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<http://www.pc.rhul.ac.uk/sites/lab/>

## Abstract

Interoception is key to 'the self' and emotion. Sensitivity to one's body is thought to be a robust trait variable, however, increased self-focus can enhance self-processing. We examined whether self-observation in a mirror enhances interoceptive sensitivity. Participants performed a heartbeat detection task while looking at their own face in a mirror and also at a black screen. Interoceptive sensitivity rose significantly in the mirror condition for participants who had lower interoceptive sensitivity at baseline, independently of a range of potential confounds. Our results suggest that self-observation may be a viable way to manipulate interoceptive sensitivity, in order to directly test for causal relations with other aspects of self-processing.

## I. Introduction

Interoception = sensory signals arising from the body

The Research Question :

The evidence so far -

Individuals differ in their 'Interoceptive Sensitivity' i.e. their responsiveness to these body signals

Can we manipulate Interoceptive Sensitivity to test for causal changes in e.g. emotional arousal, decision-making, implicit memory and self-processing?

No?

- Not affected by
  - meditation or yogic breathing (Khalsa et al., 2008)
  - stress or relaxation (Fairclough & Goodwin, 2007)
  - social anxiety (Stevens et al., 2011)

Yes?

- The apparently accidental presence of a mirror improved one measure of heartbeat detection (Weisz et al, 1988)

Interoceptive Sensitivity affects many aspects of self-processing

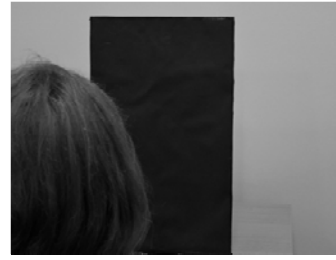
- Objective vs. subjective measures of emotional arousal
- Intuitive decision-making
- Implicit memory
- Body ownership
- Links to clinical conditions e.g. anxiety, anorexia

## II. Experimental Design

Interoceptive Sensitivity measured by heartbeat detection

Within-subjects design with 2 conditions

	25sec	35sec	45sec
Baseline Dark screen	Counted heartbeats.	Counted heartbeats.	Counted heartbeats.
	Recorded heartbeats.	Recorded heartbeats.	Recorded heartbeats.
Mirror	Counted heartbeats.	Counted heartbeats.	Counted heartbeats.
	Recorded heartbeats.	Recorded heartbeats.	Recorded heartbeats.



Baseline Condition



Mirror Condition

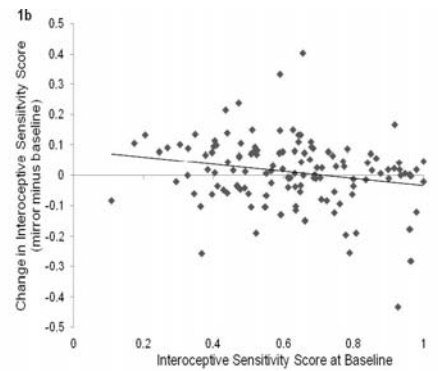
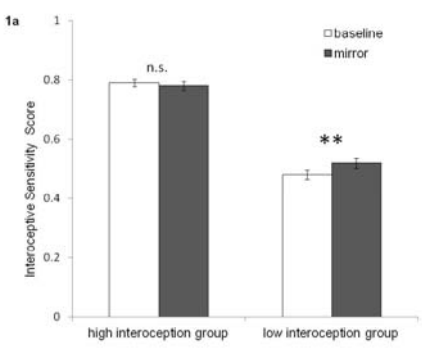
### Methods & Materials

- Participants gazed at a mirror and at a blank screen. Order of conditions randomised.
- Heartbeat detection measured by the Mental Tracking method (Schandry, 1981) 3 randomised trials (25s, 35s, 45s) in each condition. True number of heartbeats recorded with a pulse transducer.
- Potential confounds measured = gender, age, level of regular exercise, body mass index, order of conditions and change in heart rate between conditions.

### Interoceptive Sensitivity =

$$1 - \frac{\text{counted heartbeats} - \text{recorded heartbeats}}{\text{recorded heartbeats}}$$

## III. Results & Analysis



### Median split (Figure 1a)

ANOVA with baseline/mirror as within-subjects factor and Interoceptive Group as between-subjects factor (as well as order of conditions and gender) with change in heart rate as a covariate. Significant interaction ( $F(1,120)=7.376$ ,  $MSE=0.033$ ,  $p=0.008$ ,  $\eta^2=0.058$ ).

Participants with below-median Interoceptive Sensitivity improved significantly in heartbeat detection when gazing at their own faces in a mirror.

### Multiple Regression (Figure 1b)

The only significant predictor of the change in Interoceptive Sensitivity between conditions was Interoceptive Sensitivity at baseline ( $F(2,126)=3.75$ ,  $MSE=0.044$ ,  $p=0.026$ , predicting 5% of the variance ( $\text{adjusted } R^2=0.041$ ).

## IV. Discussion

Interoceptive Sensitivity can be manipulated by increasing self-focus

The effect is concentrated in people with low baseline Interoceptive Sensitivity, who have been neglected in previous research.

### Interoception and the 'Self'

- 'Self' is a function of multisensory integration
- Exteroception interacts with interoception
  - In body ownership (Tsakiris et al., 2011)
  - In somatoparaphrenia (Fotopoulou et al., 2012)
- People with low Interoceptive Sensitivity may have a more malleable sense of self.

## V. Conclusions

It may be possible to manipulate Interoceptive Sensitivity to test for causal links with other measures of self-processing.

Further research is necessary to show whether this improvement in Interoceptive Sensitivity is elicited by other self-relevant stimuli.

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