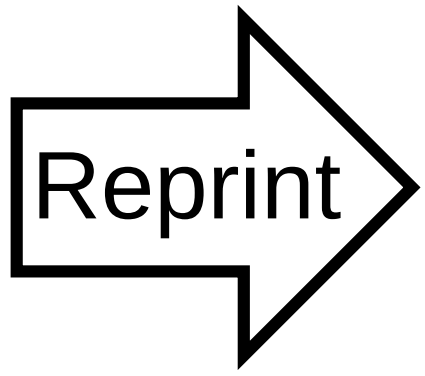


There is context and context – How variations in appearance and design-induced context shape face learning

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Background

- Face learning studies show that exposure to natural variations in images (e.g. in lighting, viewpoint, background or physical appearance) facilitate learning new facial identities¹.
- However, real-world evidence indicates that stability in appearance may aid early learning, with variability only becoming helpful to refine representations later².
- While variations in lighting and viewing angle are well-known to support the development of image-independent representations in lab-based studies³⁻⁴, the specific role of variations in physical appearance or background remain unclear.
- Based on a cost-efficient encoding hypothesis², which postulates that we memorize faces through a coarse-to-fine processing, we assumed that whenever appearance or context were discriminant enough, the resolution of facial representations should be lower than when variations encourage refinement.

Aims

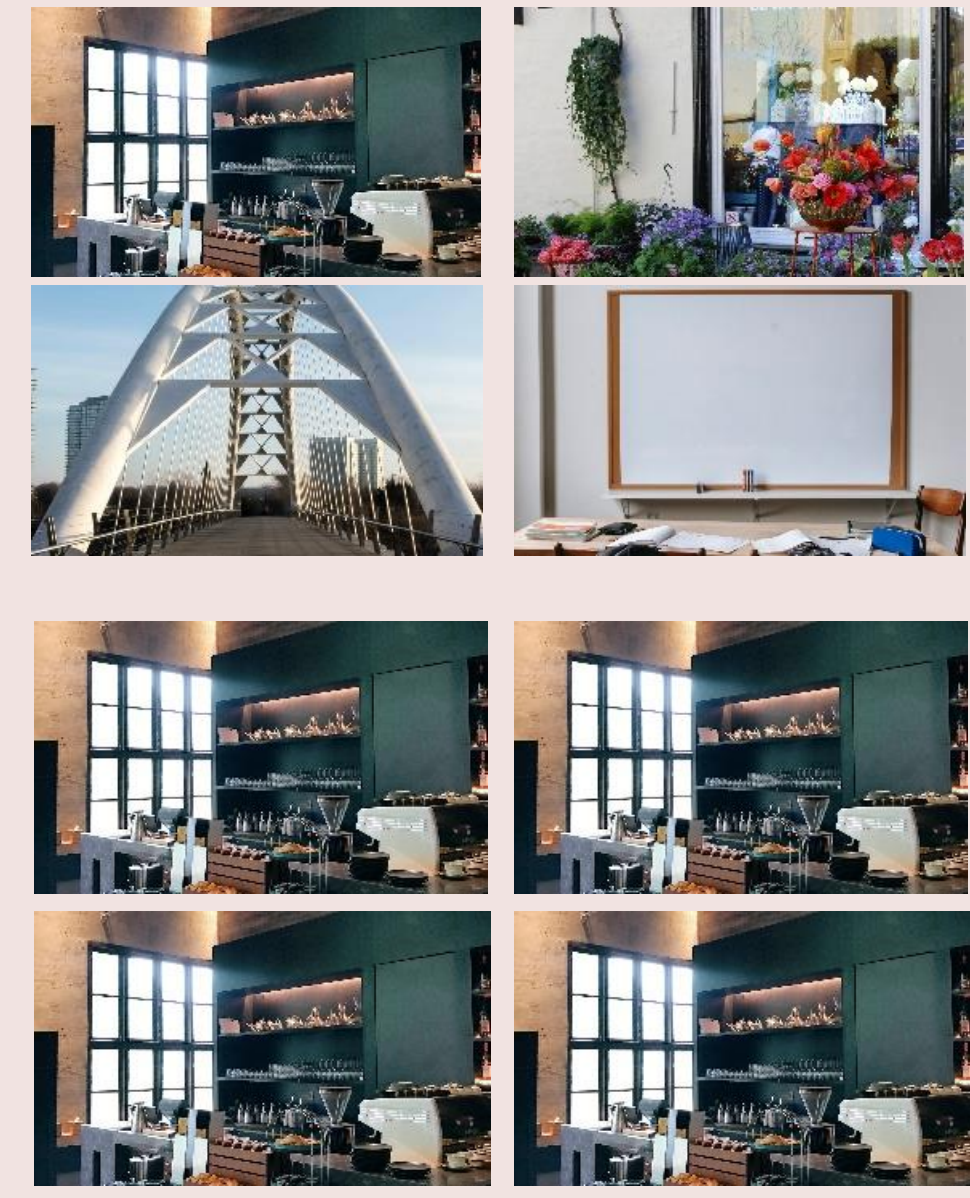
We conducted two pre-registered experiments to tease apart the role of stability in appearance (stable vs. variable hair colour and style) and context (stable vs. variable background scene) during face learning.

