Age-related decline in face identification can be trained away, and is explained by horizontal bias.

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Background

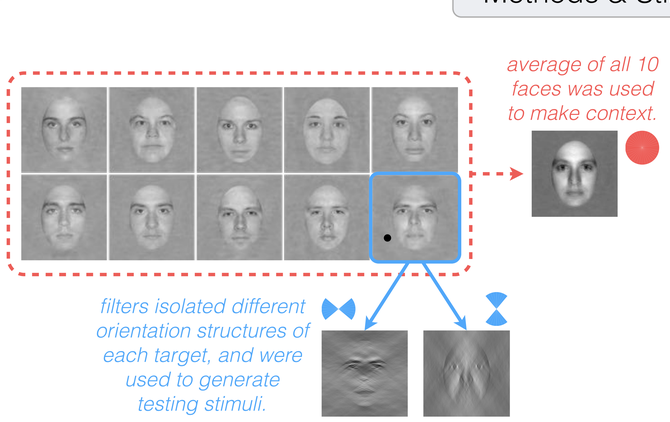
Information diagnostic for face identity is carried by a narrow orientation band centred around horizontal.[1,2]

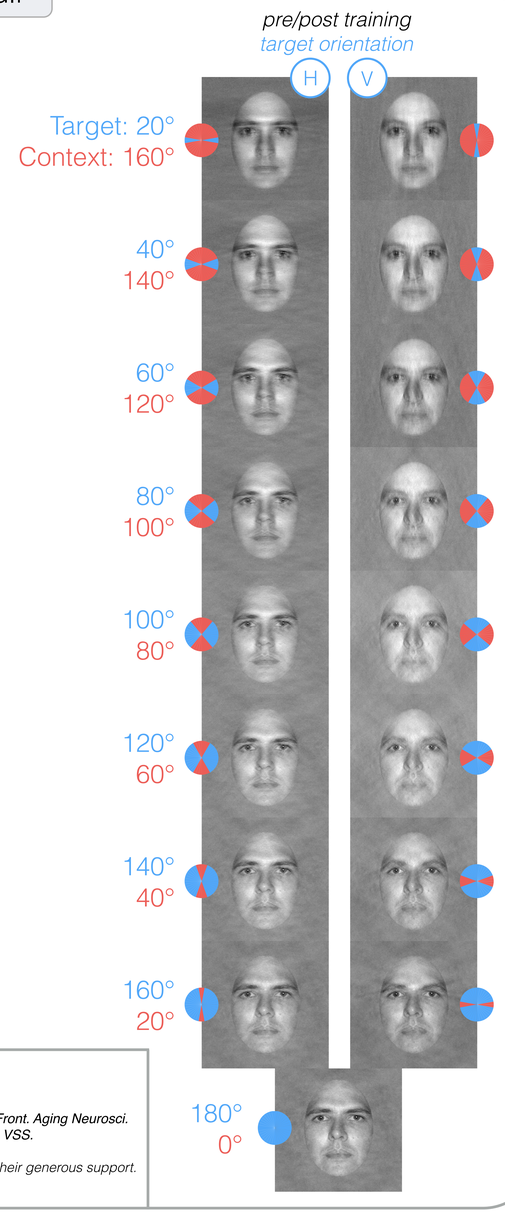
More efficient use of diagnostic information by young adults correlates with upright face identification accuracy[2], enhanced identification of familiar upright faces[3], and improvements from training on inverted faces.[4]

Older adults are less accurate at face identification, and rely less on horizontal structure[5,6] for broad orientation bands, especially when diagnostic identity structure is presented in a facial context.[6]

Can training improve older adults' identification of upright faces?
Are changes in the use of specific orientation bands able to explain such improvements?

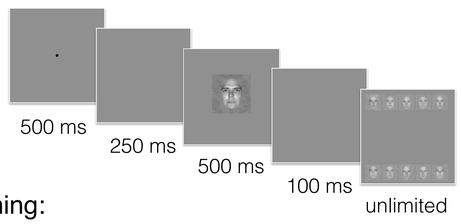
Methods & Stimuli





Observers:
12 older adults (67-77 years old; mean = 70.8; 6 males)

Trial structure:



Pre- & post-training:
Observers identified orientation all 17 orientation manipulation conditions for all 10 identities, repeated twice (total of 340 trials in each of sessions 1 and 5).

Training:
Observers identified 10 full, unfiltered upright faces ( ), 40 times per identity per session, for a total of ~1200 trials across sessions 2, 3, and 4.

