

BACKGROUND

- Emotion recognition abnormalities, particularly for fearful expressions, have been reported in populations high in psychopathic traits. [1]
- Such abnormalities are thought to be associated with structural and functional differences in the amygdala. [2, 3]
- However, the nature of this affective processing abnormality is not fully understood.
- Our goal was to determine how early in the processing stream the deficit occurred.

CURRENT STUDY: We tried to determine whether differences in affective information processing ability could be observed as early as the face-sensitive N170 ERP component in individuals high in subclinical psychopathic traits.

HYPOTHESES: If the deficit in face processing is due to reduced attention to such stimuli, we would expect to see a smaller N170 component to fearful faces for those higher in psychopathic traits, particularly callous affect, a central feature of psychopathy.

FACE-HOUSE-OBJECT ERPs

TASK: Respond by button press each time a butterfly (target) image is presented.

- 210 trials
 - 16 target trials
 - 64 trials per ERP stimulus category [Fig. 1]
- Stim duration: 250 ms
- ISI: 1200 – 1800 ms

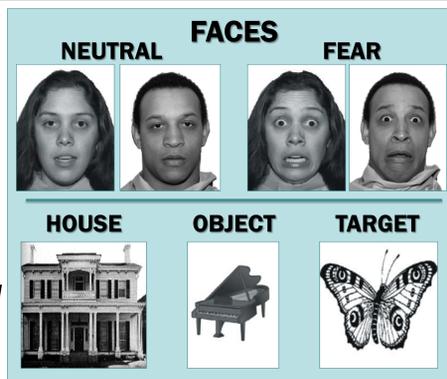


Figure 1. Example stimuli.

METHODS

PARTICIPANTS:

- 47 male University of Waterloo students [$M_{age} = 19.1 \pm 1.97$ years]

MEASURE:

- Self-report Psychopathy Scale [SRP-III; 4]

EEG ACQUISITION & ANALYSIS:

- Continuous EEG collected using 64-channel QuickAmps system.
- Offline 1-30 Hz bandpass filtered, re-referenced to averaged mastoids.
- Posterior right hemisphere sites were interpolated due to missing data.
- The N170 was scored as the most negative component at O1/O2 and P7/P8 at approximately 170 ms post-stimulus.

RESULTS

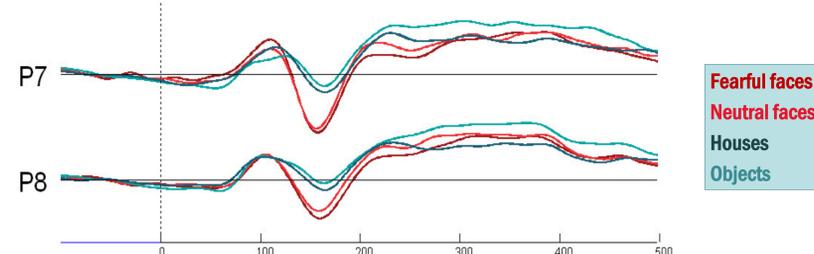
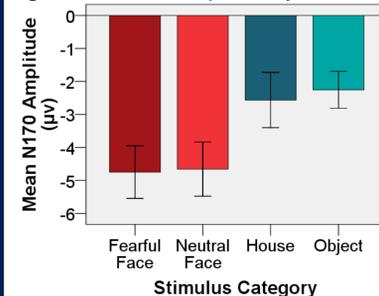


Figure 2. Grand averaged ERP waveforms by stimulus category at sites P7 and P8.

Figure 3. Mean N170 amplitudes by stimulus category.



- As expected, face stimuli elicited significantly larger N170 components compared to object or house stimuli [Fig. 2, 3; Table 1]
- N170 amplitudes did not differ significantly between fearful and neutral faces, nor did they differ between non-face stimulus categories

Comparison	Paired Differences		t	df*	p	95% CI of the difference
	Mean	SD				
Fear - Neutral	-0.06	1.330	0.28	45	.78	[-0.45, 0.34]
Fear - Houses	-2.16	2.018	7.01	42	> .001	[-2.78, -1.54]
Fear - Objects	-2.48	1.823	9.34	46	> .001	[-3.02, -1.95]
Neutral - Houses	-2.08	2.173	6.29	42	> .001	[-2.75, -1.42]
Neutral - Objects	-2.48	1.775	9.56	46	> .001	[-3.00, -1.95]
Houses - Objects	-0.32	1.500	1.40	43	.17	[-0.77, 0.14]

* Note: degrees of freedom vary by comparison due to missing data.

Table 1. Paired t-test statistics and correlation coefficients between N170 components by stimulus category.

RESULTS (cont.)

- Contrary to our predictions, participants higher in callous affect generally produced larger N170 amplitudes in response to fearful faces [Fig. 4a]
- Importantly, this relationship was still significant for fearful faces after statistically controlling for variance shared with N170 responses to neutral faces [Fig. 4b]

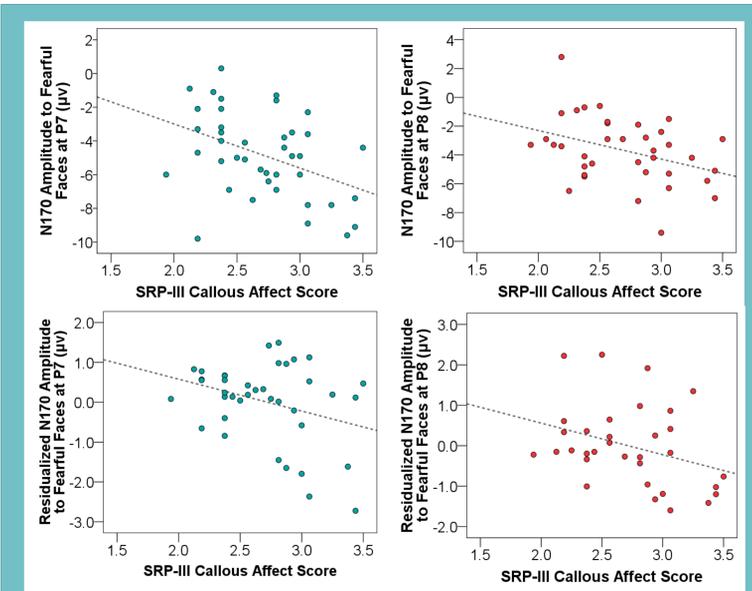


Figure 4. Plots of callous affect scores of the SRP-III with [a] N170 amplitudes to fearful faces and [b] standardized residuals of N170 amplitudes to fearful faces after accounting for responses to neutral faces.

CONCLUSIONS

- Given that those higher on callous affect, one of the core aspects of psychopathy, produced larger N170s to fearful faces than those lower on this dimension, we conclude that processing differences occurred as early as 170 ms but that fear-processing deficits are not due to a reduced allocation of attention in the early stages of visual processing.
- The larger N170s would be consistent with such individuals having more difficulty integrating this type of complex visual material [5] or that they used a more feature-based strategy to process the information as one does with upside down faces [6, 7].
- Given that these results are from a high-functioning sample supports the view that psychopathic traits, even at a subclinical level, involve alternate strategies for social interaction [8].

REFERENCES

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