



Meaning Supports Gist Perception

Carine K. Wong, Alan Z. Lu, John M. Henderson

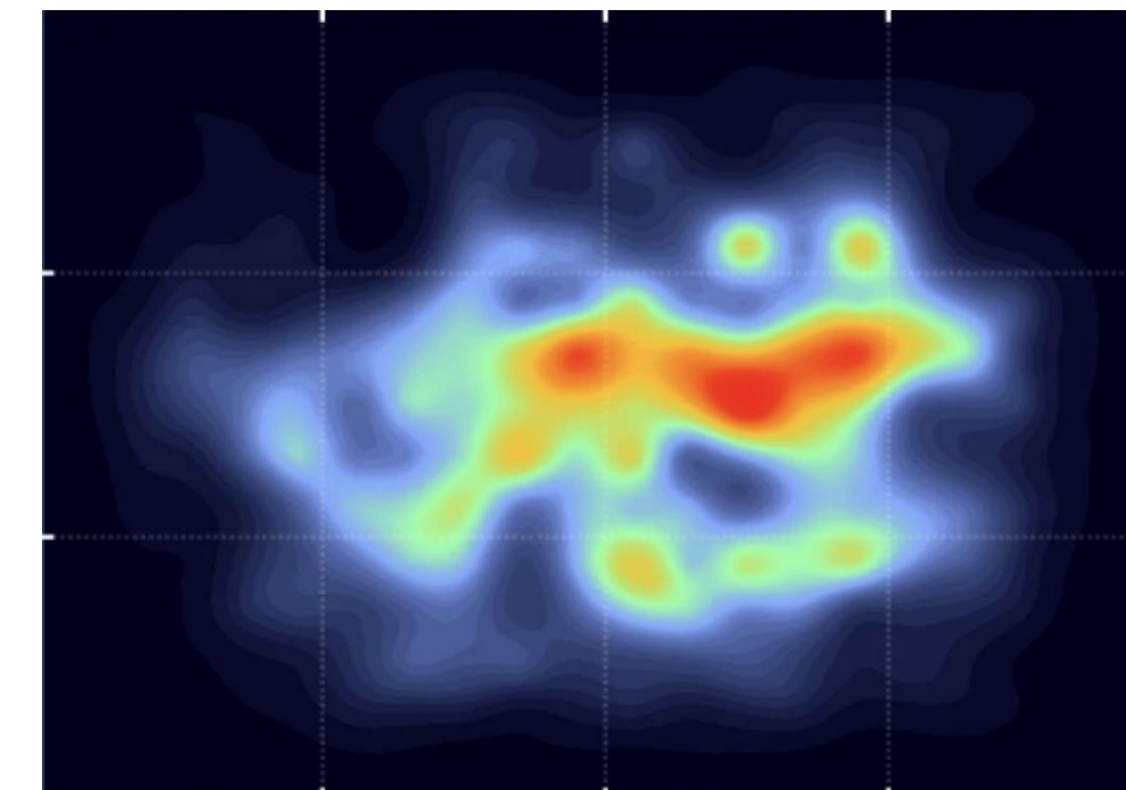
Center for Mind and Brain, Department of Psychology, University of California - Davis

Background

- Gist perception: the visual system's ability to understand real-world scenes at a glance
- Semantic information extracted from gist contains scene category information
 - Gleaned within 100 ms of scene-viewing (Malcolm, 2014)
- Semantic information guides attention and behavior in scene-viewing (Hayes & Henderson, 2021; Henderson & Hayes, 2017)
- Meaning maps measure the spatial distributions of local semantic density in scenes (Henderson & Hayes, 2017)



