

Evolution of Novelty Responses During Few-Shot Memory Formation in Mice

Eva Goldstein¹, Daniel Molinuevo Gomez¹, James B. Priestley¹

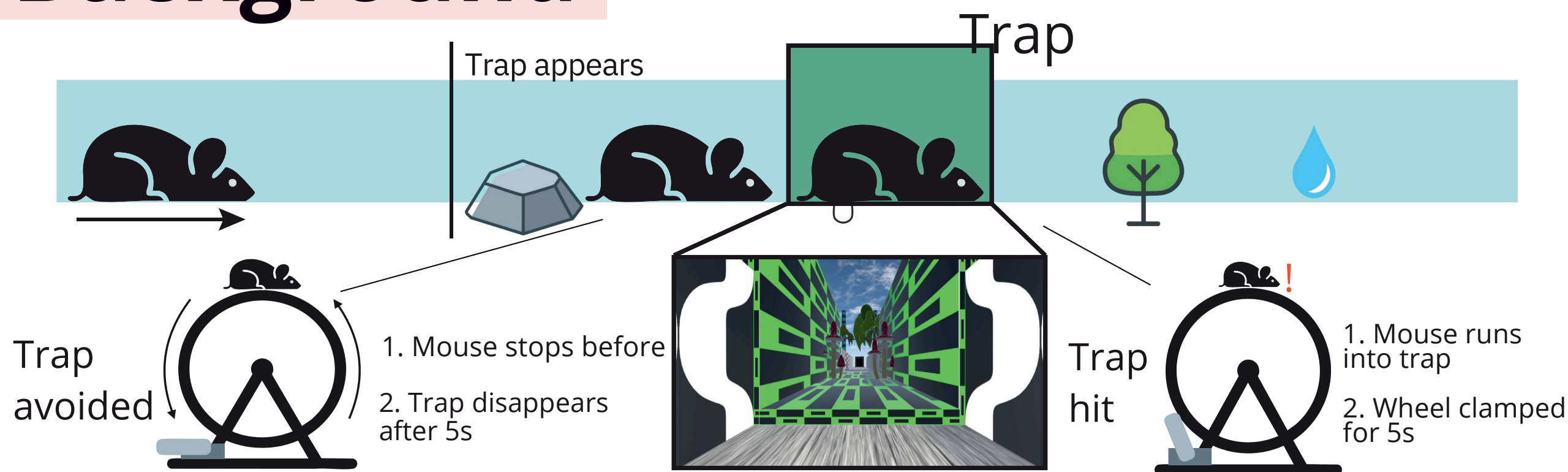
¹ Priestley Lab - Neurobiology of Memory, EPFL

