

Quantity over quality? The impact of the number of faces to learn and of their appearance on the robustness of facial representations

Wenrui LI^a, Christel DEVUE^a

^a Psychology and Neuroscience of Cognition, University of Liège, Belgium

✉ Wenrui.Li@uliege.be

Introduction

- Exposure to variable facial images can facilitate face learning¹, but this benefit is not consistently observed².
- Previous studies from our lab showed an **advantage for faces with variable hairstyle compared to faces with a consistent appearance when eight identities were learned**³, whereas studies with **four identities showed either no difference or a stable-face advantage**⁴.
- The **cost-efficient account of face learning**⁵ suggests that refinement of face representations depends on exposure and on a trade-off between task demands and cognitive costs. We therefore tested whether **learning load** (i.e. number of faces to learn, low/four vs. high/eight) could account for these different findings.

Research question: Does learning load influence the effect of appearance variability on face recognition?

Predictions: 4 faces > 8 faces overall, with a benefit of **variable appearance only in the high learning load condition**.

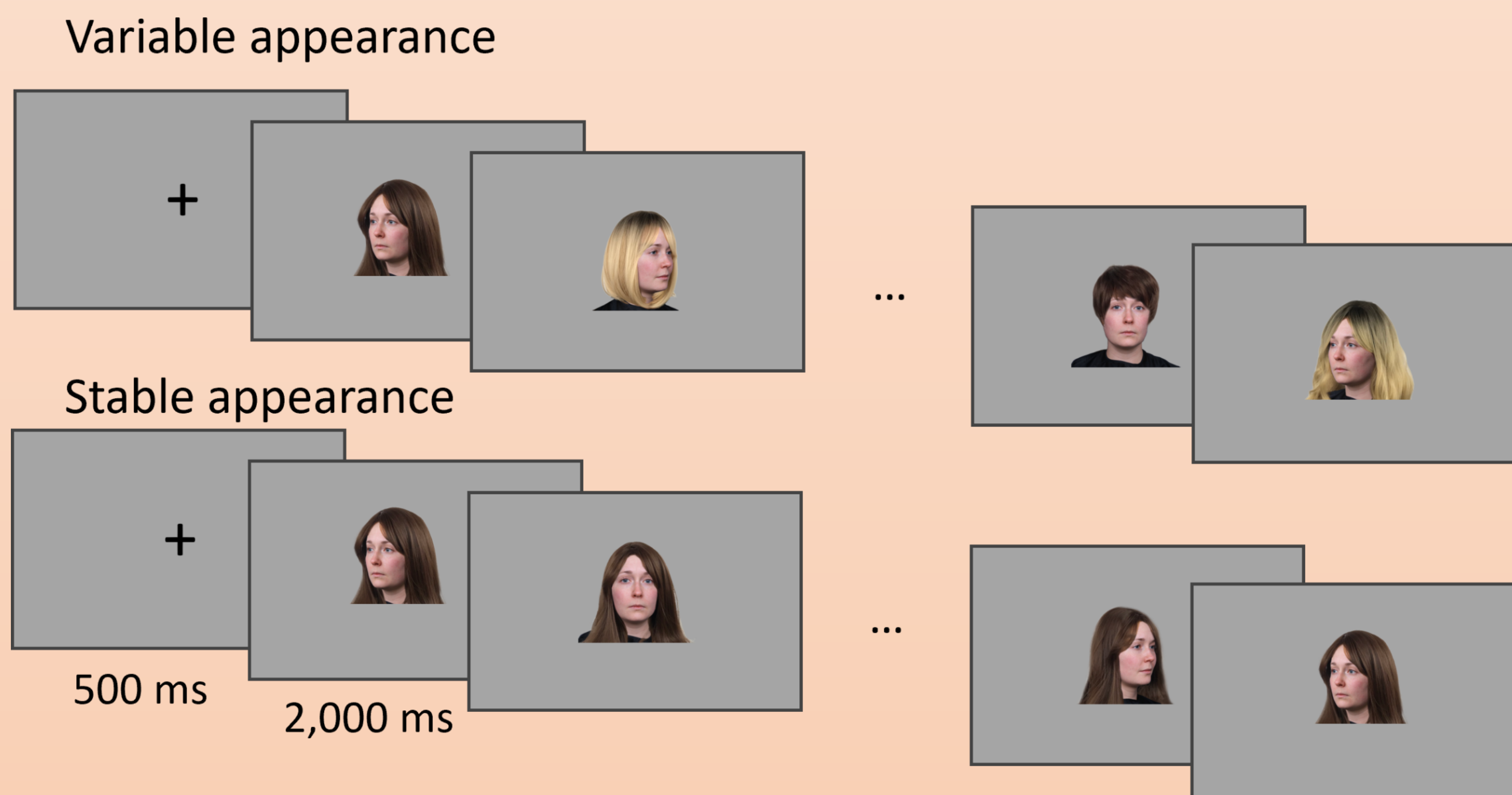


Method

N = 235 | **Number of faces:** 4 ($n = 118$) vs. 8 ($n = 117$) (between-subjects) | **Appearance:** stable vs. variable (within-subjects)

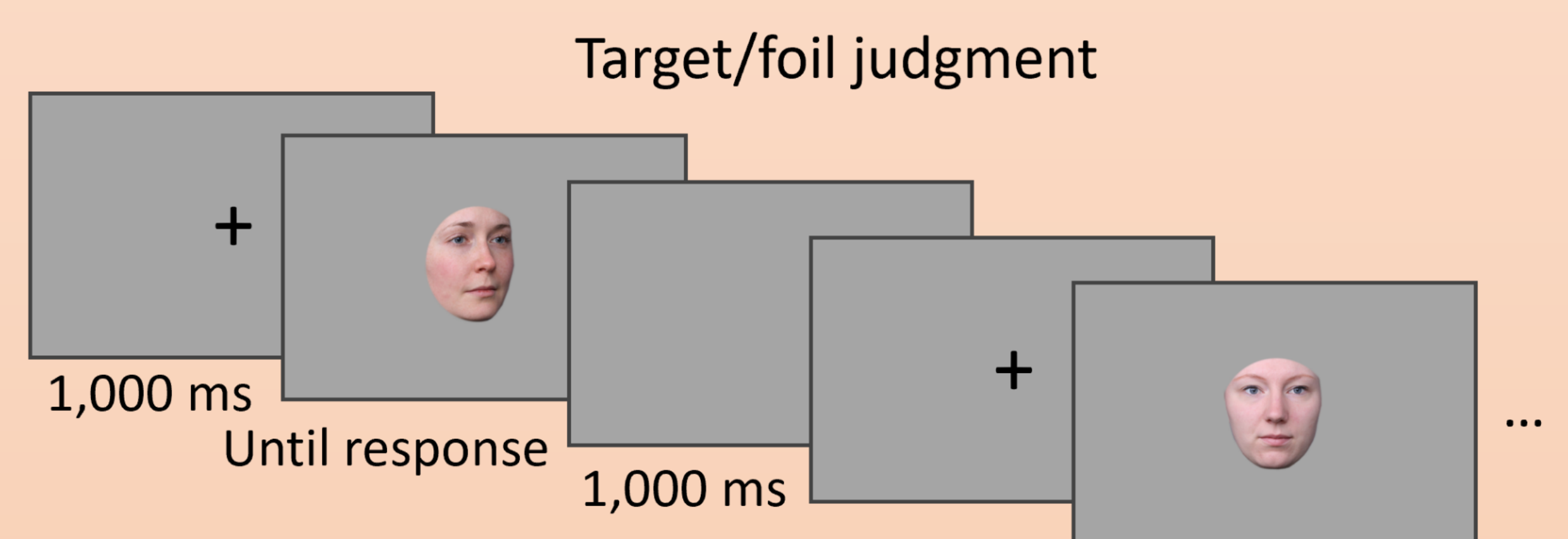
4-face condition: 2 stable + 2 variable | **8-face condition:** 4 stable + 4 variable