Original Scene



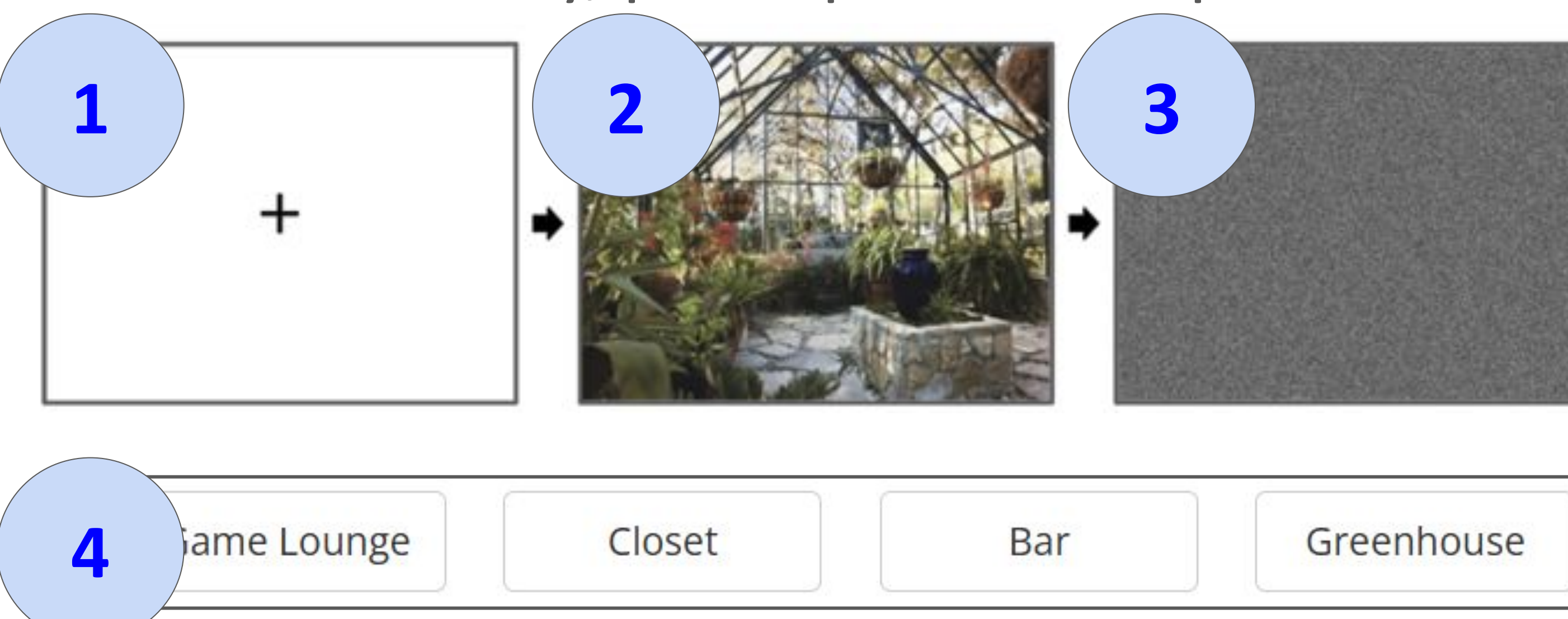
Meaning Map

Question

- Does semantically meaningful content support gist perception?

Methods

In an online study, participants were presented the following:



1. **Fixation cross** (2 s)
2. **A real-world scene** (50/75/100 ms)
3. **Noisy mask** (1 s) - stops visual processing
4. **Button choices** (until response) - 4-alternative forced choice task of identifying scene's basic category

100 scenes were presented, varying by two conditions:

