

Altered frontal function during sensory gating in panic disorder: An MEG study

Chia-Hsiung Cheng^{*1,2,3,4}, Shih-Chieh Hsu⁴, Chia-Yih Liu⁴



¹Department of Occupational Therapy and Graduate Institute of Behavioral Sciences, Chang Gung University, Taiwan

²Laboratory of Brain Imaging and Neural Dynamics (BIND Lab), Chang Gung University, Taiwan

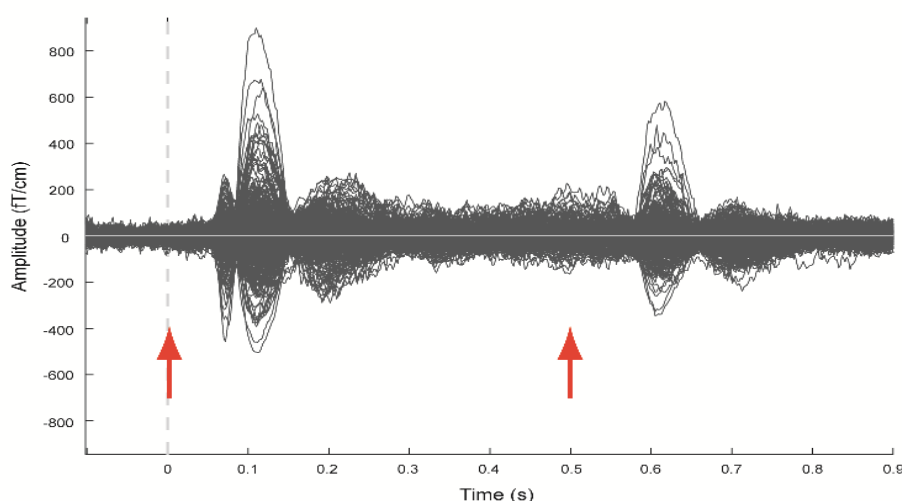
³Healthy Aging Research Center, Chang Gung University, Taiwan

⁴Department of Psychiatry, Linkou Chang Gung Memorial Hospital, Taiwan

*E-mail: ch.cheng@mail.cgu.edu.tw

Background

- Panic disorder (PD) is characterized as recurrent anxiety attacks, accompanied by physiological symptoms.
- It has been shown that environments with high sensory load would trigger heightened anxiety, possibly due to the failure in the modulation of sensory inputs.
- Although PD patients showed defects in the processes of threatening or affective stimuli, it remains unclear whether in the regular environment, brain responses to non-threatening stimuli exhibit an abnormal pattern.
- Sensory gating (SG) refers to an attenuation of neural response to the second identical stimulus (Figure below).
- SG is considered as an automatic processing in the CNS to filter out repetitive sensory inputs.
- However, it is unknown what neural correlates might be associated with SG changes in PD.
- **Aims:** We used MEG to study SG in PD patients, and to explore the relationship between SG and psychological as well as clinical assessments.



