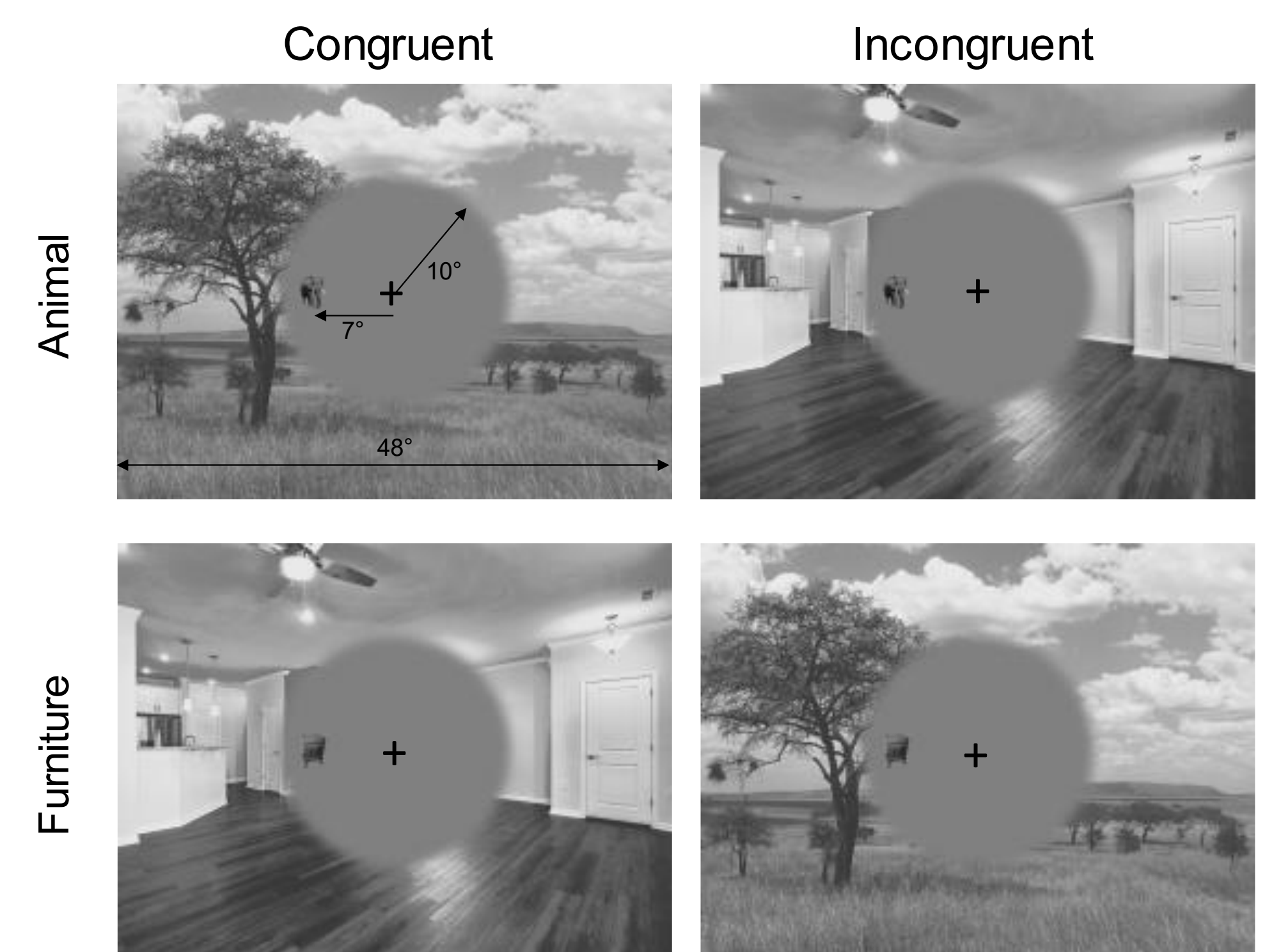
Methods

Participants: Twenty-five students from Université Grenoble Alpes (19 women, 19.1 ± 0.8 years old) with normal or corrected-to-normal vision.