Methods & Hypotheses

Learning materials:
8 women from the Stirling/ESRC 3D Face Database, 6 images each
→ 4 learned as stable and 4 learned as variable (counterbalanced)



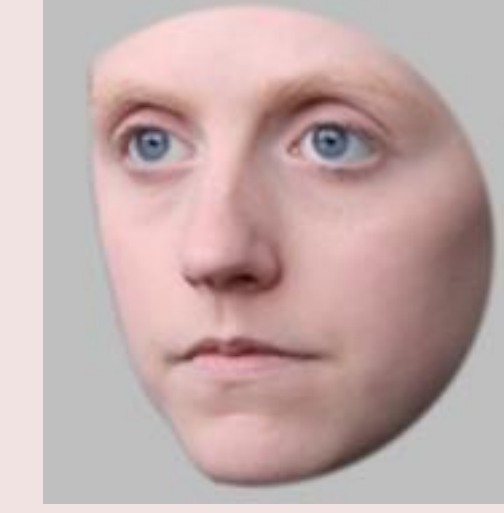
14 images indoor/ 14 outdoor scenes per participant



Testing materials = cropped images
8 learned targets (6 new images each)



8 foils (6 images each)



Experiment 1

Participants: 84 (58 women, 26 men; Mean age = 23.38, SD= 4.76).

Learning procedure: **eight identities learned in separate blocks** of 6 images (2.5s)
= **standard lab-based method** + eye-tracking.

Experiment 2

Participants: 84 (79 women, 5 men; Mean age = 19.69, SD= 2.44).

Learning procedure: 6 images (2.5s) of **eight identities presented at random**
= **unsupervised learning**, closer to real-world exposure.

Hypotheses:

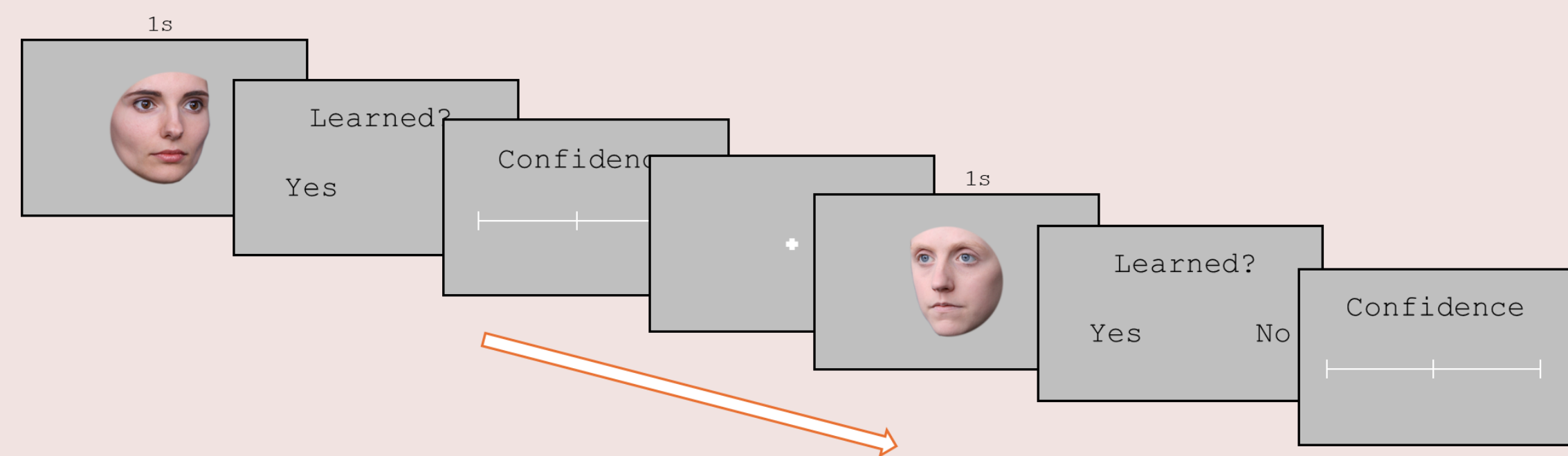
Stability in appearance and context should...

