The N170 is driven by the presence of horizontal facial structure

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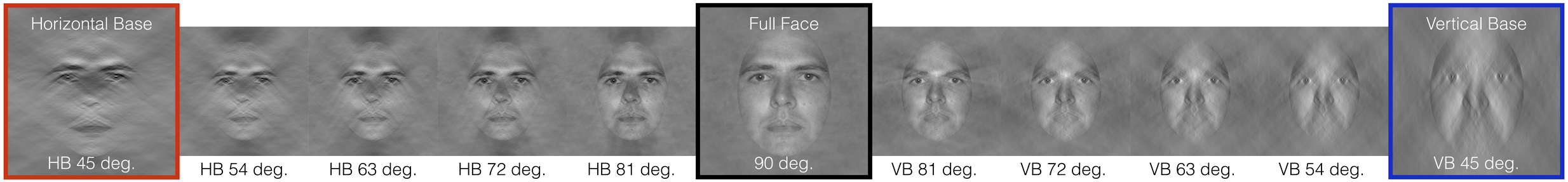


Introduction

- Horizontal structure contains most diagnostic information[a,c,d]
- Observers are tuned to use horizontal structure[c,d]
- Horizontal structure underlies behavioural[c] and N170[b] face inversion effects
- How does orientation structure affect the N170?

Methods

- 11 Caucasian observers
- 3 male, mean 22 ± 3.7 years old
- Task (84 trials per condition)
  - ↳ 1 s pre-stimulus fixation
  - ↳ 0.2 s stimulus duration
  - ↳ 1 s post-stimulus blank screen
  - ↳ 6 alternative forced choice
  - ↳ 0.25 s delay before next trial
- Stimulus filtered with a Bandwidth of 45-81 deg., centred on the horizontal or vertical (Base), with additional full face (90 deg.)
- Response using full faces
- Size: 4.6°, 0.05 $RMS_{contrast}$ pre-filter
- post-filter contrast control group factored out role of contrast in bandwidth's modulation on behaviour and N170 (n=11)

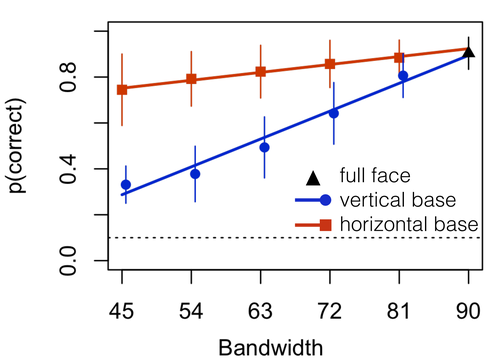
EEG Methods

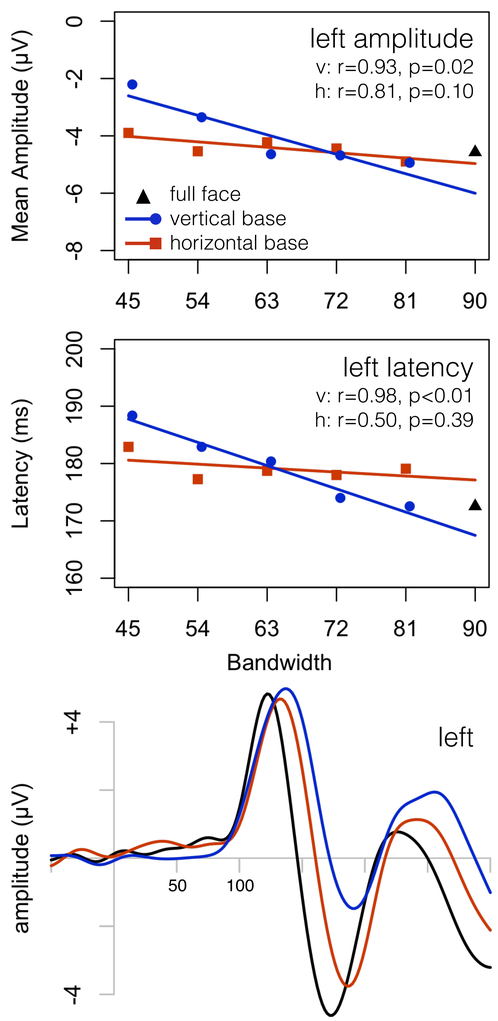
- 256-channel EGI geodesic net (500 Hz sampling rate)
- Referenced to electrode Cz
- 30 Hz lowpass filter
- 15 electrodes around PO7 & PO8
- Time-locked to stimulus onset
- Mean amplitude measured as average voltage in 40 ms time-window centred on N170 peak
- Latency measured as time of local peak between 150-210ms

