

Choong-Wan Woo

Center for Neuroscience Imaging Research,
Institute for Basic Science
Department of Biomedical Engineering
Sungkyunkwan University
Suwon 16419, South Korea

Email: choongwan.woo@gmail.com
Github: <https://github.com/wanirepo>
Lab website: <http://cocoanlab.github.io>
Twitter: @choongwanwoo
(Last updated: April 2019)

MAJOR RESEARCH GOALS

- Developing integrated brain models of mental processes and clinical outcomes
- Understanding the neural mechanisms of pain and emotion regulation
- Translating basic and computational neuroscience findings into the development of clinical neuroimaging tools (diagnosis, prognosis, treatment selection, drug discovery, etc.)

CURRENT ACADEMIC POSITION

Assistant Professor

March 2017 ~ present

Center for Neuroscience Imaging Research,
Institute for Basic Science
Department of Biomedical Engineering,
Sungkyunkwan University (Suwon, South Korea)

EDUCATION and TRAINING

Research Associate/Postdoctoral Fellow

Feb 2017

Cognitive and Affective Neuroscience Lab
Institute of Cognitive Sciences,
University of Colorado at Boulder, USA
Advisor: Tor D. Wager, Ph.D.

Ph.D. (dual)

Cognitive Neuroscience*/Cognitive Science**
*Department of Psychology and Neuroscience,
**Institute of Cognitive Sciences,
University of Colorado at Boulder, USA
Advisor: Tor D. Wager, Ph.D.

Aug 2016

PhD dissertation (submitted at Aug 2016)

Brain Representations and Mechanisms of Pain Experience and Regulation: A Multivariate Pattern Approach (committee: Tor D. Wager, Randall C. O'Reilly, Yuko Munakata, June Gruber, Tamara R. Sumner, Alaa Ahmed)

Clinical Training

Full time 3-year Residency Training (Clinical Psychology)
Department of Psychiatry, Seoul National University Hospital
Advisor: Min-Sup Shin, Ph.D.

Feb 2010.

M.A. Clinical Psychology, GPA: 4.25/4.30 Feb 2007.
 Department of Psychology, Seoul National University, South Korea
 Advisor: Seok-Man Kwon, Ph.D.

MA Thesis at Seoul National University (Feb 2007)
*The Relationship between Excessive Doubts due to Error Processing
 Dysfunction and Obsessive Compulsive Symptoms*

B.S. (cum laude) Biological Sciences, GPA: 3.62/4.30 Feb 2005.
 Major GPA: 3.75/4.30, Last 2 years' GPA: 3.96/4.30
 Seoul National University, South Korea
 Advisor: Eun-Ju Lee, Ph.D.

RESEARCH GRANTS

National Research Foundation of Korea, PI, KRW 400M/4 years 2019-2022
 "Development and validation of pain biomarkers based on functional neuroimaging and
 machine learning in human" (2019R1C1C1004512)
 Institute for Basic Science, Center for Neuroscience Imaging Research 2017-
 "Pain and Emotion" Unit leader (IS-R015-D1)

HONORS and AWARDS

International Association for the Study of Pain (IASP) Travel Award (\$1,450),
 IASP, 16th World Congress on Pain, Yokohama, Japan (Sep 2016)
Organization for Human Brain Mapping (OHBM) Abstract Travel Award (\$1,000),
 OHBM 2016 Annual meeting, Geneva, Switzerland (June 2016)
Heyer Award,
 Dept. of Psychology and Neuroscience, University of Colorado at Boulder (May 2015)
Carol B. Lynch Graduate Fellowship,
 University of Colorado at Boulder (May 2015)
Institute of Cognitive Science (ICS) Travel Award,
 University of Colorado at Boulder (July 2014; Feb 2015)
Invited scholar,
 European Pain School, Siena, Italy (June 2013)
American Psychosomatic Society (APS) Travel Award for MacLean Scholars,
 American Psychosomatic Society (Jan 2013)
United Government of Graduate Students Travel Award,
 University of Colorado at Boulder (Oct 2012)
Fulbright Graduate Study Award,
 Bureau of Educational and Cultural Affairs,
 United States Department of State, (2011 ~ 2013)
High Academic Achievement Award,

College of Natural Sciences, Seoul National University (2005)

Undergraduate Student Research Award,

Title: "*The Role of Contrast and Exposure Duration in Pattern Motion Perception*"

Institute of Psychological Science, Seoul National University (2004)

Scholarship for the Research Participating Program for Undergraduate Students,

Title: "*Brain Imaging Method: Focusing on Functional Magnetic Resonance Imaging*"

