



Neural Correlates of Anesthesia

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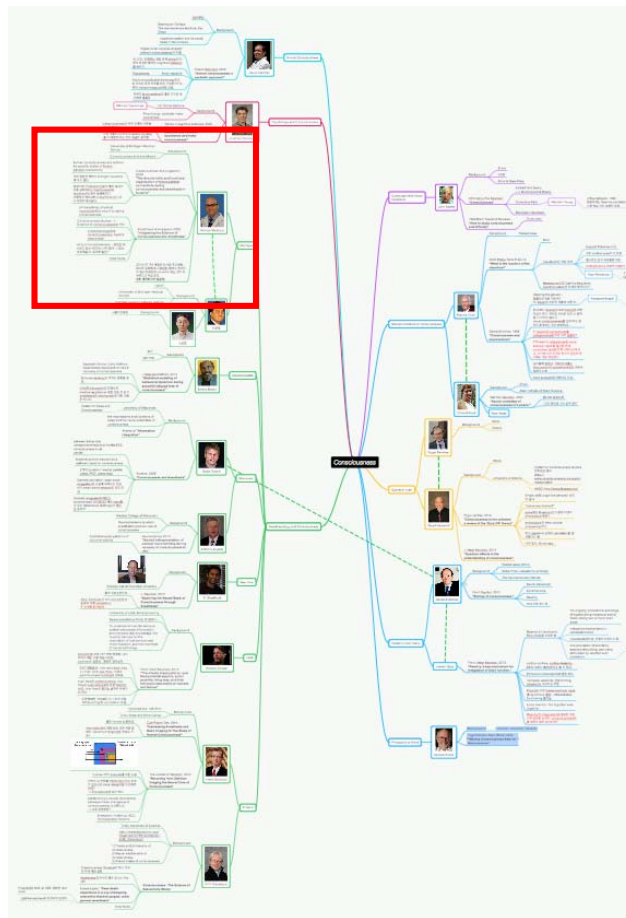
My Life in Japan



During July...

- One big goal of this summer was to specify my research topic
- While taking classes at Ookayama campus, I tried to read lots of papers, making mindmap out of it.

During July...



University of Michigan Medical School

Consciousness and anesthesia

human consciousness are defined by specific states of fronto-parietal connectivity.

위에 마취약 먹어서 Granger causality 재 보고 싶다.

평상시엔 Frontoparietal이 훨씬 많다가 마취 상태에서는 feedforward와 feedback의 양이 동일해진다. 마취에서 깨어나면서 asymmetry가 다시 천천히 복구된다.

philosophical, physical, neuroscientific way of studying consciousness

Consciousness studies -> Science of consciousness로 가자.

anesthesiology에서 consciousness는 'explicit awareness'

unity of consciousness... 하지만 제시되고 있는 NCC는 너무 많다 -> 없는 것과 똑같다. 도대체 뭘까?


New Node

Background

Consciousness and Cognition, 2009
"The directionality and functional organization of frontoparietal connectivity during consciousness and anesthesia in humans"

Anesthesia & Analgesia, 2006
"Integrating the Science of Consciousness and Anesthesia"

2014/07/24 메일로 인사말 주고받음. 페이퍼 요청했더니 보내줌! 럽에도 한국인이 많고 한국인과 co-work 하는 것이 익숙하다고 하십니다. 유학 생각한다면 일순원.



