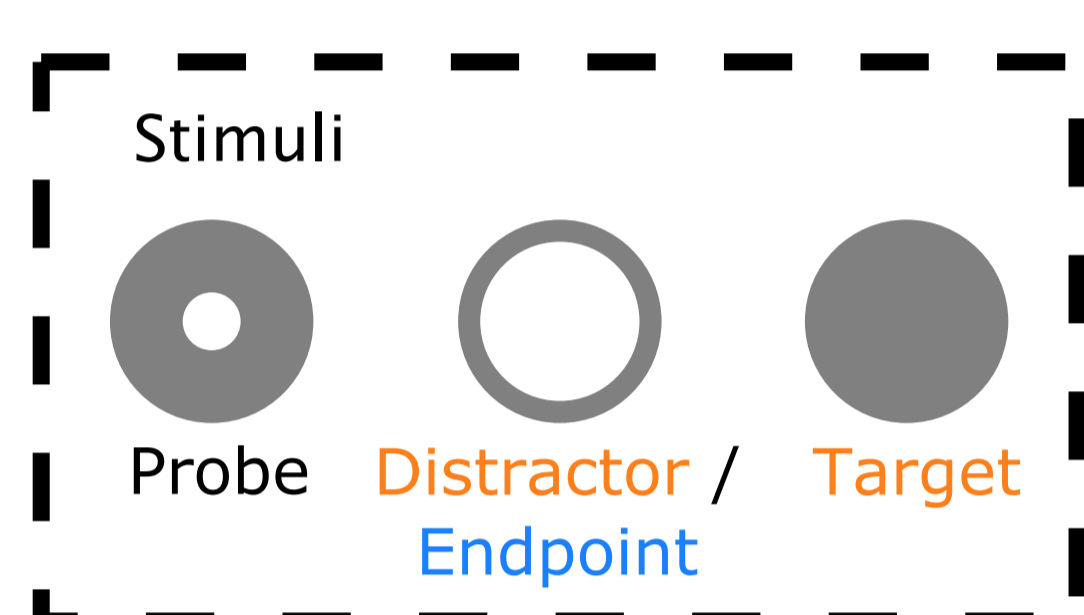


Preventing re-fixations is not a general principle, despite inhibition of return

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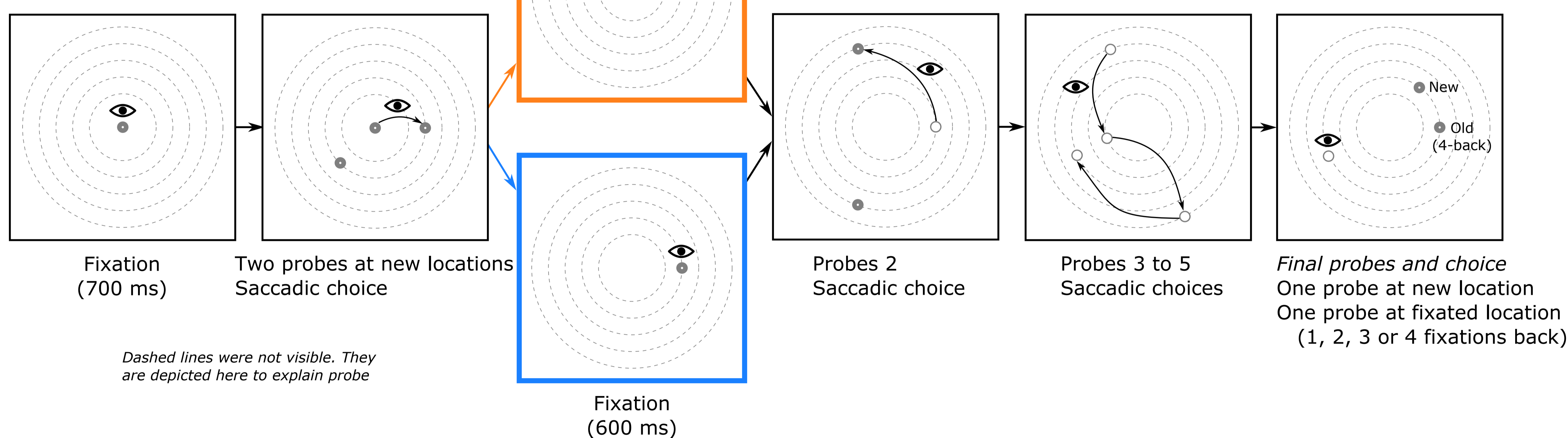
1. Introduction