Center for Teaching and Learning, Seoul National University (2004)

PROFESSIONAL AFFILIATIONS

2018 ~ Present	Association for Psychological Science (APS)
2015 ~ Present	Society for Affective Sciences
2015 ~ Present	Organization for Human Brain Mapping
2013 ~ Present	Social and Affective Neuroscience Society
2012 ~ Present	American Psychosomatic Society
2012 ~ Present	Society for Neuroscience
2011 ~ Present	Cognitive Neuroscience Society

PROFESSIONAL ACTIVITIES

Ad-Hoc Reviewer	<i>eLife; Pain; Cognitive, Affective, and Behavioral Neuroscience; Human Brain Mapping; NeuroImage; Journal of the American Academy of Child and Adolescent Psychiatry; Brain and Language; Journal of American Neuroradiology; Magnetic Resonance in Medicine; Neuroinformatics</i>
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LICENSURE

2010 ~ Present	Professional Clinical Psychologist (Korean Psychological Association)
2010 ~ Present	Mental Health Clinical Psychologist (Ministry of Health and Welfare, Republic of Korea)

RESEARCH

Publications (Journal Articles):

Under review

Kohoutová, L., Heo, J., Cha, S., Moon, T., Wager, T. D., & Woo, C. -W. (under review)

Interpreting machine learning models in neuroimaging: Towards a unified framework

2019

- Hong, Y, Yoo, Y, Han, J., Wager, T. D. & **Woo, C. -W.** (2019) False-positive neuroimaging: Undisclosed flexibility in testing spatial hypotheses allows presenting anything as a replicated finding, *NeuroImage*
- Matthewson, G.*, **Woo, C. -W.***, Reddan, M. C., & Wager, T. D. (2019) Cognitive self-regulation influences pain-related physiology, *PAIN (Editor's choice)*
- *co-first authors
- Jeong, S. -J., Lee, I. Y., Jun, B. O. , Ryu, Y. -J., Sohn, J. -W., Kim, S. -P., **Woo, C. -W.**, Koo, J. W. , Cho, I. -J., Oh, U., Kim, K., and Suh, P. -G. (2019) Korea Brain Initiative: Emerging Issues and Institutionalization of Neuroethics, *Neuron*, 101 (3), 390-393

2018

- Kragel, P. A., Kano, M., Van Oudenhove, L., Ly, H. G., Dupont, P., Rubio, A., Delon-Martin, C., Bonaz, B. L. Manuck, S. B., Gianaros, P. J., Ceko, M., Losin, E. A. R., **Woo, C. -W.**, Nichols, T. E. & Wager, T. D. (2018) Generalizable representations of pain, cognitive control, and negative emotion in medial frontal cortex. *Nature Neuroscience*, 21, 283-289

2017

- Koban, L., Kross, E., **Woo, C. -W.**, Luka Ruzic, L. & Wager, T. D. (2017) Frontal-brainstem pathways mediating placebo effects on social rejection. *Journal of Neuroscience*, 37 (13) 3621-3631
- Woo, C. -W.**, Chang, L. J. Lindquist, M. A., & Wager, T. D. (2017) Brain signatures and models in translational neuroimaging. *Nature Neuroscience*, 20, 365-377
- Woo, C. -W.**, Schmidt, L., Krishnan, A., Jepma, M., Roy, M., Lindquist, M. A., Atlas, L. Y., & Wager, T. D. (2017) Quantifying cerebral contributions to pain beyond nociception. *Nature Communications*, 8, 14211
- Wager, T. D. & **Woo, C. -W.** (2017) Imaging biomarkers and biotypes for depression. *Nature Medicine*. 23, 16-17. doi:10.1038/nm.4264
- López-Solà, M., **Woo, C. -W.**, Pujol, J., Deus, J., Harrison, B. J., Monfort, J. & Wager, T. D. (2017). Towards a neurophysiological signature for fibromyalgia. *PAIN*. 158(1):34-47
- Lindquist, M. A., Krishnan, A., Lopez-Sola, M., Jepma, M., **Woo, C. -W.**, Koban, L., Roy, M. Atlas, L. Y., Chang, L. J., Losin, E. A. R., Eisenbarth, H., Ashar, Y. K., Delk, Z., & Wager, T. D. (2017). Group-regularized individual prediction: Theory and application to pain. *NeuroImage*. 145, 274-287. doi: 10.1016/j.neuroimage.2015.10.074