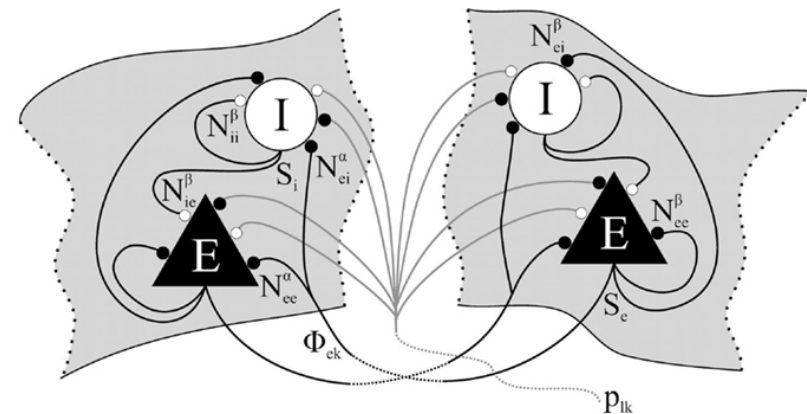
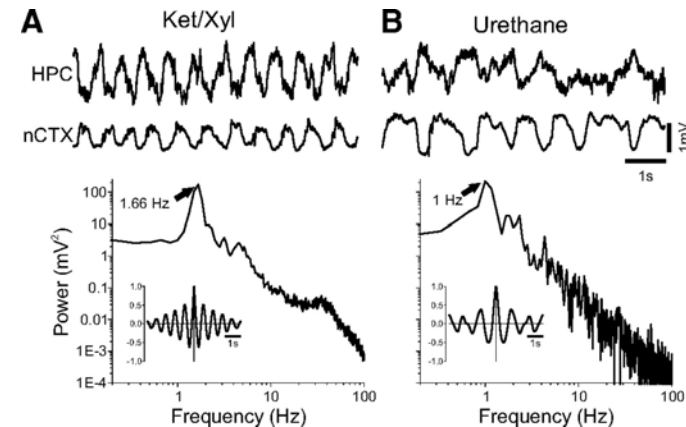
George Mashour

During July...

- One big goal of this summer was to specify my research topic
- While taking classes at Ookayama campus, I tried to read lots of papers, making mindmap out of it.
- **I found a keyword, ‘anesthesia and consciousness’**

Neuronal Modeling of Anesthesia

- When a person is under general anesthesia, the brain wave pattern shows UP/DOWN state
- This is due to massive synchronization of cortex caused by thalamic control

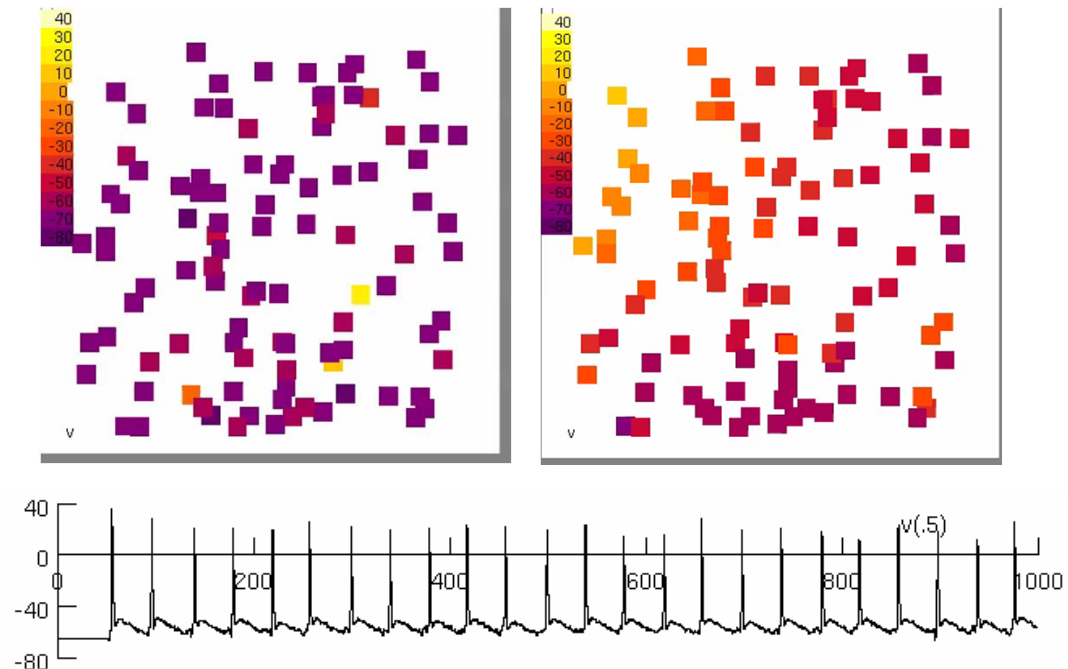
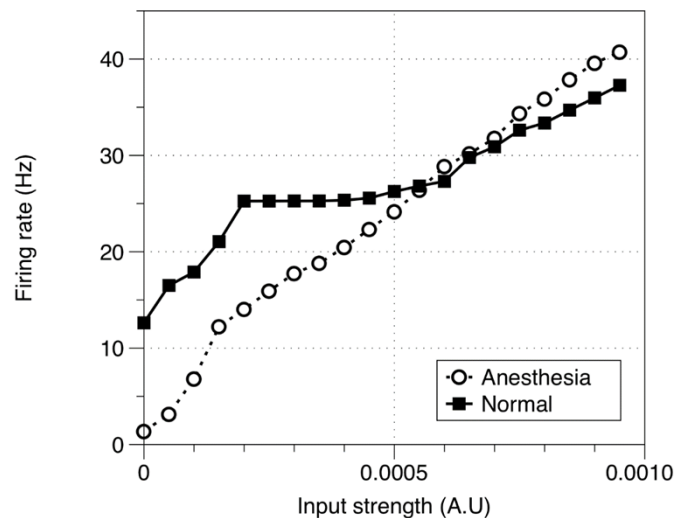