Learning phase



Recognition test

Internal facial features only

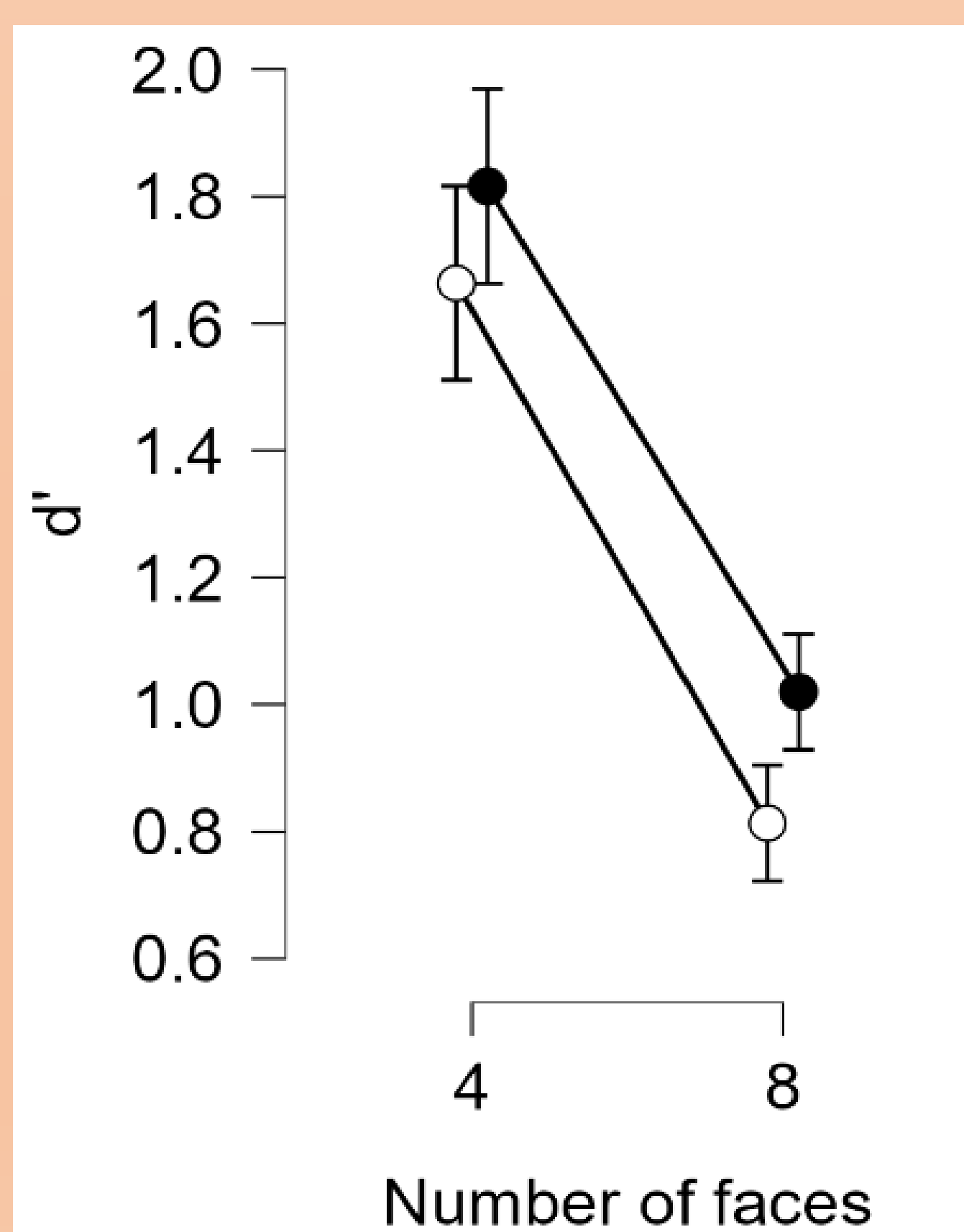


6 images/identity · 3 viewpoints · varying lighting · blocked by identity

6 images/identity · 3 viewpoints · varying lighting

Results

Recognition sensitivity (d')