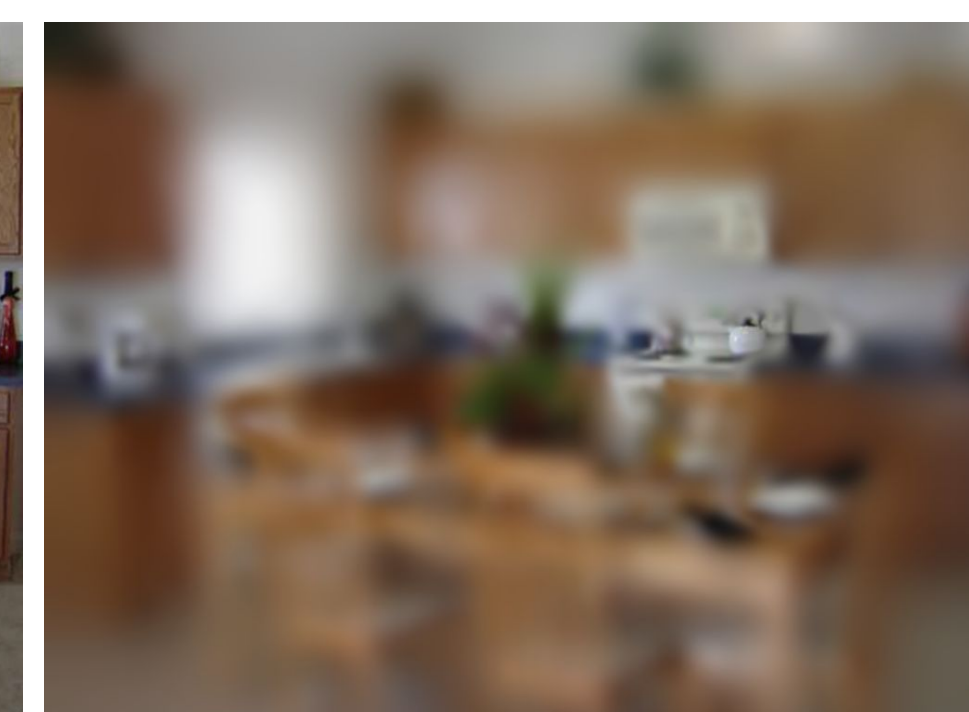
- Presentation duration (50/75/100 ms)
- Type of blurring (used to manipulate availability of semantic information)

We analyzed participants' response accuracy per combination of conditions.

