# Investigating interoception and emotion in left- vs right-predominant anterior temporal lobe degeneration

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## BACKGROUND

- The hemispheric contributions toward interoception, the perception of internal bodily cues, and emotion recognition remains unclear.
- Semantic dementia cases present with either left-dominant (i.e., **left-SD**) or right-dominant (i.e., **right-SD**) anterior temporal lobe atrophy (Figure 1).

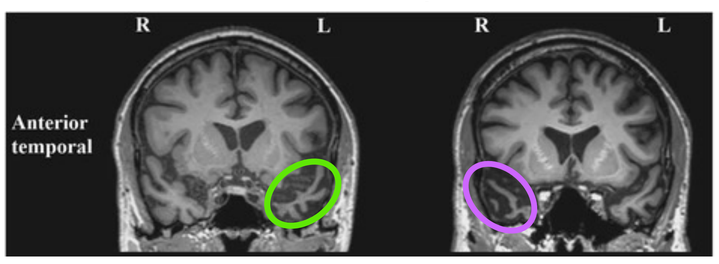



Fig 1. Adapted from Landin-Romero et al., 2016[1]

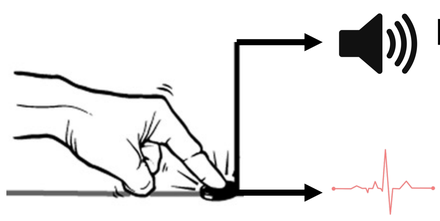
- Both **left-SD** and **right-SD** experience difficulties with emotion recognition, to varying degrees.
- Only one study to date has shown **impaired interoception** in **left-SD**[2], associated with the *right insula, amygdala, and anterior cingulate cortex*.
- No study has investigated interoception in **right-SD**, despite right temporal lobe atrophy.
- **We hypothesised right-SD would show interoceptive deficits and that worse interoception would predict worse emotion recognition performance**

## METHODS

**Participants Healthy Controls = 21, Left-SD: N = 8 Right-SD: N = 6**

### 1. Interoception/Exteroception task:

- 2-minute tasks, with simultaneous ECG recorded



**EXTEROCEPTION**
"when you *hear the recorded heartbeat*"

**INTEROCEPTION**
"when you *feel your own heartbeat*"

- Accuracy: Event frequency was compared to the response frequency for each task (mean distance index).
- Lower score = better performance

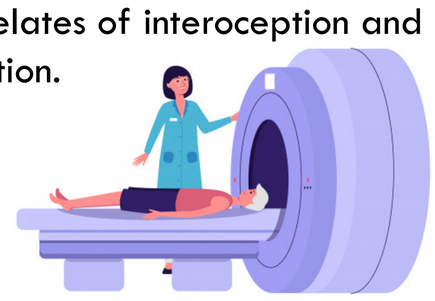
### 2. Emotion recognition

Facial Affect Selection Task (FAST)[7]

"Point to the happy face"

### 3. Neuroimaging:

- Voxel-based morphometry (VBM) analyses used to identify neural correlates of interoception and emotion.