Results

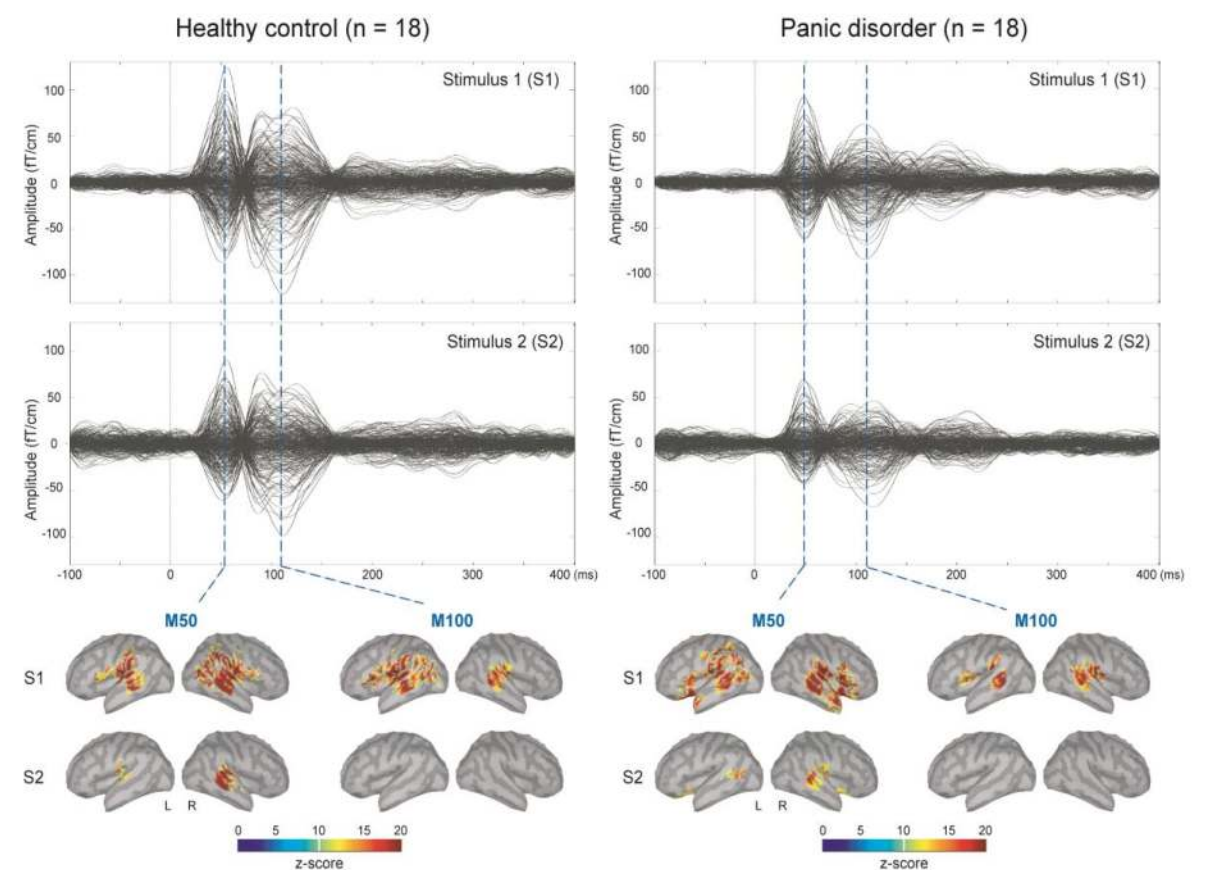


Figure 1. Upper panel: Grand-averaged sensor waveforms to S1 and S2 in each group. Lower panel: Cortical activities of minimum norm estimate regarding M50 and M100 components are mapped onto brain template.