Preventing re-fixations increases efficiency in visual search. This supposedly results from inhibition of return (IOR). Yet, re-fixations are not inhibited perfectly: the probability of a re-fixation increases over time. However, in tasks other than search re-fixations can actually be beneficial. Here we investigate the task and temporal specificity of preventing re-fixations.



Filler trials
 In the **search task** another 240 trials were added where the target would be found in the first five fixations, irrespective of choice

Reveal distractor (600 ms)



2. Methods

Subjects made a series of six saccadic choices. In the final choice they had to choose between an old and a new location.

Lag: old location was picked from varying **lags** (1, 2, 3 or 4 back)

Search task: find target location (240 trials)

Free saccades: make saccades until trial end (240 trials)

Analysis

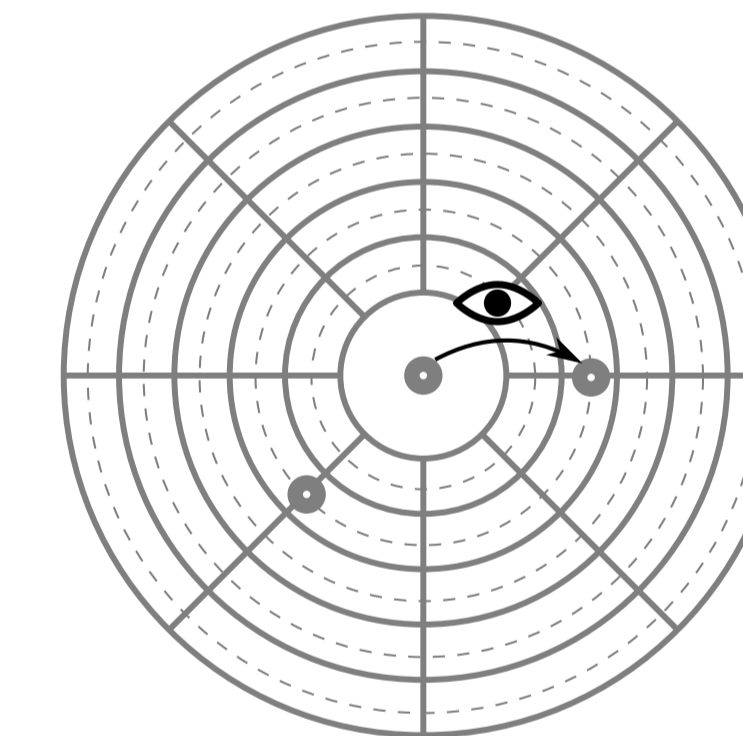
Linear mixed logit model on choice (0 = new target, 1 = refixation)

Model 1: choice ~ task * lag + (1|lag:subject) + (1|task:subject)