... encourage a coarse encoding (poorer recognition) while variability should help focus attention on diagnostic inner facial features (improved recognition performance).

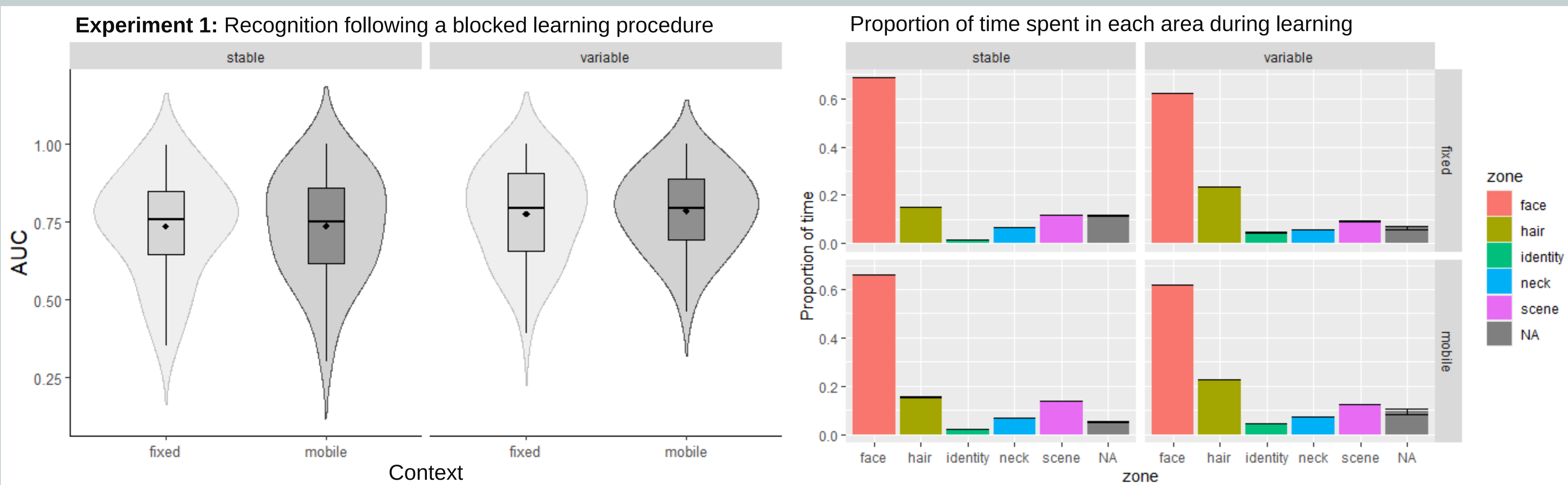
... support identity matching during learning and encoding of diagnostic facial features, improving subsequent recognition compared to variable conditions.

Delayed recognition test:

After 20 minutes.
96 trials (6 images x 16 identities).



