CABI NEWSLETTER

VOLUME 6, ISSUE 2

Georgia State University/Georgia Tech
Center for Advanced Brain Imaging

INSIDE THIS ISSUE

CABI FEATURED ARTICLE

Dr. Dobromir Rahnev and Jiwon Yeon investigated the neural bases of perceptual decision making and confidence. Perceptual decision making is the process of making a judgment based on sensory information. Perceptual decisions are naturally accompanied by a sense of confidence in the accuracy of the decision. Although the neural correlates of perceptual decision making and confidence have been the subject of substantial research, it is controversial whether the two processes share the same neural circuits. To address this issue, the researchers recruited twenty-five participants who performed direction detection tasks of moving dots. The decisional and confidence processes were separated temporally by obtaining the confidence responses after the decision response was made. In addition, the fMRI regressors for the decision and confidence periods were decorrelated by collecting confidence on only 55% of all trials. The decision and confidence were associated with large overlapping areas of brain activity in MT+, IPS, FEF, iPCS, IFC, MFG, dorsal ACC, and anterior insula. The neural activations were robust so that after removing the influence of one regressor (i.e., either decision or confidence) from the original fMRI signal and re-computing the activations for the other regressor, the same overlapping regions remained activated. Finally, the researchers examined whether any brain regions were relatively more selective for decision vs. confidence. They found that confidence recruited a number of unique regions over and above the decision process such as aPFC, dlPFC, dACC, and TPJ. On the other hand, there were no regions that are directly associated with the decision process but not confidence. These results demonstrate that overall decision and confidence are processed in highly overlapping neural circuits, but that several regions are preferentially involved in confidence computation.

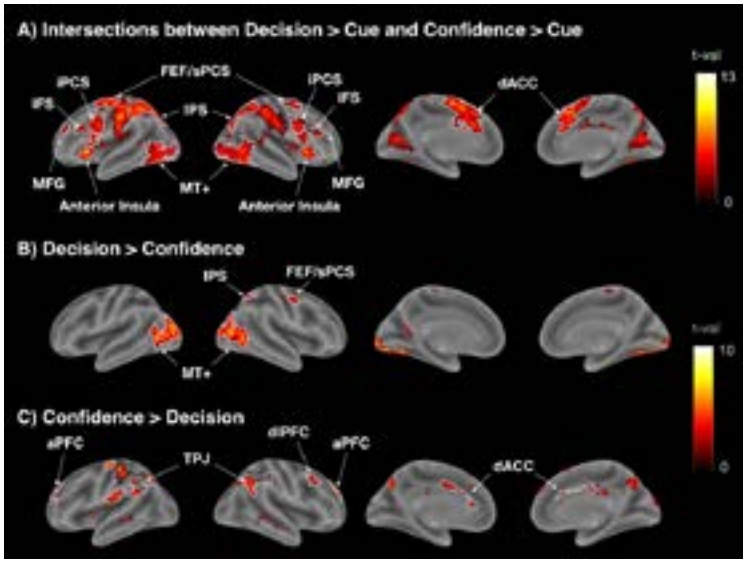

Figure 1. (A) Brain regions activated by both perceptual decision making and confidence. Large overlapping regions were observed across MT+, IPS, FEF, iPCS, IFC, MFG, dorsal ACC, and anterior insula areas. (B) Brain regions selectively activated for the decision period over the confidence period. Although activations in MT+, IPS and FEF regions were observed, none of the regions is directly associated to the decision process. Specifically, MT+ region's activation is due to the moving dot stimuli, and IPS and FEF regions' activation is likely due to the involvement of top-down spatial attention. (C) Brain regions selectively activated for the confidence period over the decision period. The results showed activations in aPFC, dlPFC, dACC, and TPJ regions.

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Upcoming Events

EEG Workshop

February 21, 2019
9:30am - 11:30am
CABI
831 Marietta St.

Michael W. Cole

Assistant Professor
Ctr for Molecular & Behavioral Neuroscience (CMBN)
Rutgers University - Newark
March 8, 2019
11:30am @ CABI

Callosum Poster Session

April 16, 2019
CABI
831 Marietta St.,
Atlanta Ga 30318
4:00 - 6:00pm

PUBLICATIONS

Bang, J.W., Sasaki, Y., Watanabe, T., & Rahnev, D. (2018). Feature-specific awake reactivation in human V1 after visual training. Journal of Neuroscience 38(45):9648-9657.

Clark, S., Mittal, V.A., Bernard, JA, Ahmadi, A, King, T.Z., & Turner, JA (2018). Stronger default mode network connectivity is associated with poorer clinical insight in youth at ultra high-risk for psychosis. Schizophrenia Research, 193, 244-250. http://dx.doi.org/10.1016/j.schres.2017.06.043.

Buetefisch C. M. , Revill K. P. , Haut M. W., Kowalski G. M., Wischnewski M., Pifer M., Belagaje S. R., Nahab F., Cobia D. J. , Hu X. , Drake D., Hobbs G. Abnormally reduced primary motor cortex output is related to impaired hand function in chronic stroke. J Neurophysiol. 2018 Oct 1;120(4):1680-1694

Krishnamurthy V, Krishnamurthy LC, Schwam DM, Ealey A, Shin J, Greenberg D, Morris RD. Retrospective Correction of Physiological Noise: Impact on Sensitivity, Specificity, and Reproducibility of Resting-State Functional Connectivity in a Reading Network Model. Brain Connect. 2018 Mar;8(2):94-105.

Murdaugh, D., King, T.Z., & O'Toole, K. (2019). The efficacy of a pilot pediatric cognitive remediation summer program to prepare for transition of care. Child Neuropsychology, 25(2), 131-151.

Na, S., Li, L., Crosson, B., Dotson, V., MacDonald, T.J., Mao, H., & King, T.Z. (2018). White Matter Topology relates to cognitive flexibility and cumulative neurological risk in adult survivors of pediatric brain tumor. Neuroimage: Clinical, 20, 485-497.

Smith, D.M., Zhao, Y., Keilholz, S., Schumacher, E. H. (2018). Investigating the Intersession Reliability of Dynamic Brain State Properties. 2018 Brain Connectivity Jun; 8(5): 255-367.

Yousefi B., Shin J., Schumacher E. H., Keilholz S. D. (2018). Quasi-periodic of intrinsic brain activity in individuals and their relationship to global signal. NeuroImage, 167, 297-308.

Message From The Director

This year, CABI has focused on improving functionality of the center for our users. In addition to upgrading the 3T MRI scanner, we replaced the projector system with the Avotec's SV 6060 projector, which is a substantially better model. We have also migrated to using the GT Shared User Management System (SUMS) for scheduling and billing and hosted several workshops. In December, CABI hosted an FSL data analysis workshop. In February CABI hosted an EEG workshop. If you have ideas for any additional workshops, please let me know.

CABI will also host our annual CALLOSUM Poster Session on April 16, 2019. If you would like more information about the poster session, please contact Nytavia Wallace at nwallace@gatech.edu and we will accept applications for the annual CABI Seed Grants in May.

Finally, CABI now has a slack workspace to improve communication among users. If your interested in joining contact nwallace@gatech.edu or vahluwalia7@gatech.edu.