Stimuli: Stimuli were composed of an **object** (animal or furniture) displayed during 400 ms in peripheral vision, either on the left or right side of a central fixation. A **scene** background was simultaneously displayed, and was either **semantically congruent** with the object (outdoor scene/animal or indoor/furniture) or **incongruent** (outdoor scene/furniture or indoor/animal).

Task: Participants had to perform a **go/no-go saccadic task** on an object (animal or furniture). They were instructed to saccade towards the object belonging to a target category (animal or furniture), or maintain fixation at the centre when the object belonged to the distractor category. Conditions were counterbalanced across participants.

Measures: Saccades accuracy, latency (ms).



Hypotheses

Saccade errors:

- When the target object is present: more omissions of saccades towards the target object when displayed on an incongruent scene than on a congruent scene.
- When the target object is absent (i.e. the distractor is present): more false alarms towards the distractor object when displayed on an incongruent scene (i.e. congruent with the target category) than on a congruent scene (i.e. incongruent with the target category).

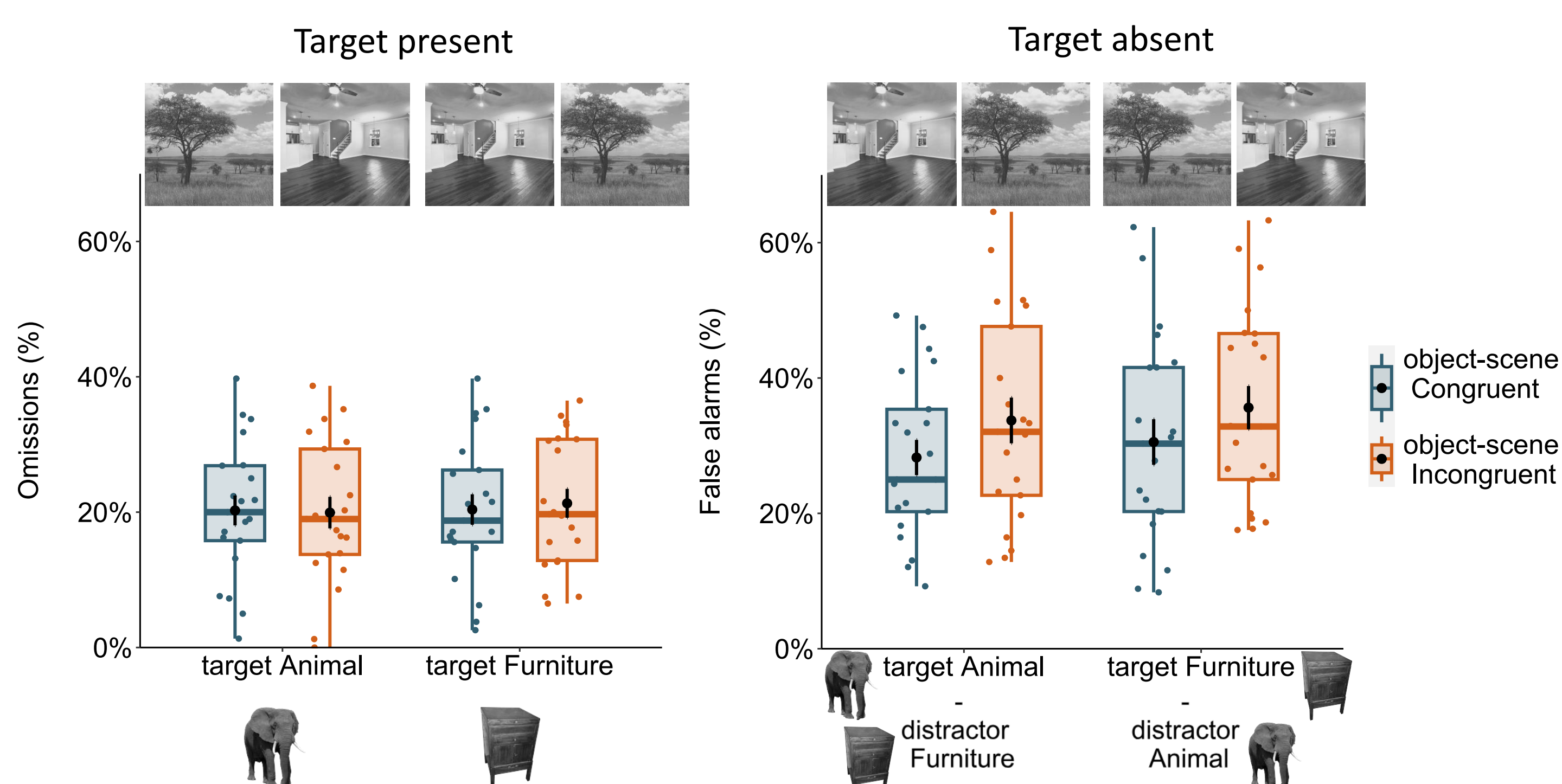
Saccade latencies:

