Variability and face learning: A novel controlled stimuli set

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BACKGROUND

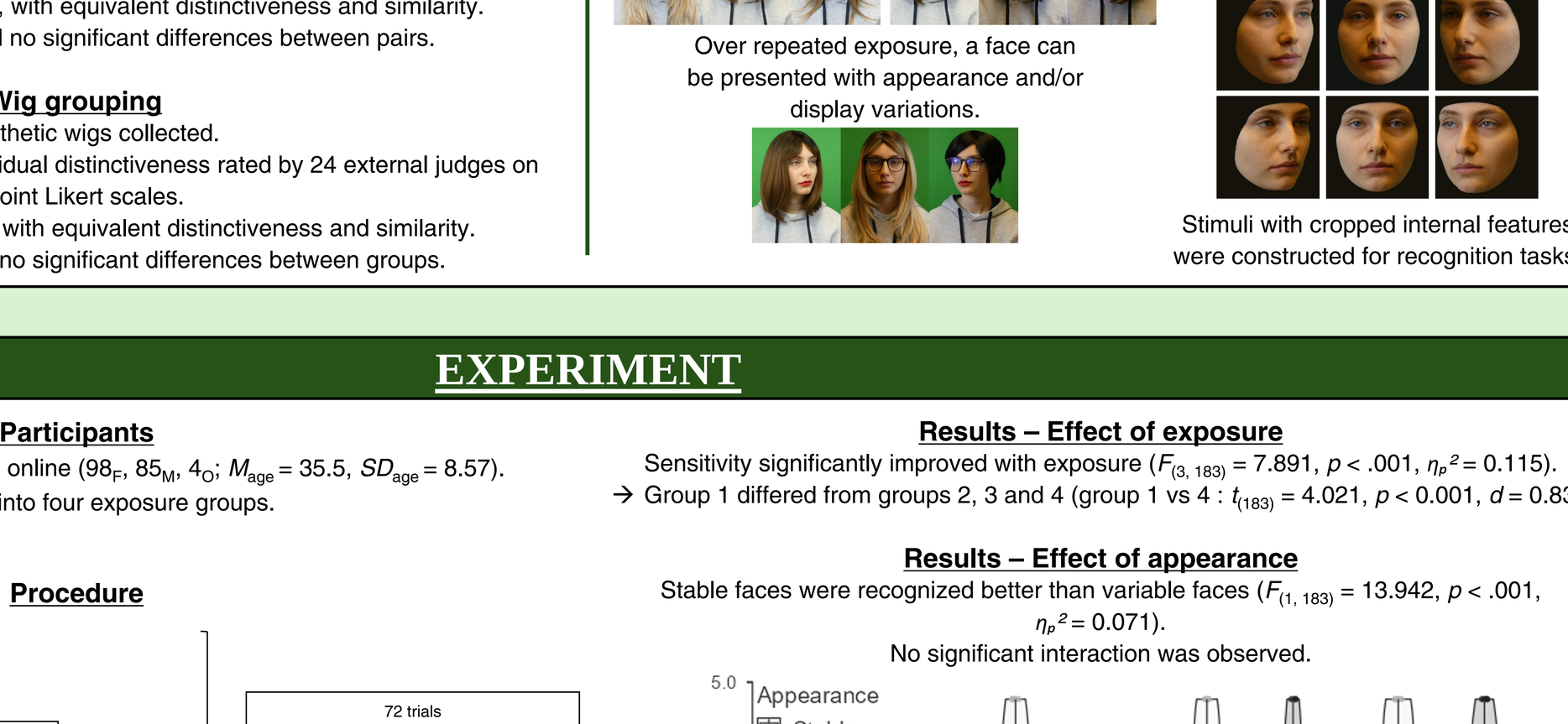
- "Within-person variability" is believed to promote the development of robust facial representations[1].
- Recent studies distinguish between **appearance** variability (changes in facial features) and **display** variability (changes in viewing conditions)[3,4,6].
  - → Appearance variability is believed to affect the familiarization process, yielding different representations for "stable" versus "variable" faces[4,6].
  - → However, most experimental materials do not distinguish between these two types of variability[6,7].

➔ We developed the first experimental database with a clear separation between appearance and display variability and present the first experiment to use it.

MATERIAL

8,064 video clips and 2,016 images of four pairs of female Caucasian faces were obtained.

Appearance and **display variability** can be independently manipulated.



Each actress is filmed and photographed in **28 unique appearance conditions**

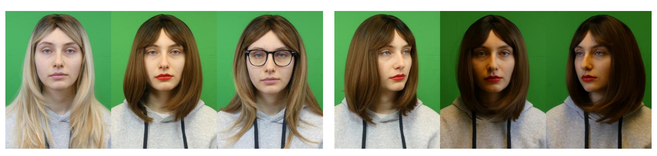
Each appearance condition is **filmed in 36 display conditions** and **photographed in 9 display conditions**

Actress pairing

12 Caucasian actresses recruited.
Pretest: Pairwise similarity and individual distinctiveness of internal features rated by 22 external judges on 7-point Likert scales.
Grouping: 4 pairs were formed, with equivalent distinctiveness and similarity.
Analysis: t-tests confirmed no significant differences between pairs.

Wig grouping

25 synthetic wigs collected.
Pretest: Pairwise similarity and individual distinctiveness rated by 24 external judges on 7-point Likert scales.
Grouping: 4 groups of 6 wigs, with equivalent distinctiveness and similarity.
Analysis: t-tests confirmed no significant differences between groups.



