

Face and Scene Learning: A Trade-Off in the Context of Appearance Variability

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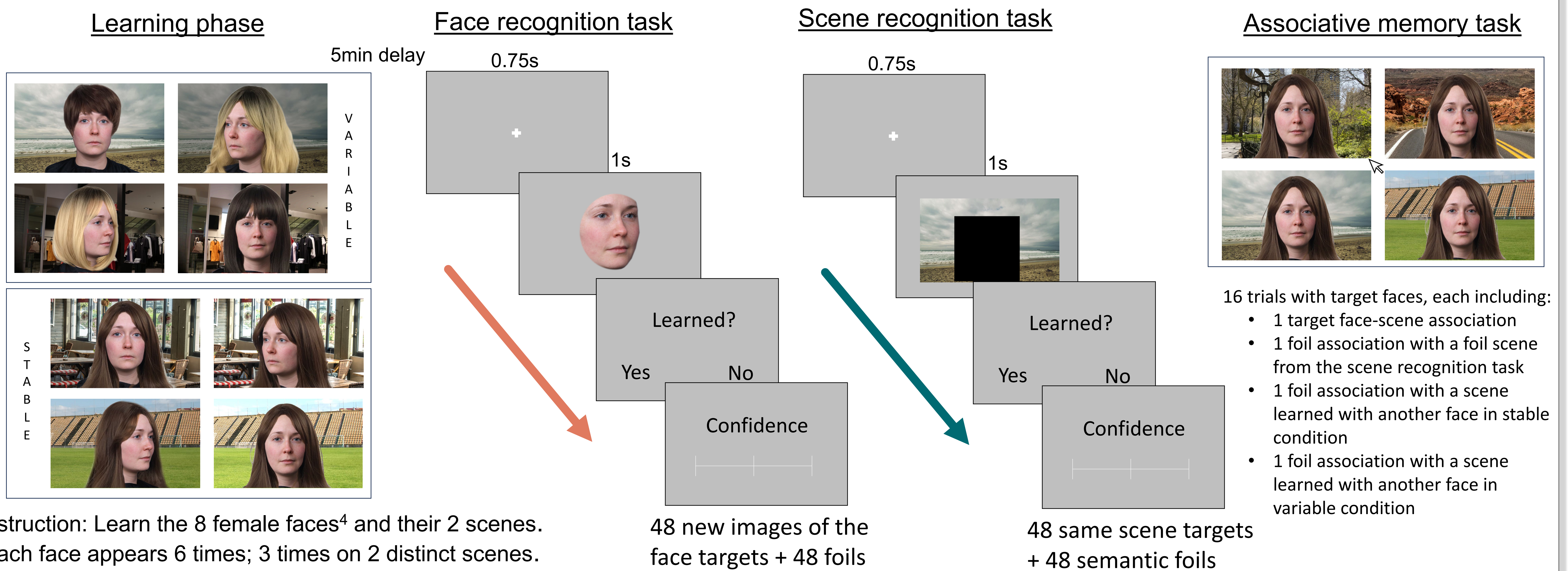
Introduction

- Face learning studies suggest that exposure to variations in facial appearance, such as hairstyle, improves the learning of novel faces^{2,3}. However, the cognitive mechanisms underlying the processing of facial variability remain poorly understood.
- The cost-efficient encoding hypothesis¹ proposes that variability in hairstyle may shift cognitive resources from low-cost, larger-scale information toward the more costly processing of fine-grained internal facial features.
- Hypotheses:** Within this framework, the internal features of faces with variable hairstyles should be better memorized than those of stable faces, at the expense of encoding external information. In contrast, stable faces should be processed at a larger scale and associated more strongly with external cues.
- Aim:** To investigate how hairstyle variability influences the allocation of processing resources between larger-scale scene information and internal facial features, and how this affects face–scene associative memory.