Introduction

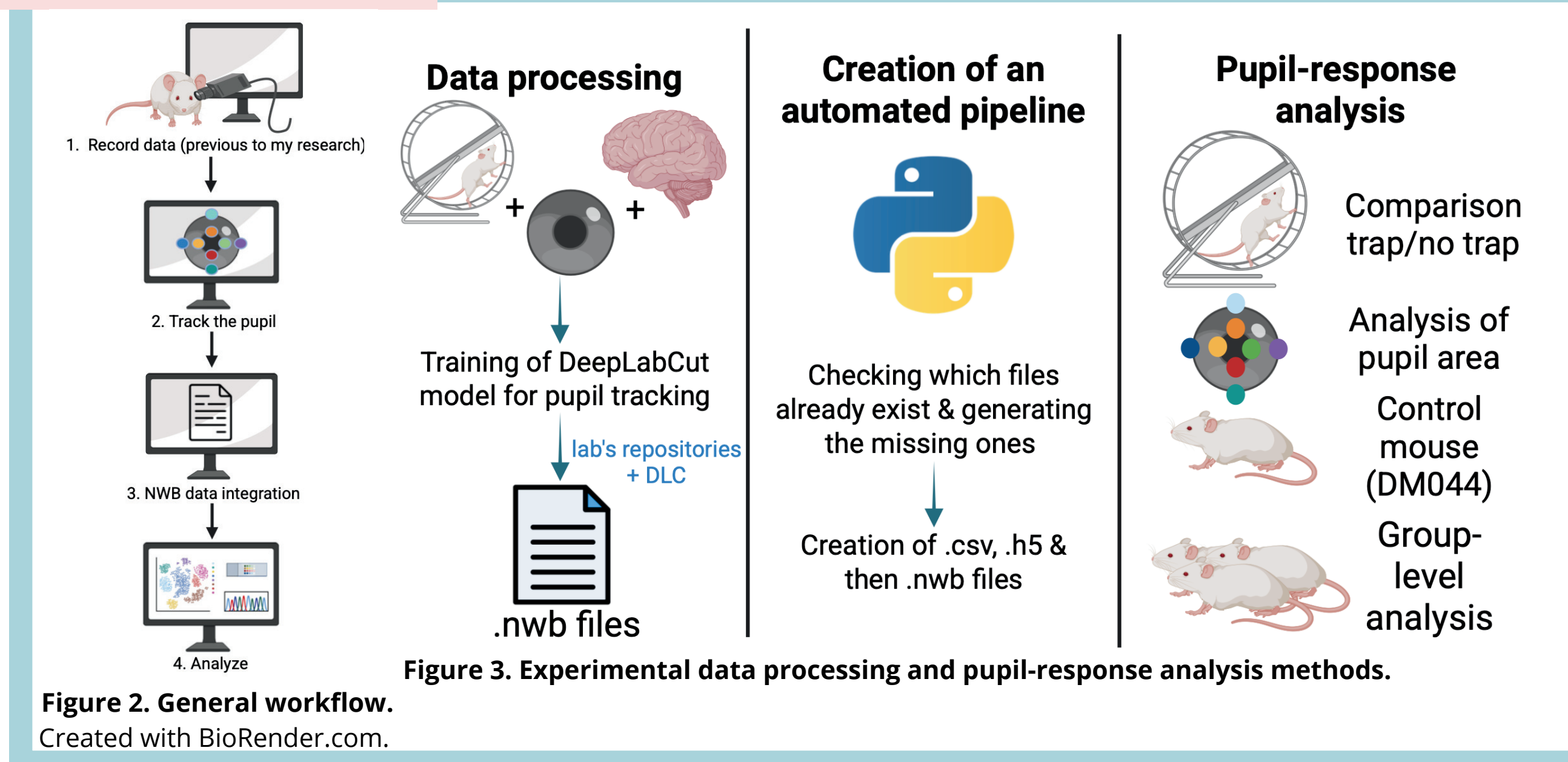
Few-shot memory refers to the ability to form a memory after only a limited number of experiences. Based on evidence from humans, we know that the hippocampus is involved in episodic memory formation. Here, virtual traps were used as **repeatable salient events** to investigate how physiological responses evolve across repeated exposures. This led to the main question: **How do novelty-related pupil responses evolve during few-shot memory formation?**

We hypothesized that salient trap events would elicit a measurable pupil response, and that this response could change across repeated exposures as the event becomes familiar.

Background



Methods



Discussion

- + Preliminary pupil response:** Figures 4 & 5 provide preliminary evidence of a pupil constriction following the virtual trap, consistent with our hypothesis.
- Not yet generalizable:** This response is absent in Figure 7 when averaging across mice.
- Pupil dynamics impacted by several factors:** Illumination, arousal, locomotion and other sources of variability may influence pupil dynamics (especially at beginning & end of environment) and require further investigation.