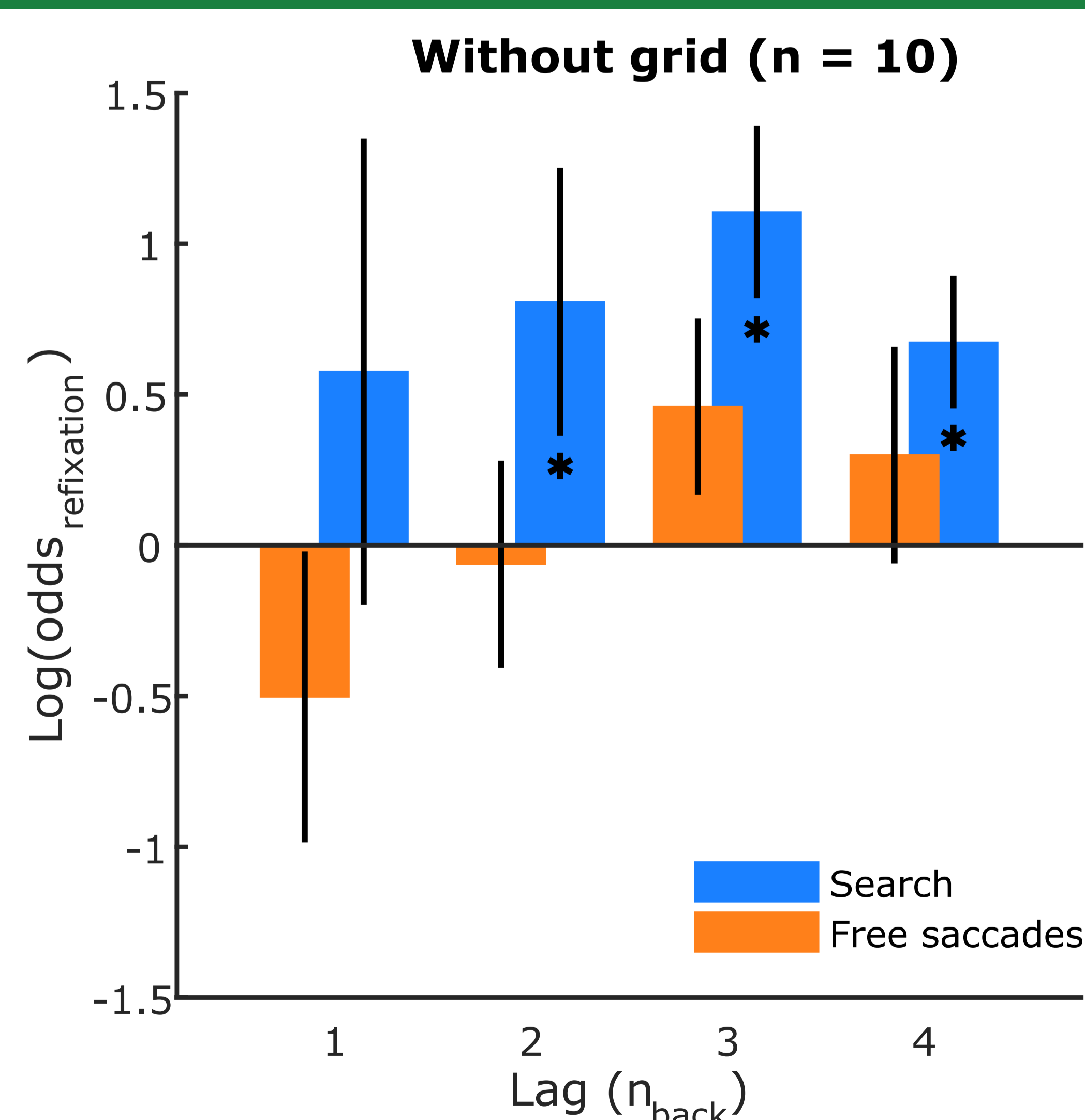
Model 2: choice ~ task * lag * grid + (1|lag:subject) + ... (1| task:subject)