2016

- Krishnan, A., **Woo, C. -W.**, Chang, L. J., Ruzic, L., Gu, X., López-Solà, M., Jackson, P. L., Pujol, J., Fan, J., & Wager, T. D. (2016). Somatic and vicarious pain are represented by dissociable multivariate brain patterns. *eLife*. 5:e15166. doi:10.7554/eLife.15166.001
- Vachon-Preseu, E. Roy, M., **Woo, C. -W.**, Kunz, M. Martel, M., Sullivan, M. J., Jackson, P. L., Wager, T. D., & Rainville, P. (2016). Multiple faces of pain: Effects of chronic pain on the brain regulation of facial expression. *PAIN*. doi:10.1097/j.pain.0000000000000587
- Wager, T. D. & **Woo, C. -W.** (2016). Issues in assessing reliability in pain neuroimaging. *PAIN*. 157, 1574–1578
- Woo, C. -W.**, & Wager, T. D. (2016). What reliability can and cannot tell us about pain report and pain neuroimaging. *PAIN*. 157(3):511-3.

2015

- Woo, C. -W.**, & Wager, T. D. (2015). The predictive mapping approach in neuroimaging. *Science (supplement), Advances in Computational Psychophysiology*, 18-21 (invited contribution)
- Woo, C. -W.**, & Wager, T. D. (2015). Neuroimaging-based biomarker discovery and validation. *PAIN*. 156(8):1379-81.
- Woo, C. -W.**, Roy, M., Buhle, J. T. & Wager, T. D. (2015). Distinct brain systems mediate the effects of nociceptive input and self-regulation on pain. *PLoS Biology*. 13(1): e1002036. doi:10.1371/journal.pbio.1002036
- Commentary on this publication
- Bray, N. (2015). Reappraising pain. *Nature Review Neuroscience*. 16, 124-125
- Ploner, M., Bingel, U., & Wiech, K. (2015). Towards a taxonomy of pain modulations. *Trends in Cognitive Sciences*. 19, 180-182
- Mano, H. & Seymour, B. (2015). Pain: A Distributed Brain Information Network? *PLoS Biology*. 13(1): e1002037
- Wager, T. D. & **Woo, C. -W.** (2015). fMRI in analgesic drug discovery. *Science Translational Medicine*. 7, 274fs6, doi:10.1126/scitranslmed.3010342
- Losin, E. A. R., **Woo, C. -W.**, Krishnan, A., Wager, T. D., Iacoboni, M. & Dapretto, M. (2015). Brain and psychological mediators of imitation: Sociocultural versus physical traits. *Culture and Brain*. doi:10.1007/s40167-015-0029-9
- Yamamoto, D. J., **Woo, C. -W.**, Wager T. D., Regner, M. & Tanabe, J. (2015) Influence of dorsolateral prefrontal cortex and ventral striatum on risk avoidance in addiction: a mediation analysis. *Drug and Alcohol Dependence*, 149, 10-17. doi: 10.1016/j.drugalcdep.2014.12.026

2014

Woo, C. -W., Koban, L., Kross, E., Lindquist, M. A., Banich, M. T., Ruzic, L., Andrews-Hanna, J. R. & Wager, T. D. (2014). Separate neural representations for physical pain and social rejection. *Nature Communications*, 5, 5380. doi: 10.1038/ncomms6380

Commentary on this publication

Rogachov, A., Cheng, J. C., & DeSouza, D. D. (2015). Discriminating neural representations of physical and social pains: how multivariate statistics challenge the 'shared representation' theory of pain. *Journal of Neurophysiology*

Woo, C. -W., Krishnan, A., Wager, T. D. (2014) Cluster-extent based thresholding in fMRI analyses: Pitfalls and recommendations. *NeuroImage*, 91, 412-419

2013

Wager, T. D., Atlas, L. Y., Lindquist, M. A., Roy, M., **Woo, C. -W.** & Kross, E. (2013). An fMRI-based Neurologic Signature of Physical Pain. *New England Journal of Medicine*, 368 (15), 1388-1397.

2010-2012

Woo, C. -W., Kwon, S. -M., Lim, Y. -J., & Shin, M. -S. (2010). The obsessive-compulsive inventory-revised (OCI-R): psychometric properties of the Korean version and the order, gender, and cultural effects. *Journal of Behavior Therapy and Experimental Psychiatry*, 41, 220-227.

Woo, C. -W. & Shin, M. -S. (2010). Cognitive impairments in schizophrenia and psychotic bipolar disorder and their relation to psychotic symptoms. *Korean Journal of Clinical Psychology*, 29, 471-489.

Woo, C. -W., Shin, M. -S., & Kwon, S. -M. (2010). Are obsessive beliefs specific to obsessive-compulsive symptoms? *Korean Journal of Clinical Psychology*, 29, 35-52.