- Lower correct saccade latencies (i.e. when the target object is present) when the object is displayed on a congruent than on an incongruent scene.

Results

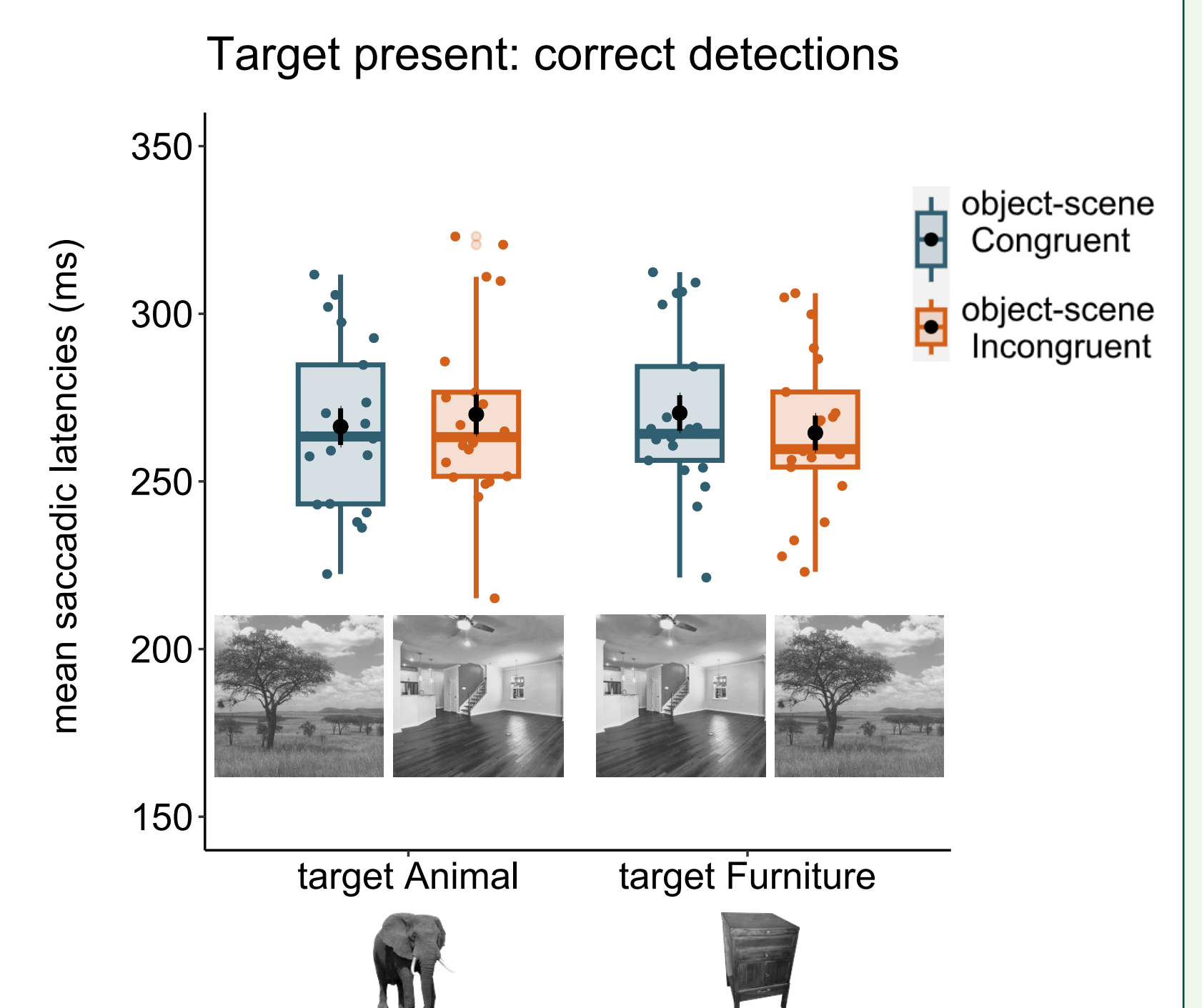
Mean saccade errors:

- When the target was present, the congruence effect was not significant: $\beta = 0.046$, $z = 0.36$, $p = .72$.
- When the target was absent, the congruence effect was significant: $\beta = 0.52$, $z = 4.9$, $p < .05$.



Mean correct saccade latencies:

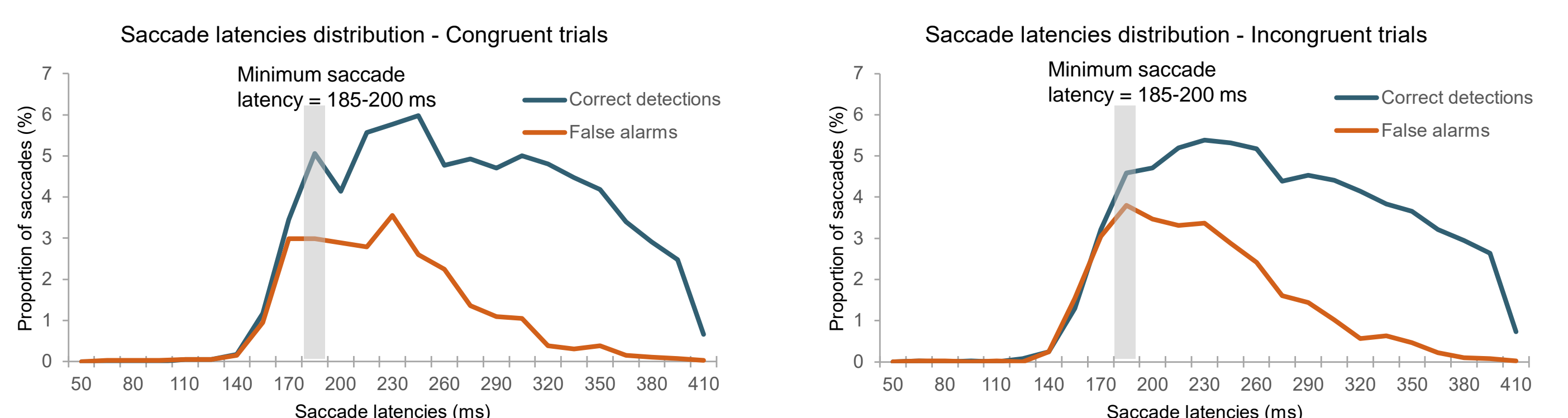
- When the target was present, the congruence effect was not significant: $\beta = 2.58$, $t(4947.77) = 0.74$, $p = .46$, $dz = 0.16$.



Minimum saccade latency:

Saccade latencies were divided into 15-ms bins. For each congruence condition, we searched for the bins containing **significantly more correct detections than false alarms** (Chi² test). The **minimum saccade latency** was the 1st of 5 consecutive bins with more CD than FA.

Consistently with mean correct saccade latencies analysis, there was no difference between congruent and incongruent trials in the time needed to correctly initiate saccades towards the target: fastest saccades were initiated in 185-200 ms in both congruence conditions.



Conclusion & perspectives

- Scene context influences gaze orientation on objects in peripheral vision.
- In future studies, we will manipulate the SOA (stimulus onset asynchrony) between the object and the scene to enhance the influence of predictions based on scene-context in periphery on gaze orientation in peripheral vision.

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