Methods

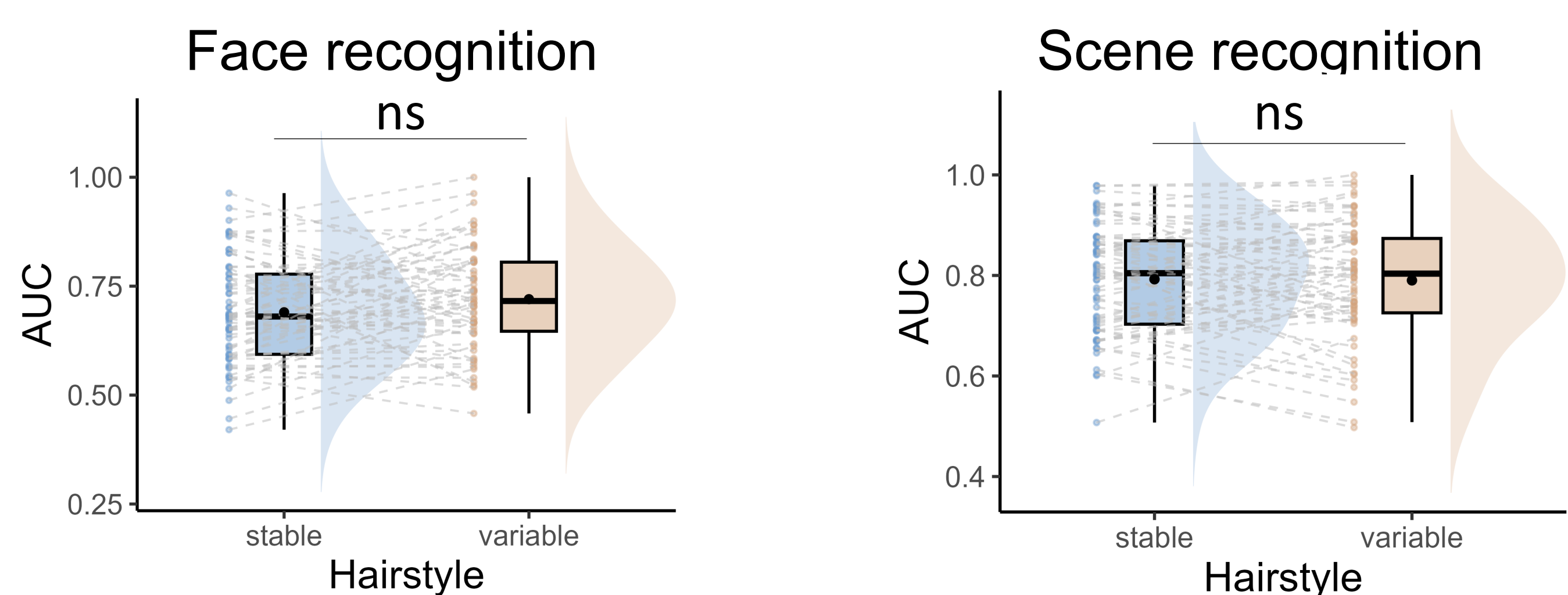
Participants: 64 (62 women; Mean age = 18.89, SD = 2.06).

Eyetracking acquisition throughout all the experiment.



Results

Area Under the ROC Curve (AUC)



Small but non-significant benefit of variability on sensitivity to faces
 $t(63) = -1.86, p = .068, d = 0.23$