Arjun V. Sharma, Trish Wolansky, Clayton T. Dickson, "A Comparison of Sleeplike Slow Oscillations in the Hippocampus Under Ketamine and Urethane Anesthesia." *Journal of Neurophysiology* Aug 2010,104(2)932-939

Liley, David TJ, and Matthew Walsh. "The mesoscopic modeling of burst suppression during anesthesia." *Frontiers in computational neuroscience* 7 (2013).

Neuronal Modeling of Anesthesia

- I performed the modeling for increased inhibitory strength for same environment.
- Network with stronger inhibitory connections showed more synchronized pattern of spike.



Additional Works

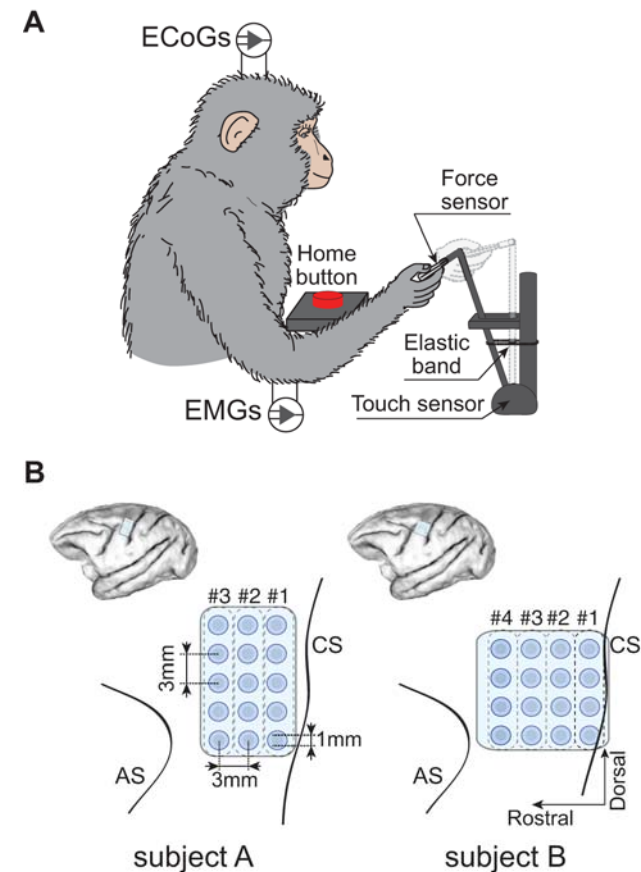
Granger Causality on Sensorimotor Cortex