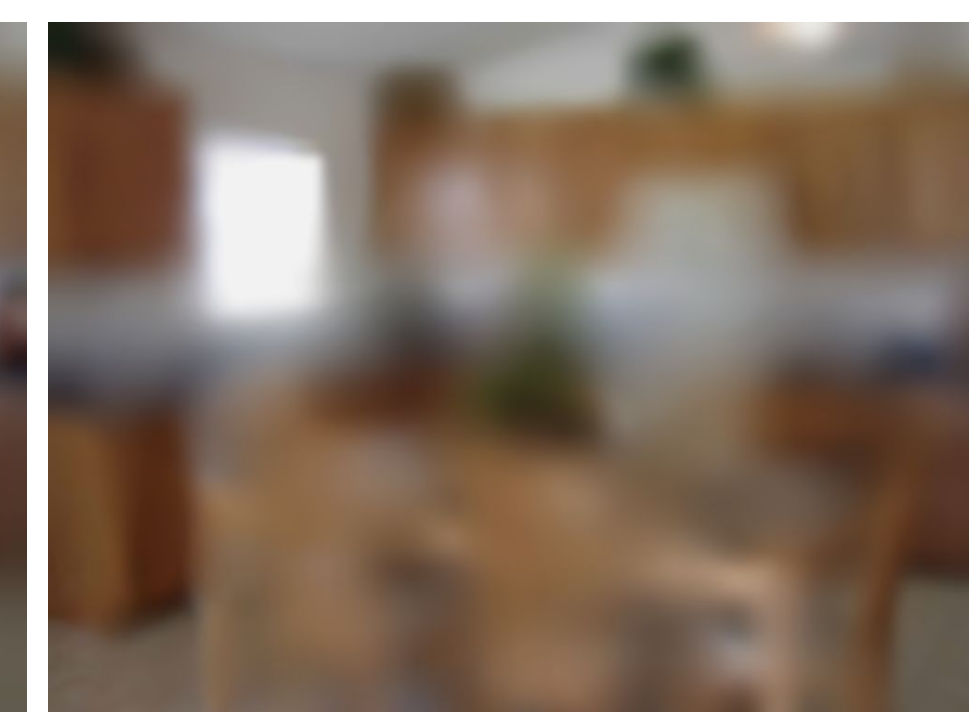
No Blur



Inverse Meaning Blur

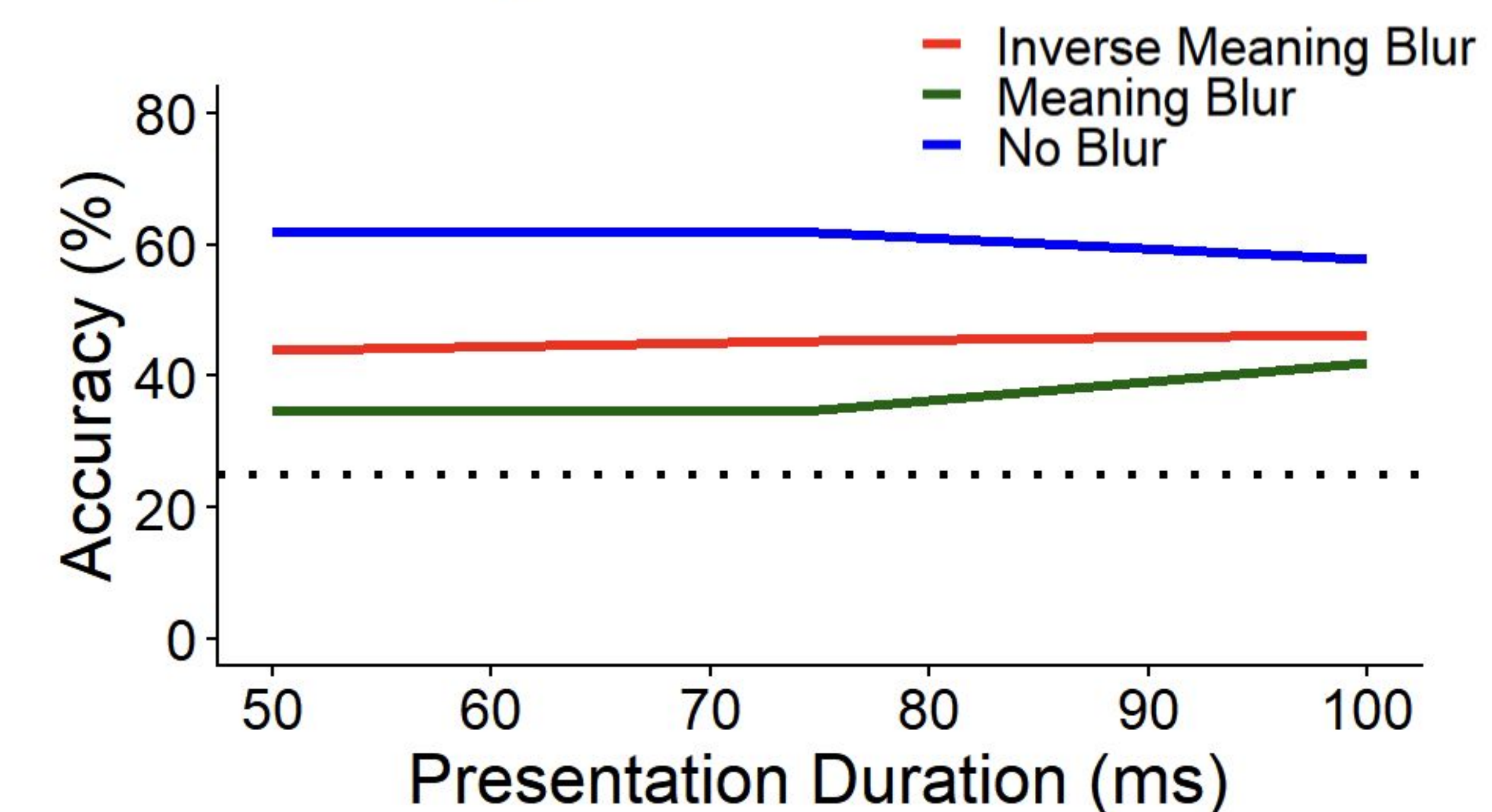


Meaning Blur

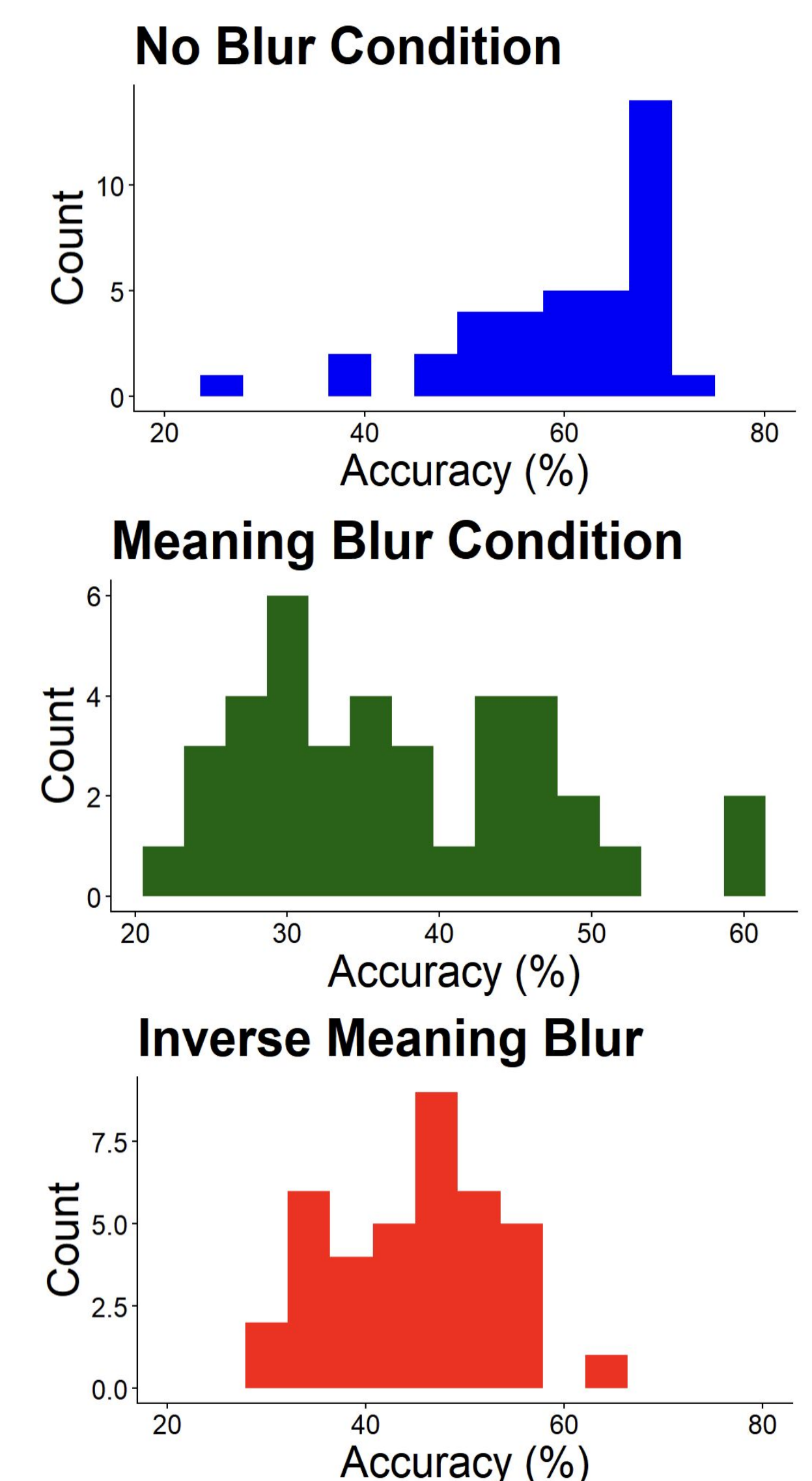


Results

Blurring Meaning Reduces Response Accuracy



% Accuracy Per Participant by Condition:



Conclusions

- Semantic meaning supports gist perception
 - When semantically dense regions are blurred, the task of scene categorization is harder

Future Directions

- Investigate the role of meaning on gist perception:
 - At longer scene presentation durations
 - In the absence of color information

References

Malcolm, G. L. (2014). Beyond Gist: Strategic and Incremental Information Accumulation for Scene Categorization. *Sage Journals*, 25(5). <https://doi.org/10.1177/0956797614522816>

Henderson, J.M., Hayes, T.R. Meaning-based guidance of attention in scenes as revealed by meaning maps. *Nat Hum Behav* 1, 743–747 (2017). <https://doi.org/10.1038/s41562-017-0208-0>

Hayes, T. R., & Henderson, J. M. (2021). Looking for Semantic Similarity: What a Vector-Space Model of Semantics Can Tell Us About Attention in Real-World Scenes. *Psychological Science*, 32(8), 1262-1270. <https://doi.org/10.1177/0956797621994768> (Original work published 2021)

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