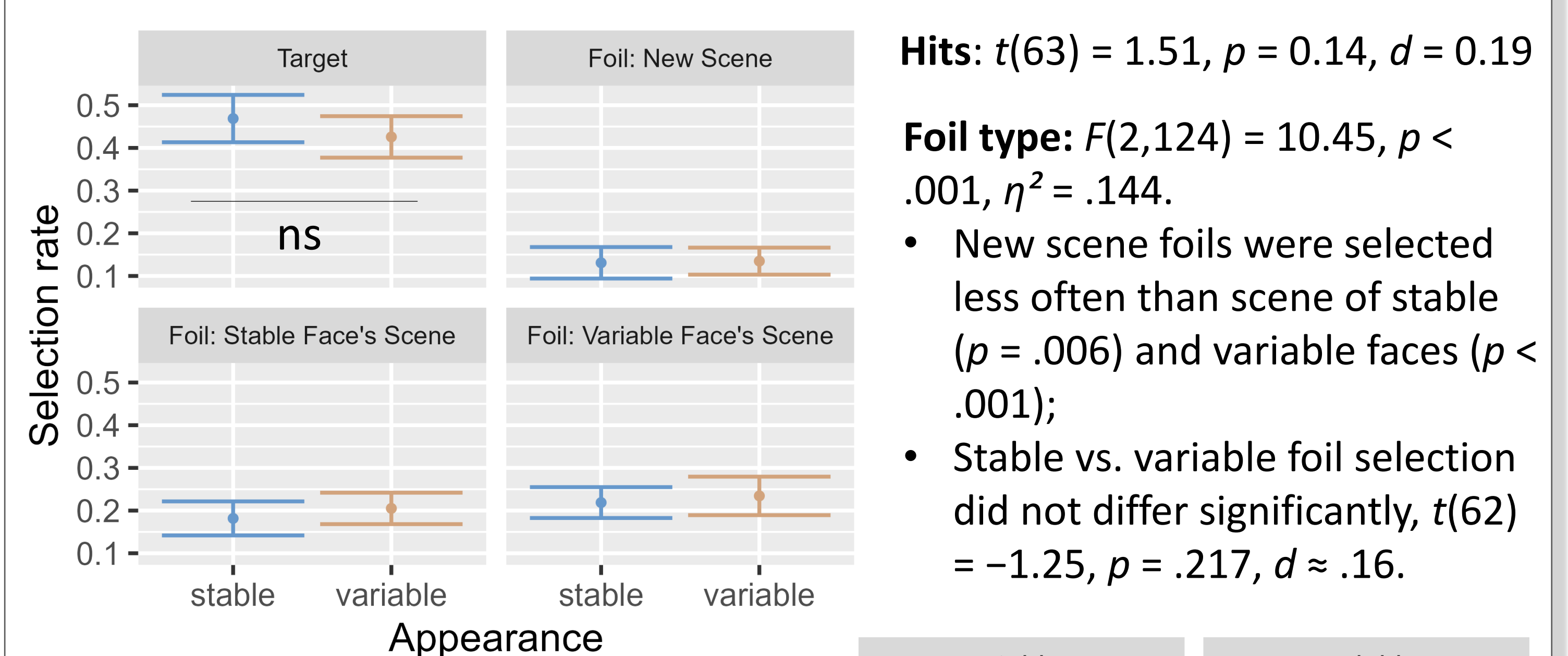
No effect of variability on sensitivity to scenes
 $t(63) = 0.19, p = .85, d = 0.02$

Correct reaction times (RT)

Task	Stable	Variable	Test	Result
Face recognition	M = 2091.35ms	M = 2057.57ms	Paired t-test	$t(63) = 0.61, p = .54, d = 0.08$
Scene recognition	Mdn = 1950.50ms	Mdn = 2033.67ms	Wilcoxon signed rank test	$V = 702, p = .024, r = 0.28$

→ But faster responses to scenes associated with stable faces

Accuracy for the association (% selection)