- Thanks to Professor Duk Shin, I had a chance to help him analyzing his ECoG data
- Granger causality :

$$Y_t = \mu + \sum_{i=1}^p a_i Y_{t-i} + \sum_{j=1}^p b_j X_{t-j} + U_t$$

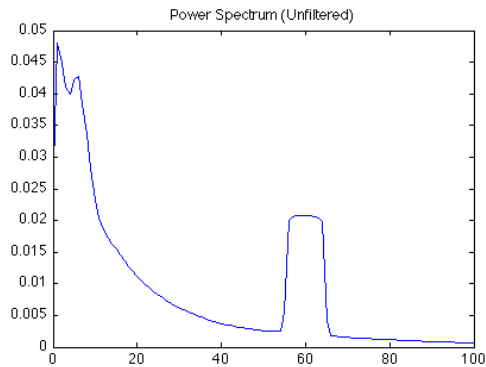
$$X_t = \mu' + \sum_{i=1}^{p-1} c_i Y_{t-i} + \sum_{j=1}^{p-1} d_j X_{t-j} + U'_t,$$

a measure of how useful it is to know one time series to predict another.

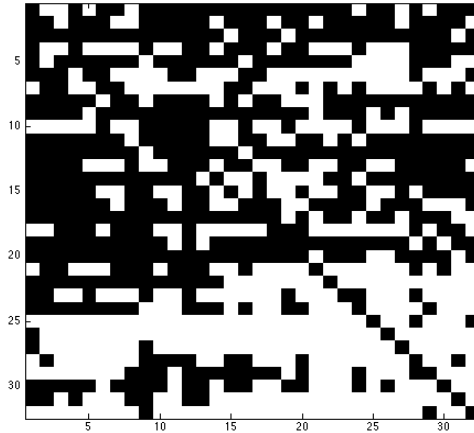
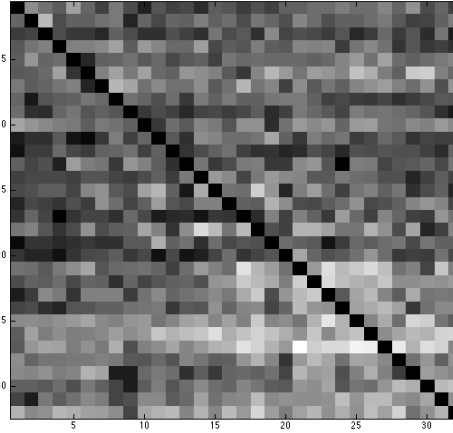
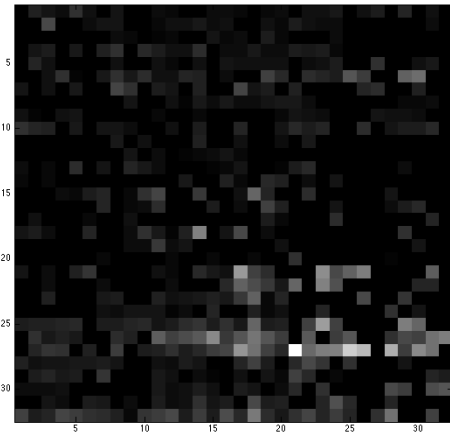
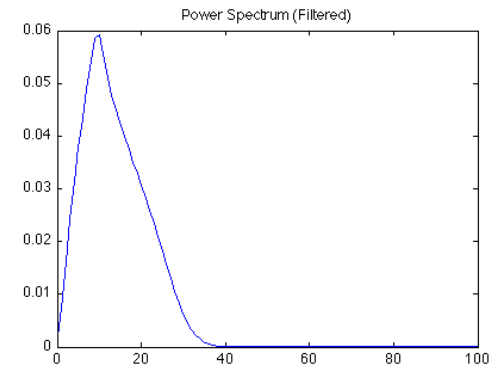