Over repeated exposure, a face can be presented with appearance and/or display variations.

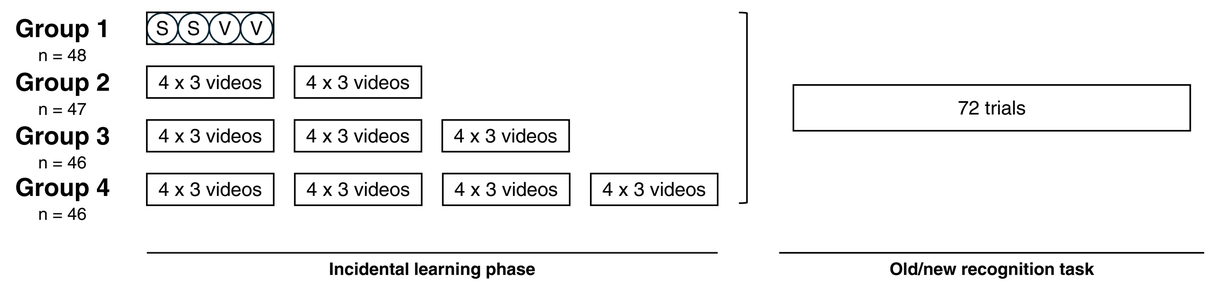
Stimuli with cropped internal features were constructed for recognition tasks.

EXPERIMENT

Participants

187 healthy participants recruited online (98_F, 85_M, 4_O; M_{age} = 35.5, SD_{age} = 8.57).
→ Divided into four exposure groups.

Procedure



Stimuli

4 faces learned
- 2 stable (display variations)
- 2 variable (display + appearance variations)

} Learned in blocks of three videos with consistant display variability

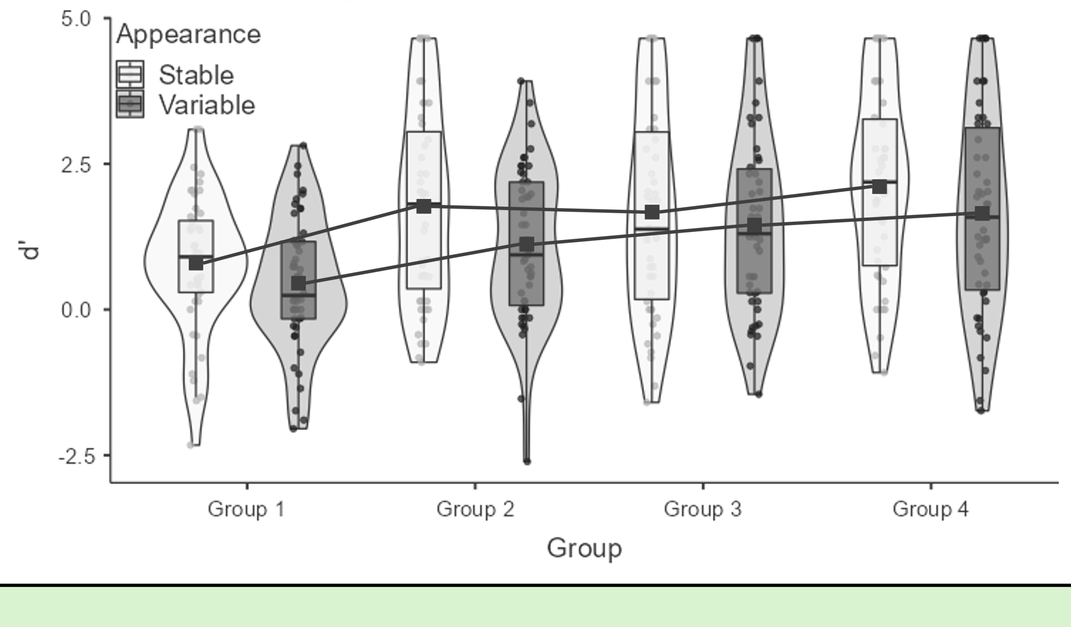
+ Old/new recognition task using cropped images of the 8 actresses: 3 x 24 trials.

Results – Effect of exposure

Sensitivity significantly improved with exposure ($F_{(3, 183)}$ = 7.891, p < .001, η_p^2 = 0.115).
→ Group 1 differed from groups 2, 3 and 4 (group 1 vs 4 : $t_{(183)}$ = 4.021, p < 0.001, d = 0.83).

Results – Effect of appearance

Stable faces were recognized better than variable faces ($F_{(1, 183)}$ = 13.942, p < .001, η_p^2 = 0.071).
No significant interaction was observed.



DISCUSSION

These preliminary results demonstrate that our material supports face learning, likely benefiting from various facilitators embedded within the paradigm. However, refinements are needed to capture the finer details of the learning process.
Unexpectedly (though not unprecedented[4,5]), stable faces were better recognized across all exposure levels. While these results do not replicate the modulating effect of appearance variability[4], they challenge current leading theories of face learning[2].

Our findings suggest that a more nuanced framework is needed to explain the unexpected effects of variability.

PERSPECTIVES

- → Further investigations to determine the parameters under which the effect of within-person variability is expressed.
- → Test alterations to the paradigm's parameters to determine the conditions under which differentiation of representations based on appearance emerges.
- → Increase statistical power by adopting a within-subject design to examine intermediary steps of the familiarization process.

This experimental material addresses a gap in the current literature and offers insights that unconstrained ecological stimuli appear to overlook.

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Study preregistration: osf.io/v3zax

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