Horizontal bias = $p(correct)_{HORIZONTAL} - p(correct)_{VERTICAL}$

References

1.Goffaux & Dakin, (2010). *Front. Psychol.*
2.Pachai, Sekuler & Bennett, (2013). *Front. Psychol.*
3.Pachai, Bennett, Schyns, Sekuler & Ramon, (in press). *JoV.*
4.Pachai, Sekuler & Bennett, (2012). *VSS.*
5.Obermeyer, Kling, Schaich & Knopt, (2012). *Front. Aging Neurosci.*
6.Sekuler, Pachai, Creighton & Bennett, (2014). *VSS.*

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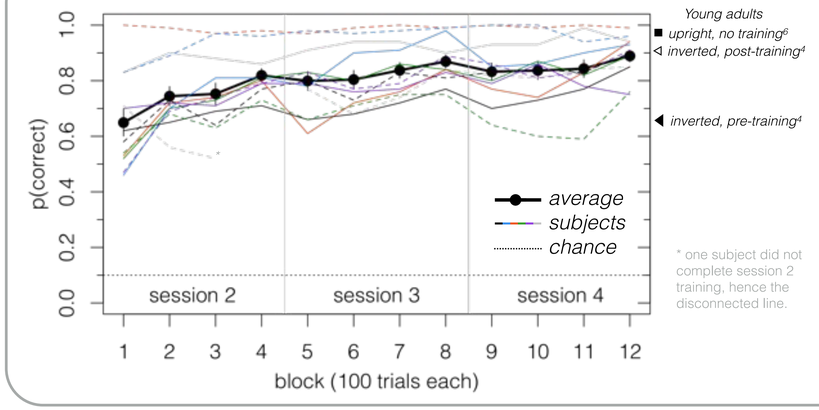
Training: Older adults improved in upright face discrimination.



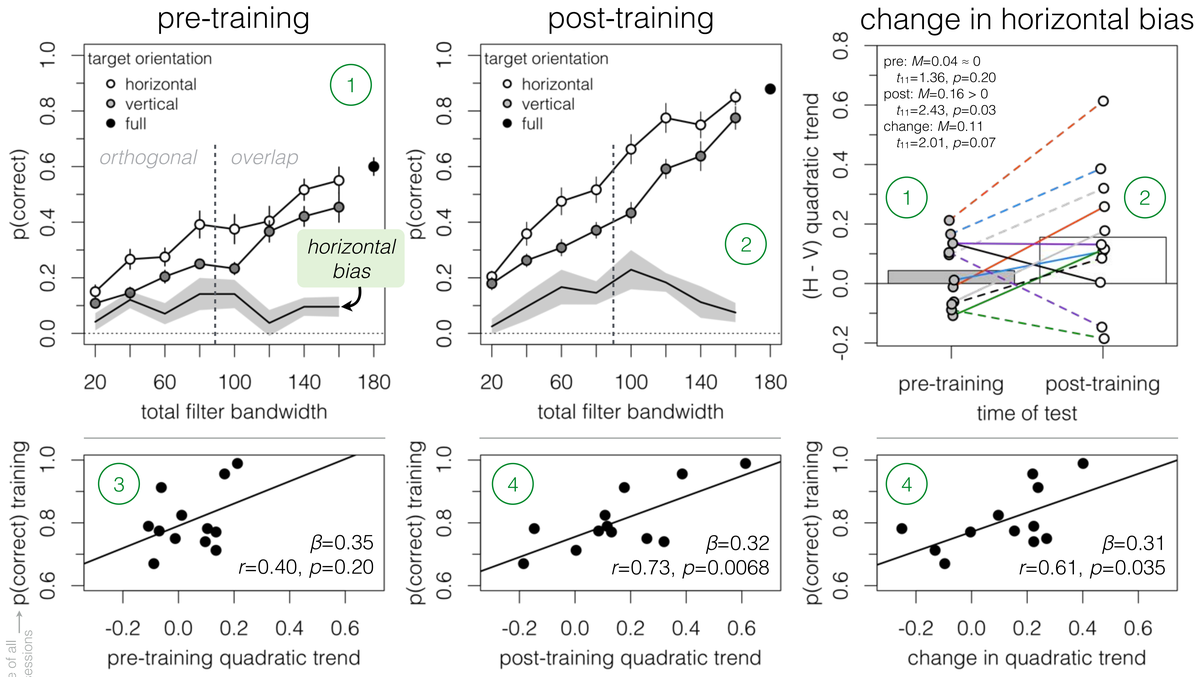
Training improved overall face identification accuracy in older adults.

Mean improvement:
0.24 ± 0.046 SEM

Linear trend test
$t_{11} = 5.93$, $p<0.0001$

Quadratic and cubic trends were smaller, but also significant.

Testing: Learning increased horizontal bias for almost all subjects.



① Pre-training: Observers showed small bias towards horizontally oriented structure.

② Post-training: Bias for broad-band horizontally oriented structure increased following training.

③ Pre-training horizontal bias did not correlate with overall face identification accuracy.

④ Post-training, and pre-to-post change in horizontal bias, both correlate with face identification accuracy.

Age-related deficits in upright face identification can be reduced, and the reduction is limited to changes in orientation structure bias. Training paradigms to enhance face perception with seniors should consider promoting better use of diagnostic orientation structure.