Conclusion

Workflow : Pupil + behaviour data: extraction, synchronization & analysis

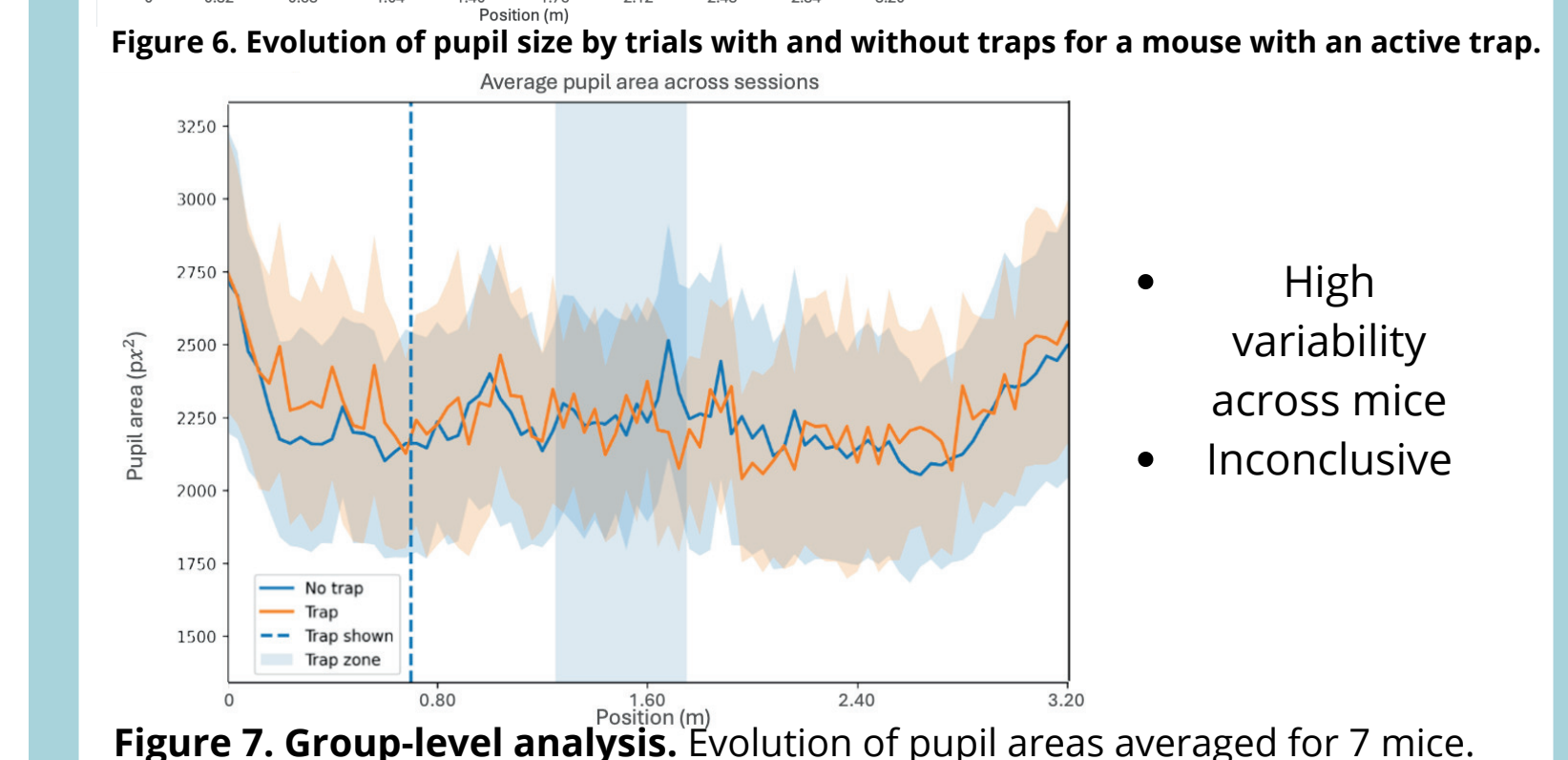
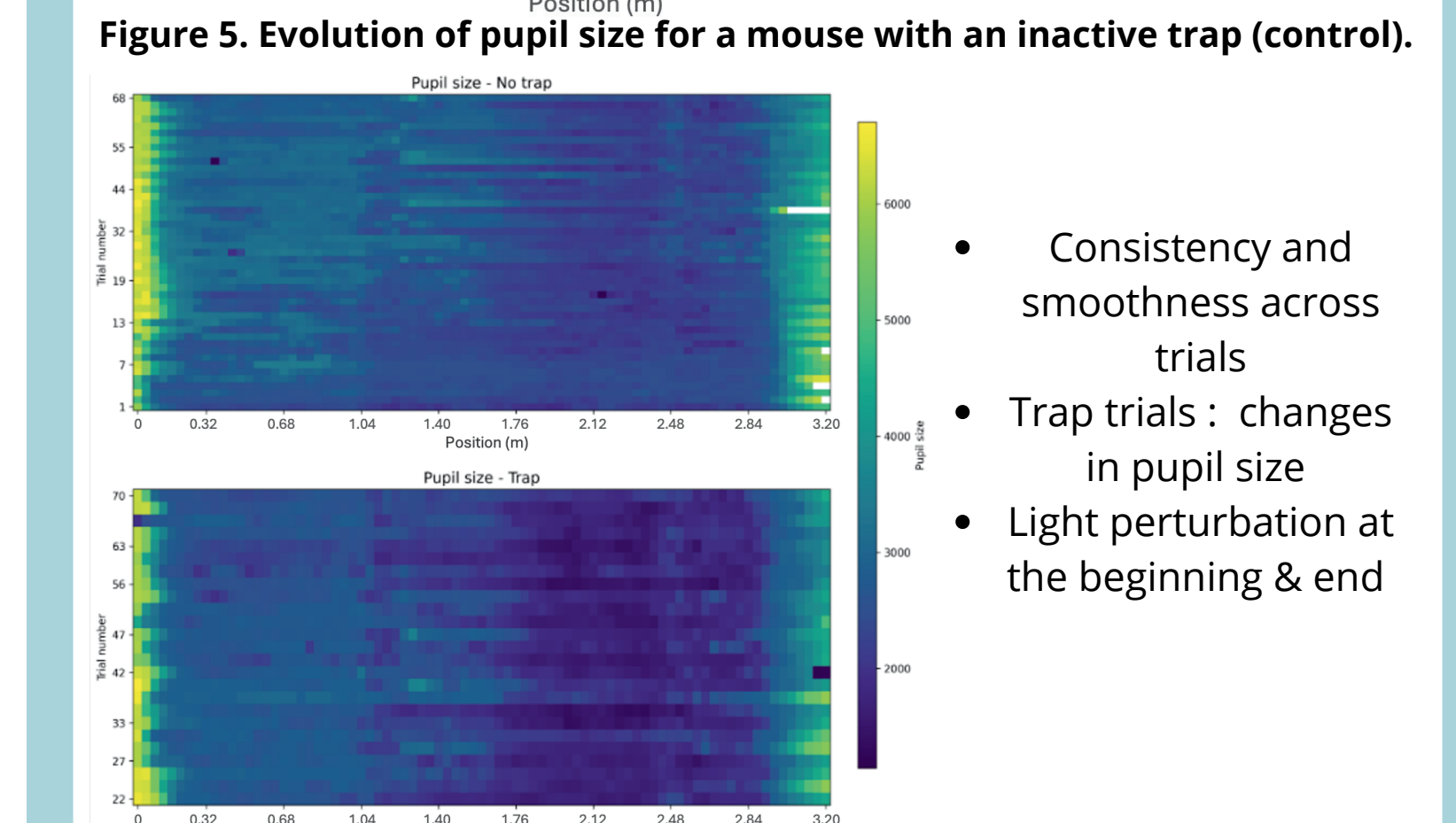
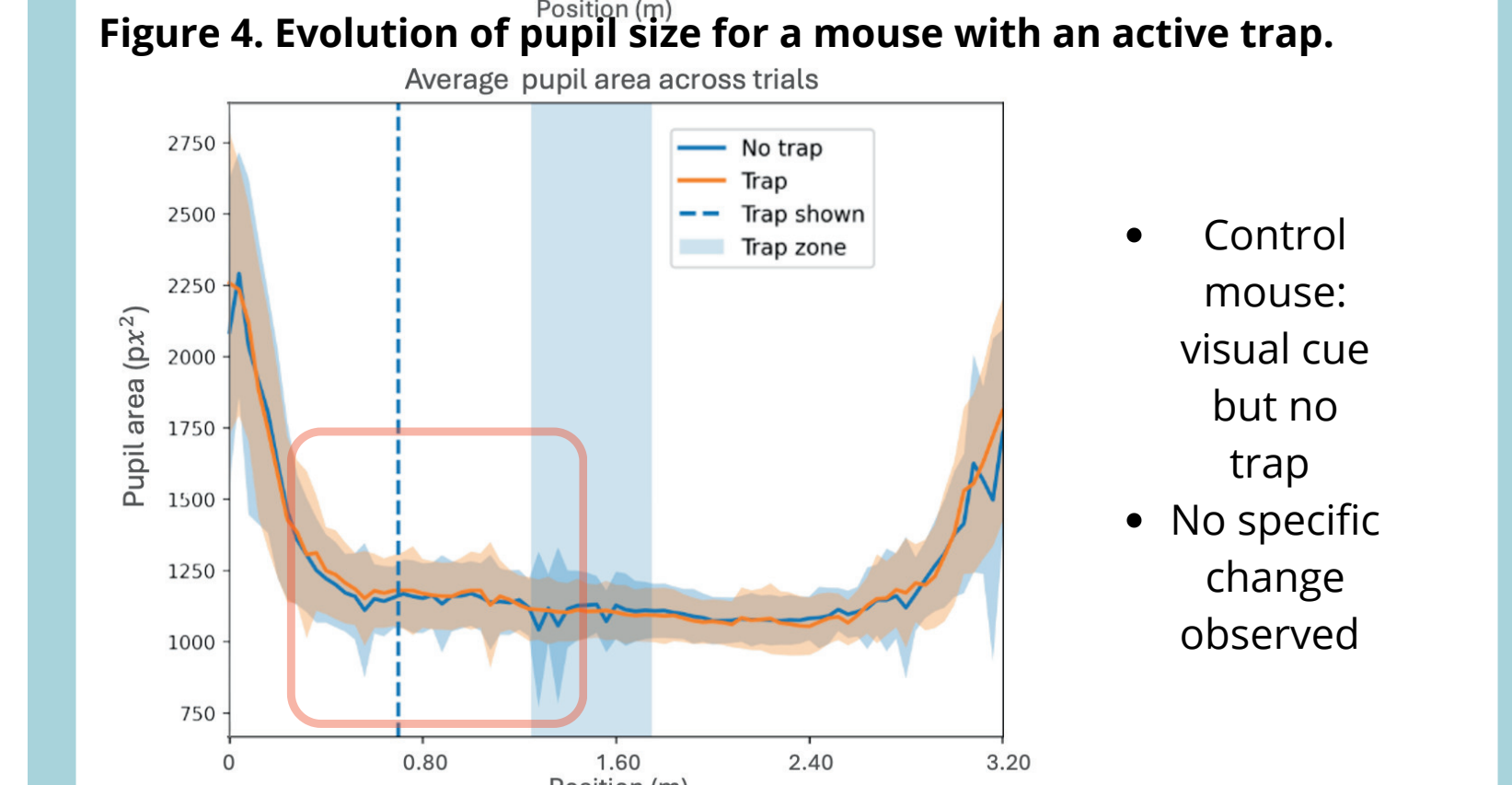
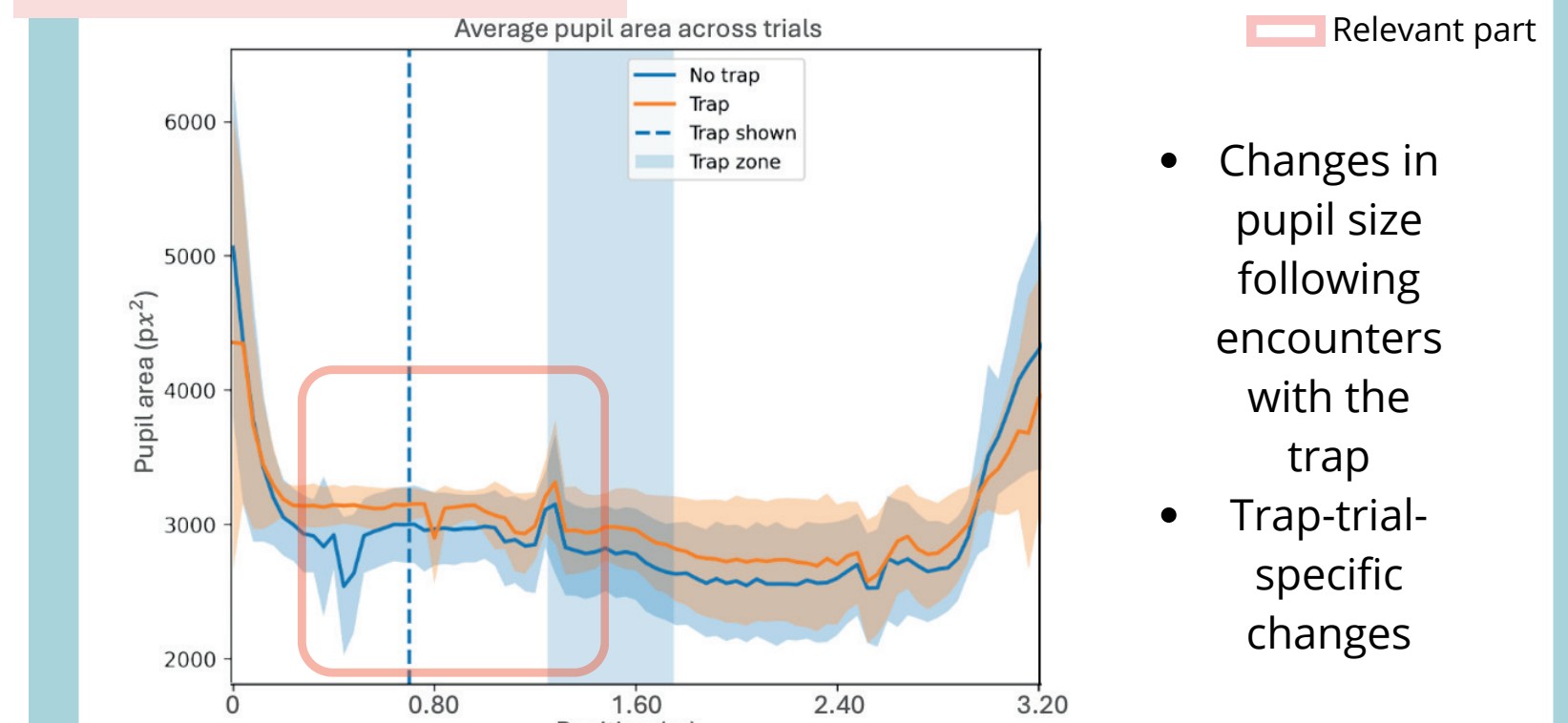
Key finding : Virtual trap: pupil area
Preliminary response observed at the individual-mouse level.

Take-home message : We have shown how to process and use pupil responses as a putative behavioral/physiological readout of responses to salient events during few-shot memory experiments.

Future work

- Improve the pipeline and the DeepLabCut model :** efficiency and generalization.
- Control illumination:** normalize pupil size to baseline and/or model light intensity as a covariate to reduce these effects.
- Characterize novelty → memory:** compare the first trap encounter with subsequent exposures to determine whether pupil responses change.
- Link physiology to neural activity:** link results to brain activity

Results



For more information

SCAN ME

