Horizontal selectivity of behavioural and ERP markers of face identification with aging

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Introduction

Horizontal structure contains diagnostic information for face identification[1]

In young adults, preferential use of horizontal information (horizontal tuning) is correlated with face identification accuracy[2]

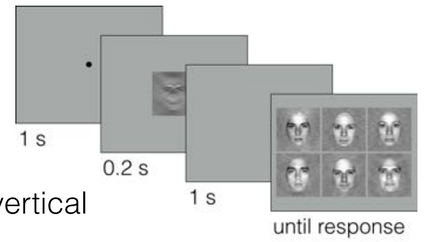
In the absence of horizontal information, the N170 is delayed and smaller[3]

Aging impairs face identification ability[4]

Is the age-related decline in face identification accuracy associated with age-related decline in horizontal tuning? Is this represented in the N170?

Methods

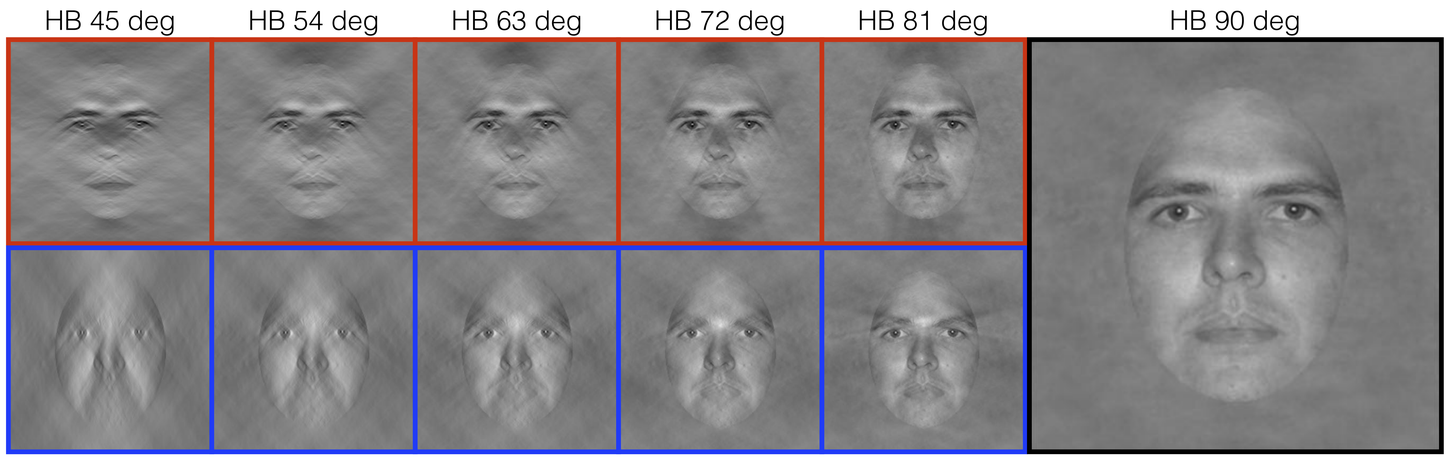
9 older adult (3 male, mean age = 73 ± 7.3), 11 younger adult (3 male, mean age = 22 ± 3.8) observers

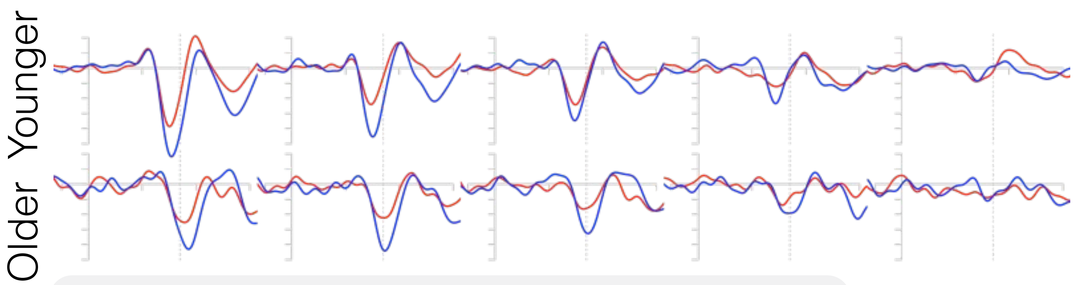


Stimuli were 45-90 deg band-pass filtered, centred on either horizontal or vertical

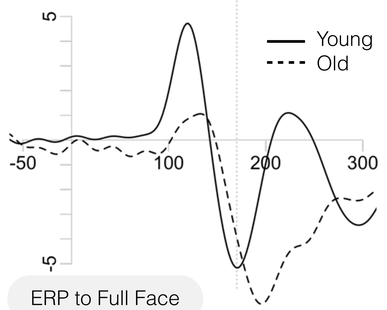
84 trials per condition, 6-AFC full face response screen