Additional Works

Granger Causality on Sensorimotor Cortex



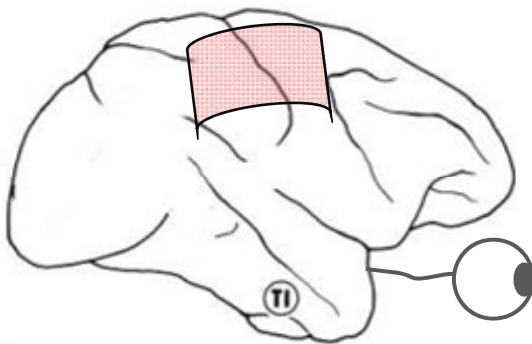
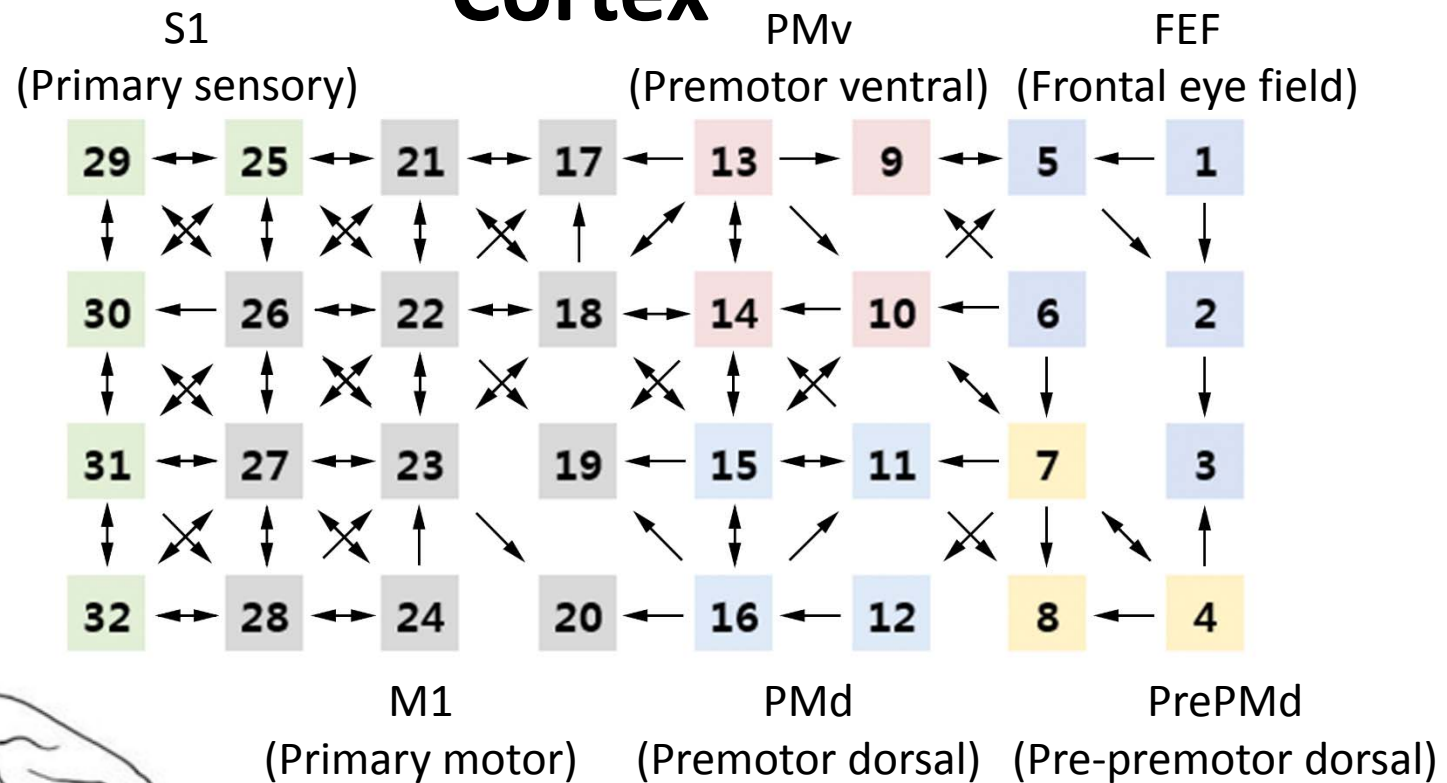
Filtering



Granger causality matrix

Additional Works

Granger Causality on Sensorimotor Cortex



**I had a wonderful summer
at Tokyo Tech.
Thank you so much.**