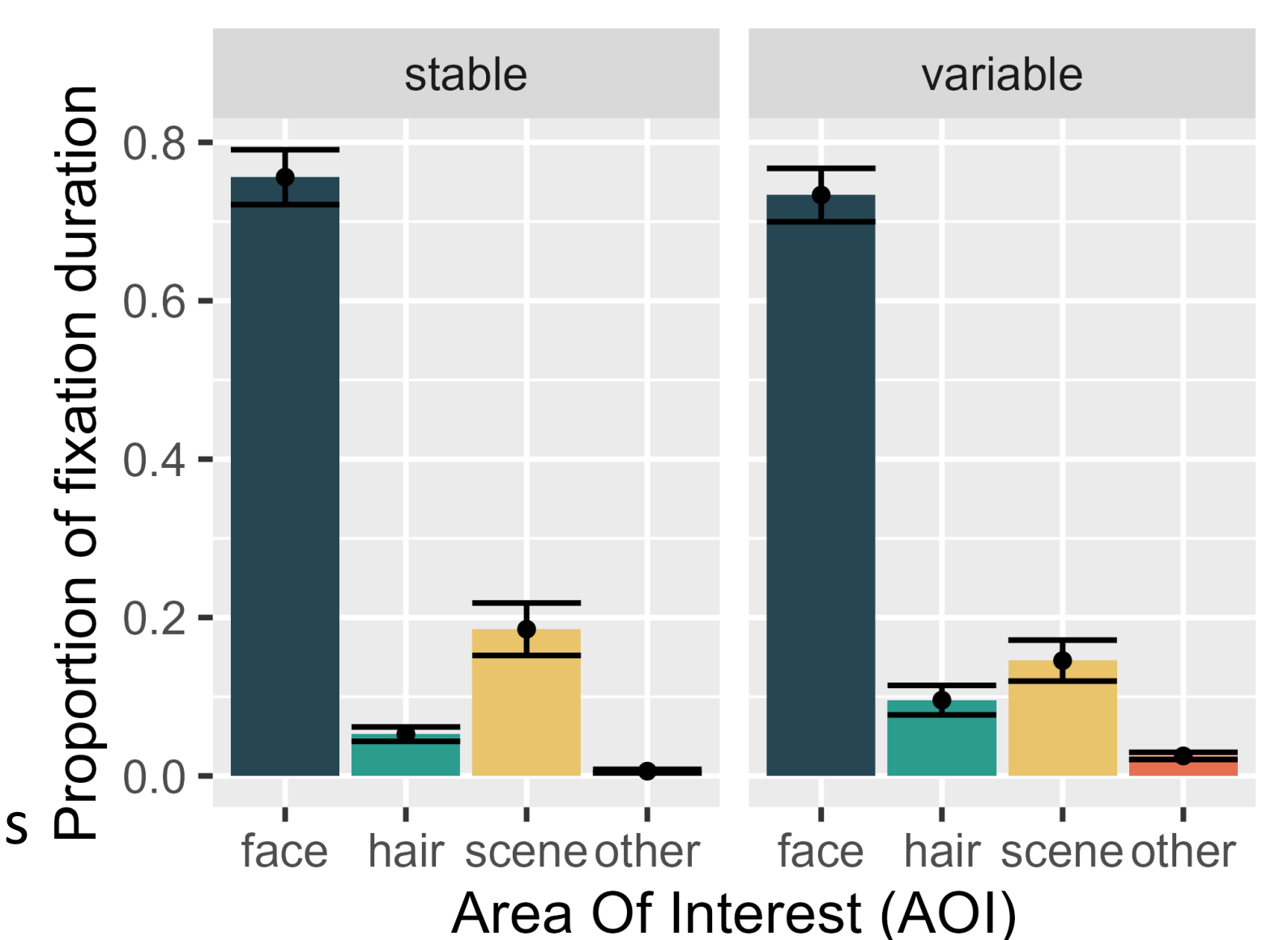


Paired t-test (BH Correction):
Face: $t(54) = 2.56, p = .01, d = 0.34$
Scene: $t(54) = 5.06, p < .001, d = 0.68$

Wilcoxon signed rank test (BH Correction):

Hair: $V = 93, p < .001, r = 0.76$

→ Variable hairstyles received longer fixations than stable ones, while fixations on the face and scene were reduced.



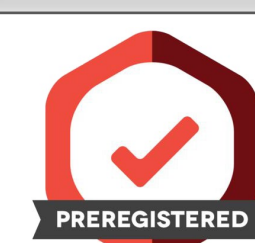
Conclusion

- In line with the cost-efficient encoding hypothesis, appearance variability showed trends toward greater encoding of fine facial details over larger-scale information.
- However, while enhanced scene memory for stable faces may reflect a shift in attentional allocation, the trend toward better memory for variable faces occurred despite reduced visual attention to their internal features.
- Further studies should investigate these trends in larger samples to better detect smaller effects.

References

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- Ritchie, K. L., & Burton, A. M. (2017). Learning faces from variability. *Quarterly Journal of Experimental Psychology*, 70(5), 897-905.
- Stirling/ESRC 3D Face Database ("pics.stir.ac.uk")

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