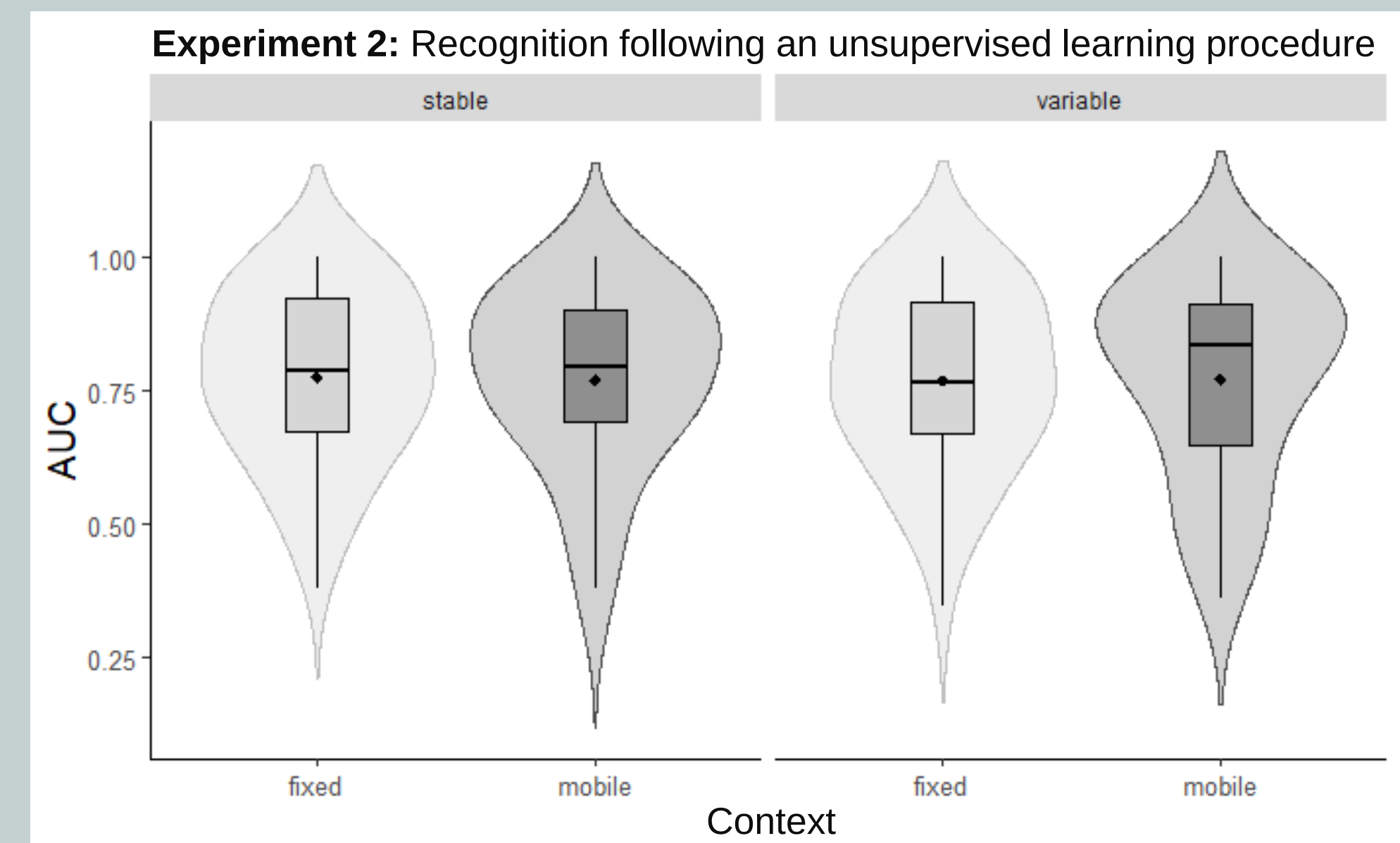
Results & Discussion



Main effect of appearance, $F(1,83) = 11.98, p < 0.001, \eta_p^2 = 0.13$. No main effect of context or interaction, all $F_s < 1$.

Inner features of variable faces are recognised better than those of stable faces, even though they were fixated less long during learning in favour of hair. This suggests a more efficient processing of inner features in variable faces.

An influence of context could be hindered by the blocked presentation, which creates some unifying context in itself.



No significant main effect of appearance, context or interaction, all $F_s < 1$.

No significant effect on reaction times or confidence ratings in either experiment.

Exploratory analyses comparing the two experiments show that performance with stable faces improved in Experiment 2 (unsupervised learning) compared to Experiment 1 (blocked learning). Therefore, unsupervised learning may encourage a more reliable encoding of inner facial features in all faces.

Conclusions

We found a specific benefit of variations in appearance, but only in a blocked learning procedure. Such procedure may discourage observers from attending to inner features of stable faces as intently because they easily recognize them from image to image (“illusion of familiarity”⁶).

The blocked format commonly used in face learning studies may inflate benefits of variability, potentially diverging from learning processes observed in more naturalistic settings.

Unexpectedly, there was no significant effect of context, possibly because we instructed participants to learn the women’s faces rather than the whole images.

References

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