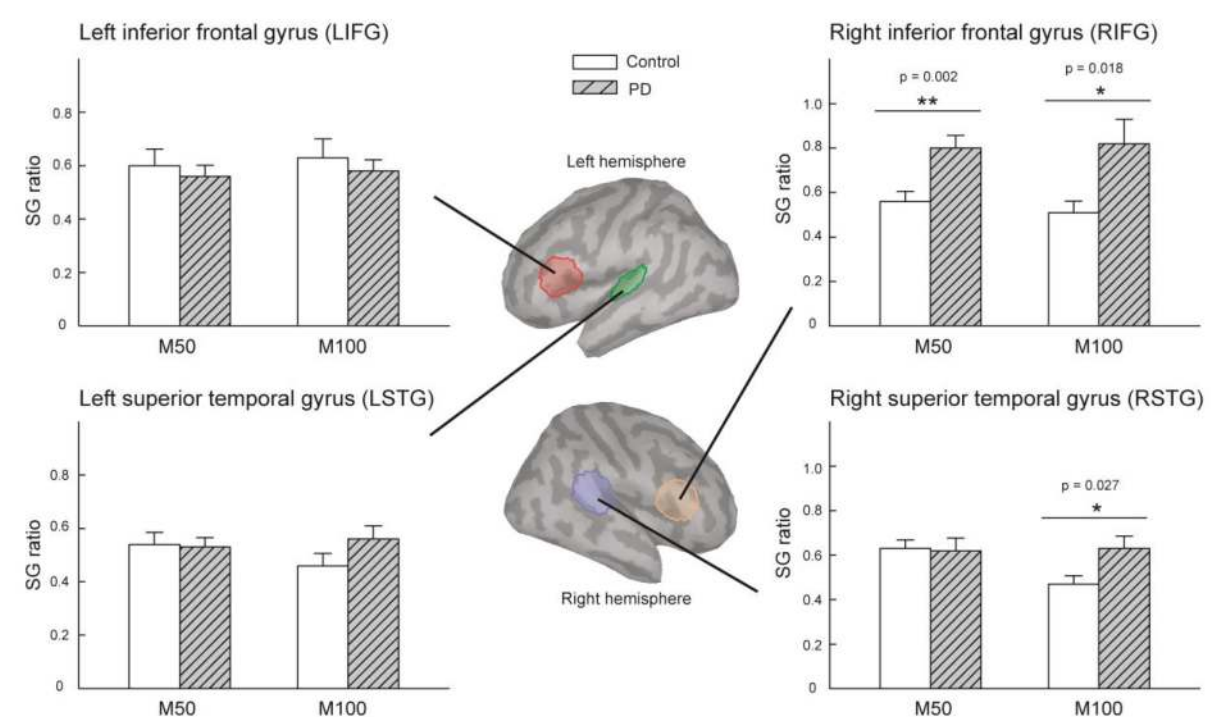


Figure 2. Compared to controls, PD patients demonstrated higher M50 SG ratios in the RIFG, and higher M100 SG ratios in both RSTG and RIFG.

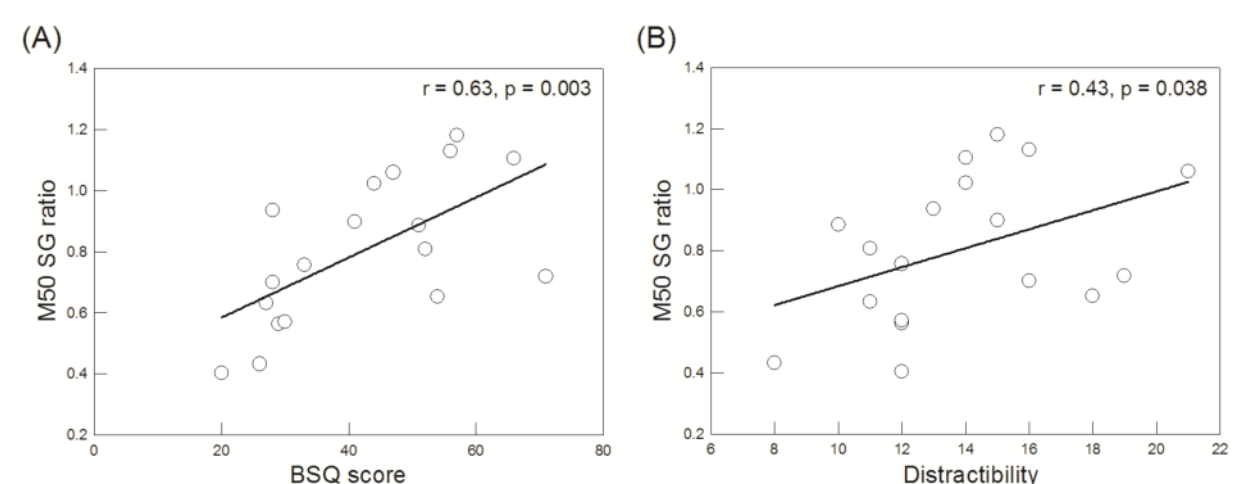


Figure 3. Among PD patients, M50 SG ratios of RIFG are significantly associated with scores of BSQ and Distractibility scale of SGI.

Methods

- **Participants**
 - 18 outpatients of PD and 18 healthy controls
 - No significant group differences on gender and age
- **Clinical assessments for PD**
 - State-Trait Anxiety Inventory (STAI)
 - Hamilton Scale for Anxiety (HAM-A)
 - Panic Disorder Severity Scale (PDSS)
 - Body Sensation Questionnaire (BSQ)
 - Sensory Gating Inventory (SGI): perceptual modulation, distractibility and over-inclusion
- **MEG recordings**
 - Auditory paired-click paradigm (ISI = 500 ms, IPI = 6 s)
 - All the subjects were instructed to watch a silent movie with subtitles
 - SG was obtained by S2/S1 ratio (a larger ratio indicates worse SG function)
 - Components of interest: M50 and M100
 - Cortical regions of interest (ROIs): right superior temporal gyrus (RSTG), left superior temporal gyrus (LSTG), right inferior frontal gyrus (RIFG), and left inferior frontal gyrus (LIFG)

Funding

This study was supported by Chang Gung Memorial Hospital (CMRPD1E0291-4) and Ministry of Science and Technology, (MOST-105-2628-B-182-004-MY3), Taiwan.

Conclusion

PD patients showed deficient ability to filter irrelevant sensory information, particularly in the right frontal cortex. Such SG abnormality was also associated with cognitive misinterpretation of somatic sensations and distractibility.

Reference

Ghisolfi ES et al. (2006) P50 sensory gating in panic disorder. Journal of Psychiatric Research, 535-540.