○ Stable ● Variable

Number of faces: $p < .001$, $\eta_p^2 = .142$

Appearance: $p = .005$, $\eta_p^2 = .007$

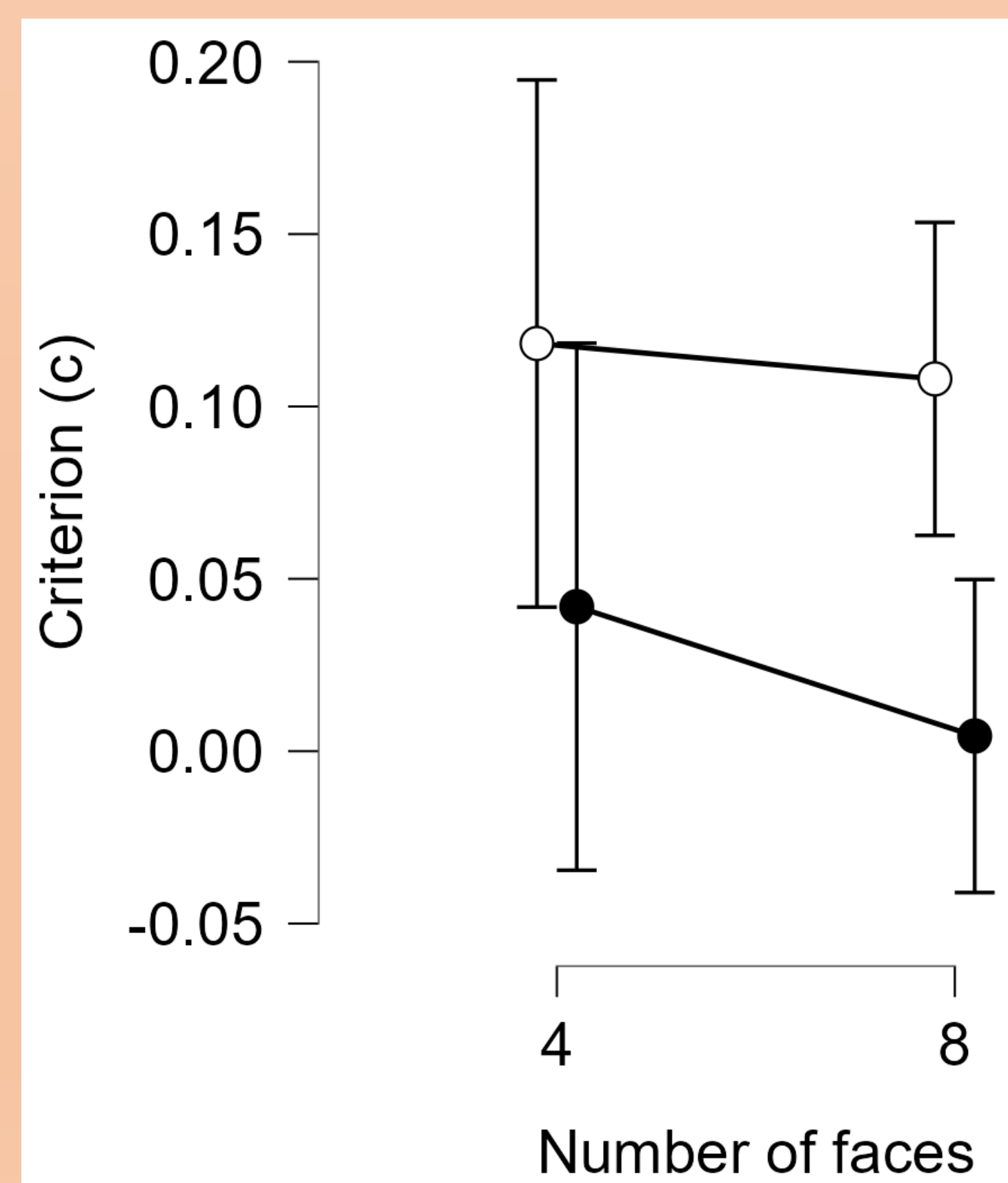
Interaction: $p = .684$, $\eta_p^2 < .001$

Planned comparisons:

8 faces: Variable > Stable, $p = .002$, $d = .29$

4 faces: no difference, $BF_{01} = 3.79$

Response criterion (c)



○ Stable ● Variable

Number of faces: $p = .714$, $\eta_p^2 < .001$

Appearance: $p = .005$, $\eta_p^2 = .007$

Interaction: $p = .683$, $\eta_p^2 < .001$

Conclusions

- Learning load substantially affected face recognition, with better performance for four than eight faces.
- Appearance variability showed a small overall benefit, with a variable-face advantage observed in the eight-face condition.
- Learning load may therefore be important for understanding when appearance variability benefits face learning.

- Baker, K. A. & Mondloch, C. J. (2019). Two sides of face learning: Improving between-identity discrimination while tolerating more within-person variability in appearance. *Perception* 48(11), 1124–1145.
- Baker, K. A., Laurence, S., & Mondloch, C. J. (2017). How does a newly encountered face become familiar? The effect of within-person variability on adults' and children's perception of identity. *Cognition*, 161, 19–30.
- Nguy, K., Iapadula, t., & Devue, C. (2026, June 16). The Effect of Variability in Appearance and Context on Face Learning.
- Li, W., Legrand, R., & Devue, C. (2026, April 13). The role of variability in appearance, exposure and learning procedure in dynamic face learning (Version 3) [Preprint]. OSF Preprints.
- Devue, C., & de Sena, S. (2023). The impact of stability in appearance on the development of facial representations. *Cognition*, 239, 105569.