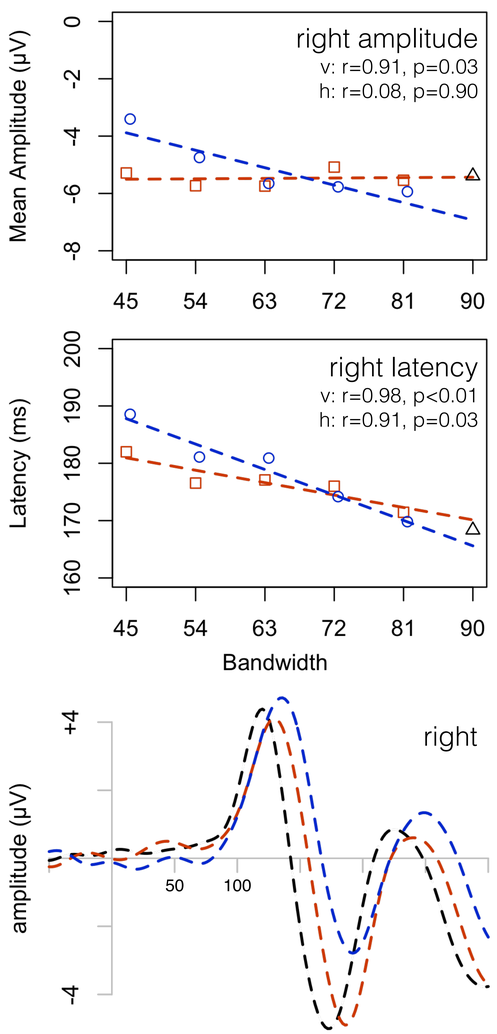
Behaviour Results

2 x 5 repeated-measures ANOVA

- Base, $F_{(1,10)} = 180$, $p < 0.0001$
- Band, $F_{(4,40)} = 189$, $p < 0.0001$
- Base x Band, $F_{(4,40)} = 37$, $p < 0.0001$







N170 Amplitude Results

2 x 5 x 2 repeated-measures ANOVA

- Base, $F_{(1,10)} = 10.1$, $p = 0.0098$
- Band, $F_{(4,40)} = 6.1$, $p = 0.0006$
- Base x Band, $F_{(4,40)} = 8.8$, $p < 0.0001$
- Hemisphere, $F_{(1,10)} = 1.8$, $p = 0.2117$
- Base x Hemi, $F_{(1,10)} = 0.04$, $p = 0.839$
- Band x Hemi, $F_{(4,40)} = 3.04$, $p = 0.0281$

N170 Latency Results

2 x 5 x 2 repeated-measures ANOVA

- Base, $F_{(1,10)} = 1.1$, $p = 0.3252$
- Band, $F_{(4,40)} = 25.9$, $p < 0.0001$
- Base x Band, $F_{(4,40)} = 9.7$, $p < 0.0001$
- Hemisphere, $F_{(1,10)} = 1.1$, $p = 0.3194$
- Base x Hemi, $F_{(1,10)} = 4.5$, $p = 0.0597$
- Band x Hemi, $F_{(4,40)} = 3.0$, $p = 0.0285$

Conclusions

- Behaviourally, horizontal structure drives face identification
- N170 is are more full-face-like with increasing horizontal structure
- *Next:* What orientation content is required to observe an N170? What is the role of facial context?

References

a. Dakin et al., (2009), *J. Vis: 9*
b. Jacques et al., (2014). *J. Vis: 14*
c. Goffaux et al., (2010), *Front. Psychol: 1*(143)
d. Pachai et al., (2013). *Front. Psychol: 4*(74)