3. Background grid

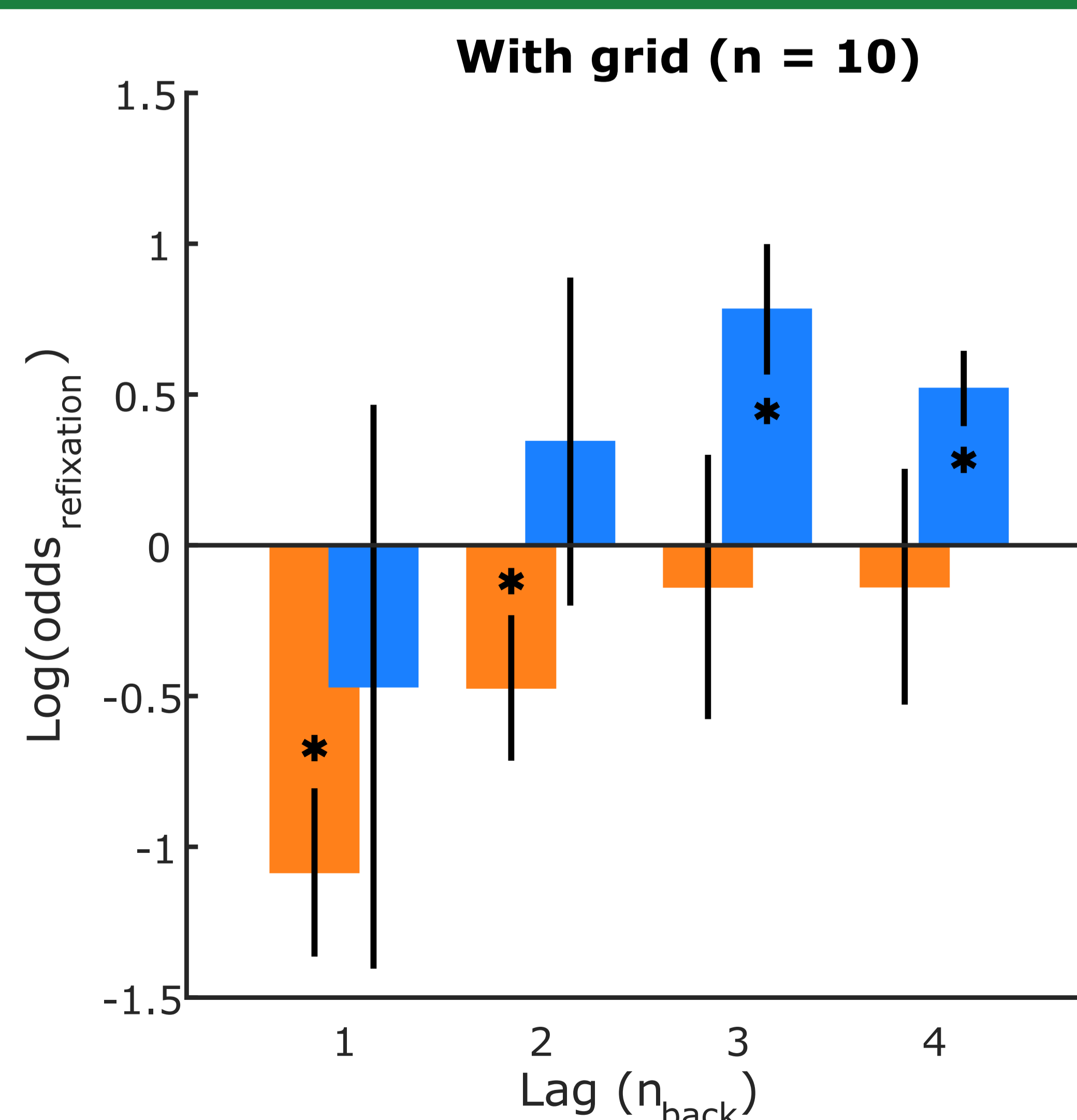
In a second experiment a background grid was added to provide more spatial reference frames: facilitating encoding of fixated locations into spatio-topic coordinates



4. Re-fixations



Model 1 (see Methods)
 Main effect of task $p < 0.001$ *
 Interaction task x lag $p = 0.028$ *
 lag effect in search $p < 0.001$ *
 no lag effect in free saccades $p = 0.148$



Model 2 (see Methods)
 Main effect of grid $p = 0.007$ *
 Interaction grid x task $p = 0.032$ *
 Interaction grid x lag $p = 0.957$
 Interaction grid x task x lag $p = 0.029$ *

5. Conclusion

Preventing re-fixations requires:
 A) the right task set
 B) sufficient spatial references

In case of sufficient reference frames there are two mechanisms preventing re-fixations:
 A) task set
 B) lag, or fixation recency

The lag effect could be related to IOR, whereas the task effect seems to reflect a more flexible mechanism