EEG: 256-channel EGI geodesic net; 500 Hz sampling rate; Referenced to Cz; 30 Hz lowpass filter; 15 electrodes around PO7 & PO8





Difference waves: Full Face minus Horizontal Base Full Face minus Vertical Base



ERP to Full Face

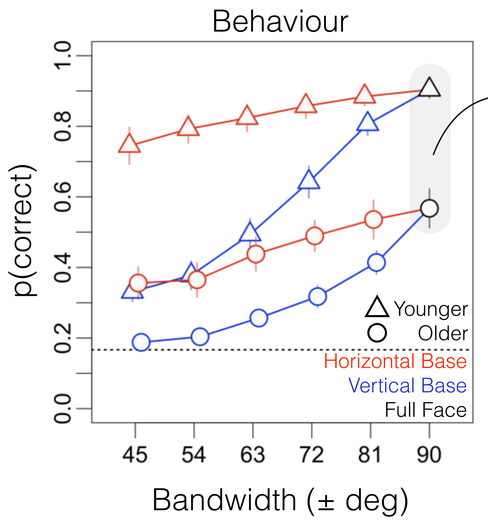
Results

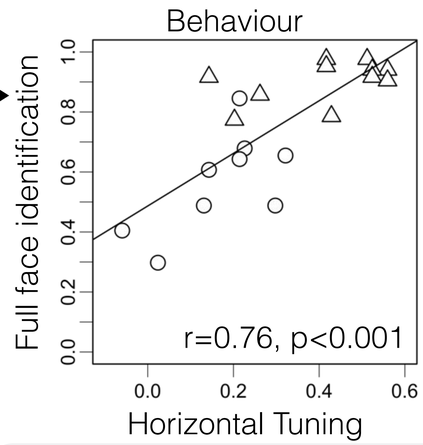
Identification accuracy increases as horizontal structure is added, and the effect is larger in younger adults

Horizontal tuning predicts full face identification accuracy

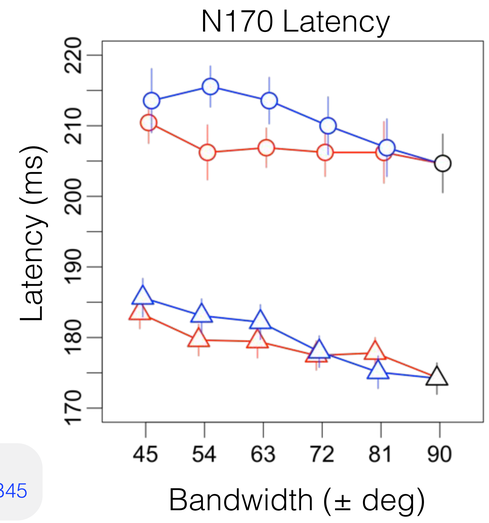
Significant age differences in N170 latency, but only trending in amplitude

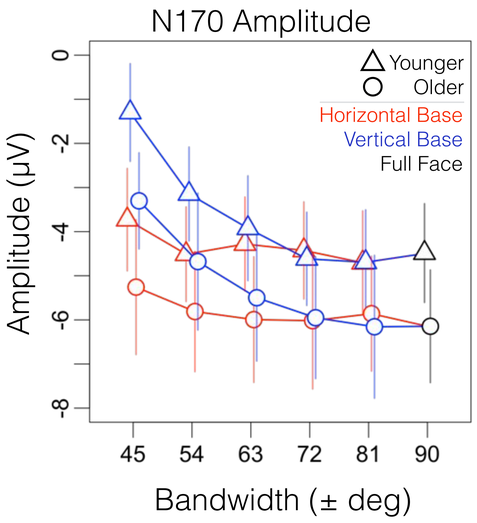
Horizontal structure associated with shorter N170 latency and larger N170 amplitude, but these effects do not differ between age groups





Horizontal tuning was measured as the difference in proportion correct from HB45 to VB45





Conclusions

Older adults display less behavioural horizontal selectivity than younger adults, contributing to reduced identification accuracy

No loss in N170 horizontal tuning in older adults, suggesting a separation of brain and behaviour at the N170

Next: Will perceptual training for horizontal structure improve face recognition in older adults?

References

1. Dakin & Watt, *J Vis* 2009
2. Pachai et al., *Front Psychol* 2013
3. Hashemi et al., VSS 2014
4. Konar et al., *Vis Res* 2013

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