## RESULTS

Fig 2. Worse emotion recognition in **left-SD** and **right-SD**

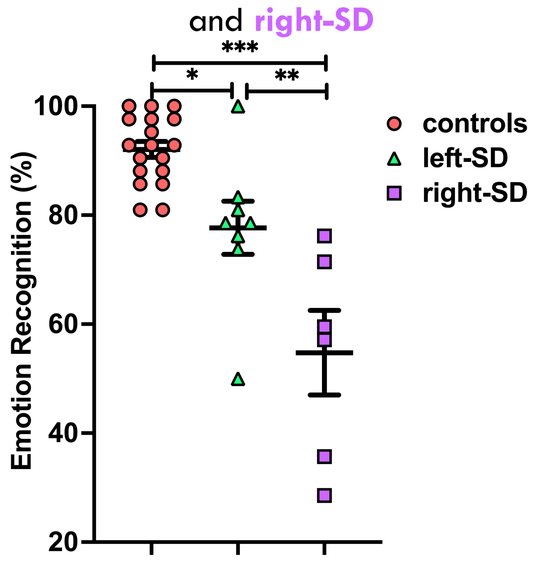



Fig 3. Worse interoception in **right-SD** than **left-SD** and controls

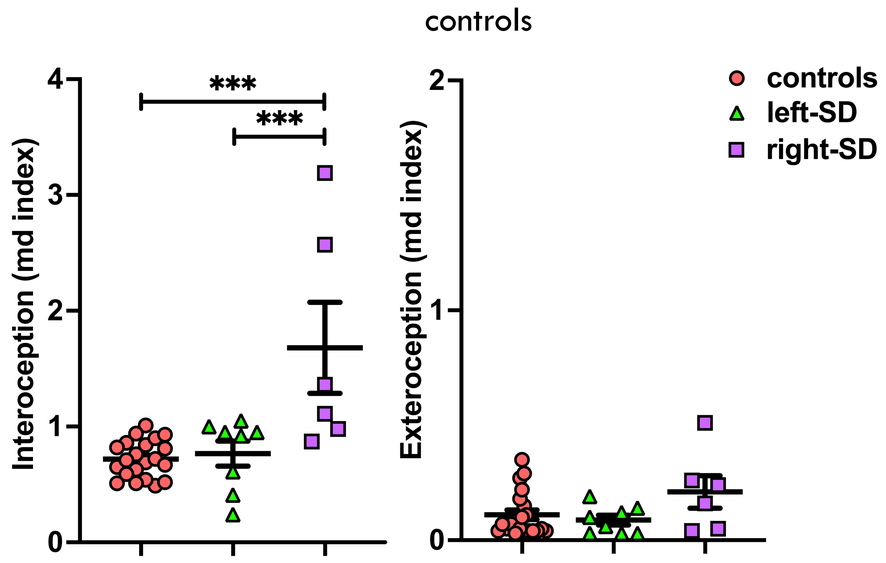
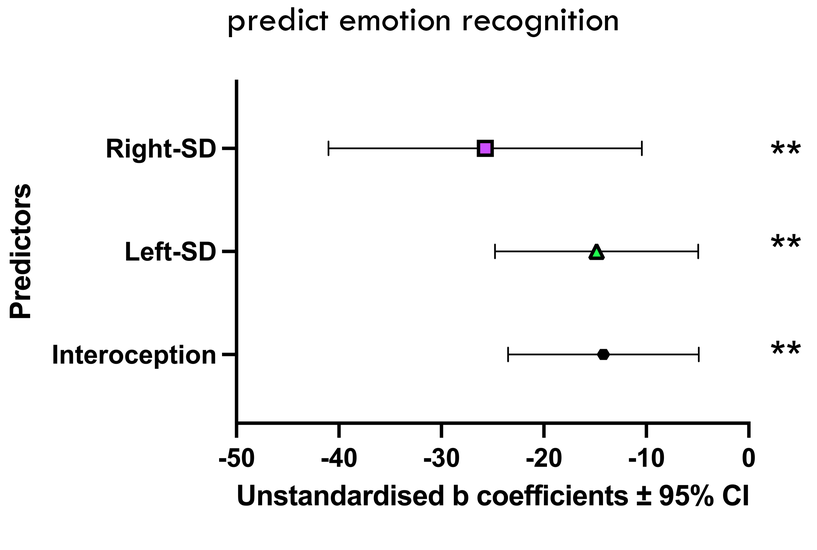



Fig 4. Diagnosis of **right-SD**, **left-SD**, and interoception predict emotion recognition

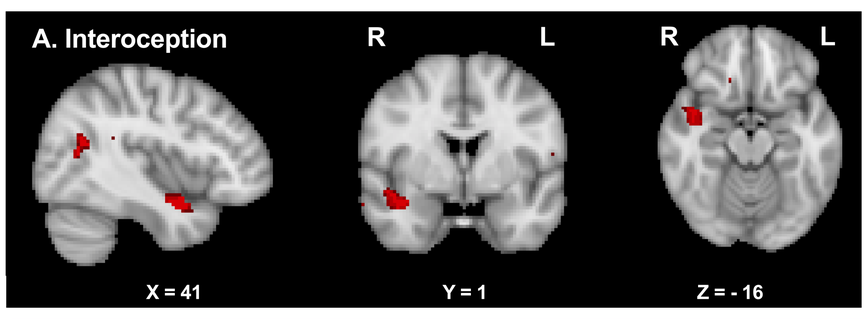


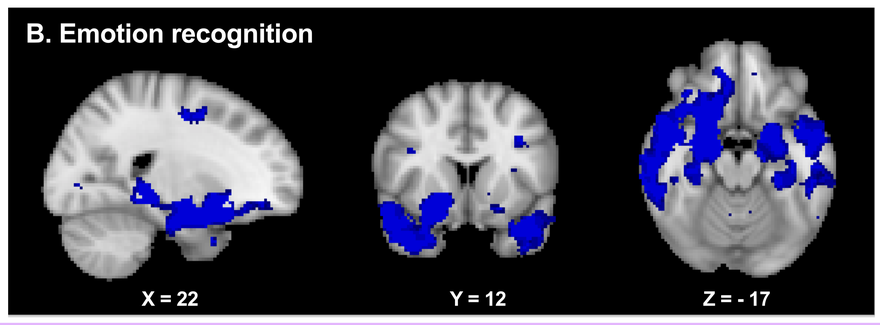

## Neuroimaging results

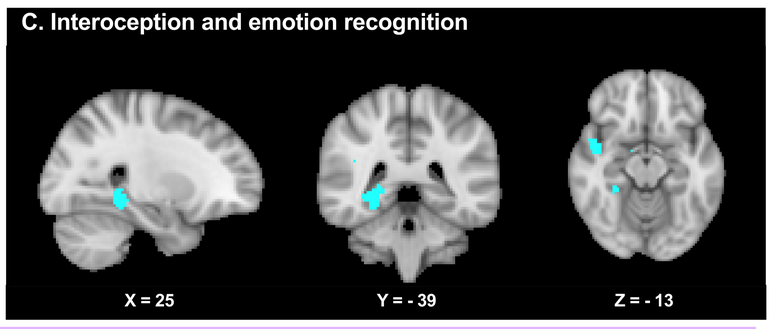
**Worse interoception:** right insula, temporal gyrus (superior and middle), thalamus, hippocampus, and temporal pole atrophy

**Worse emotion recognition:** widespread frontal and temporal brain atrophy, such as the orbitofrontal cortex, insula, and amygdala

**Worse interoception** and **emotion recognition:** right insula, temporal pole, hippocampus, thalamus, temporal fusiform atrophy




## CONCLUSIONS

- Our study is the first to report cardiac interoceptive deficits in **right-SD** patients, providing further evidence for impairment in this dementia syndrome beyond the domain of language.
- Both **left-SD** and **right-SD** showed impaired emotion recognition, however, difficulties interpreting signals from the body may underpin the emotion recognition difficulties we observed in **right-SD** patients.
- Our neuroimaging results identified that both interoception and emotion involved key regions such as the right insula, temporal pole, hippocampus, and thalamus.
- Longitudinal studies of interoception are needed to understand when interoceptive deficits arise in **right-SD** and **left-SD**.

We would like to thank the patients & their families for participating in our research

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