Choong-Wan Woo

Department of Psychology and Neuroscience
University of Colorado at Boulder
Muenzinger D244, 345 UCB
Boulder, CO 80309, USA

Phone: (720) 443-3640
Email: Choongwan.Woo@Colorado.Edu
Web: http://wanirepo.github.io
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MAJOR RESEARCH GOALS

- Developing fMRI-based biomarkers for pain, emotion, and psychopathology
- Understanding the neural mechanisms of pain and emotion regulation
- Translating basic neuroscience into the development of clinical neuroimaging tools (diagnosis, prognosis, treatment selection, drug discovery, etc.)

CURRENT ACADEMIC POSITION

PhD Candidate (dual degree) Fall 2011 ~ present (expected 08/2016)

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.

MA thesis at CU Boulder (submitted at Nov 2013)

Deconstructing pain: Sensory and cognitive manipulations of pain are mediated by distinct systems (committee: Tor D. Wager, Matt Jones, Randall C. O'Reilly)

EDUCATION and TRAINING

Clinical Residency Training Feb 2010.

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

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.

High School Seoul Science High School (서울과학고등학교) Feb 1998.

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

2015 ~ Present	Society for Affective Sciences
2013 ~ Present	Social and Affective Neuroscience Society
2012 ~ Present	American Psychosomatic Society
2012 ~ Present	Society for Neuroscience
2011 ~ Present	Cognitive Neuroscience Society
2005 ~ Present	Korean Clinical Psychological Association
2005 ~ Present	Korean Psychological Association

PROFESSIONAL ACTIVITIES

Ad-Hoc Reviewer *Brain and Language; Journal of American Neuroradiology; Pain (5), Cognitive; Affective, and Behavioral Neuroscience*

LICENSURE

2010 ~ Present Professional Clinical Psychologist (Korean Psychological Association)

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

RESEARCH EXPERIENCE

Publications (Journal Articles):

In press

Wager, T. D. & **Woo, C. -W.** (2016). Issues in assessing reliability in pain neuroimaging. *PAIN.*

Vachon-Presseau, 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.*

2016

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

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. (2015). Group-regularized individual prediction: Theory and application to pain. *NeuroImage*. S1053-8119(15)00998-2.

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.

Invited talks:

Spring 2016 *"How neuroimaging can inform cognitive theories"*
Guest lecture for a graduate-level class (Issues & Methods in Cognitive Sciences), University of Colorado at Boulder

Spring 2015 *"Imaging pain and emotion in the human brain to answer psychological questions"*
Biophotonics and Bioimaging Seminar series,
National Institute of Standards and Technology (NIST)

Spring 2011 "*Neuropsychological Assessment*"
Guest lecture for a graduate-level class (Learning and Memory),
Ewha Womans University

Conference Presentations:

Woo, C. -W., et al. (June, 2016). *Distinct neural mechanisms of pain modulation through distraction and placebo.* Poster presentation at the annual meeting of the Organization for Human Brain Mapping, Geneva, Switzerland

Woo, C. -W., et al. (June, 2015). *Cerebral contributions to pain independent of nociceptive stimulus intensity.* Poster presentation at the annual meeting of the Organization for Human Brain Mapping, Honolulu, Hawaii

Woo, C. -W. (April, 2015). *Understanding pain and emotions using multivariate pattern analysis.* Oral presentation at a workshop sponsored by the Society for Affective Sciences, "Pattern Recognition in Affective Neurosciences", Oakland, CA.

Woo, C. -W., Koban, L., Kross, E. Lindquist, M. A., Ruzic, L., & Wager, T. D. (June, 2014). *Separate neural representations for somatic pain and social rejection.* Poster presentation at Keystone Symposia on "The Brain: Adaptation and Maladaptation in Chronic Pain", Keystone, CO.

López-Solà, M., **Woo, C. -W.**, Pujol, J., Deus, J., Garcia-Fontanals, A, Contreras-Rodríguez, O., Blanco-Hinojo, L., Harrison, B. J., Wager, T. D. (May, 2014). *Aberrant fMRI Responses to multisensory events classify fibromyalgia patients: a machine learning approach.* Poster presentation at the 69th annual meeting of the Society of Biological Psychiatry, New York, NY.

Koban, L., Kross, E., **Woo, C. -W.**, Ruzic, L., & Wager, T. D. (April, 2014). *Placebo treatment reduces social rejection-related pain via activation of the dorsolateral prefrontal cortex and the periacqueductal gray.* Poster presentation at 21st annual meeting of the Cognitive Neuroscience Society, Boston, MA

Woo, C. -W., Roy, M., Buhle, J. T. & Wager, T. D. (November, 2013). *Deconstructing pain: Sensory and cognitive manipulations of pain are mediated by distinct systems.* Oral presentation at the 43rd annual meeting of the Society for Neuroscience, San Diego, CA.

Chang, L. J., **Woo, C. -W.** & Yarkoni, T. (November, 2013). *Automated Functional Parcellation and Meta-Analytic Decoding of fMRI Data With Neurosynth.* Poster presentation at the 43rd annual meeting of the Society for Neuroscience, San Diego, CA.

Krishnan, A., **Woo, C. -W.**, Ruzic, L., Fan, J., Gu, X., Chang, L. J., Wager, T. D. (June, 2013). *Physical and observed pain are represented by distinct neural patterns.* Poster presentation at the 19th annual meeting of the Organization for Human Brain Mapping, Seattle, WA.

Woo, C. -W., Roy, M., Buhle, J. T. & Wager, T. D. (April, 2013). *Cognitive reappraisal influences pain valuation, not nociception.* Poster presentation at the 20th annual meeting of the Cognitive Neuroscience Society, San Francisco, CA.

López-Solà, M., **Woo, C. -W.**, Pujol, J., Deus, J., Garcia-Fontanals, A, Contreras-Rodríguez, O., Giménez-Navarro, M., Blanco-Hinojo, L., Soriano-Mas, C., Harrison, B. J., Ortiz, H., Chang, L. J., Wager, T. D. (April, 2013). *Neural responses to pressure pain classify fibromyalgia patients.* Poster presentation at the 20th annual meeting of the Cognitive Neuroscience Society, San Francisco, CA.

Woo, C. -W., Roy, M., Buhle, J. T. & Wager, T. D. (March, 2013). *Cognitive reappraisal influences pain valuation, not nociception.* Poster presentation at the 71st annual meeting of the American Psychosomatic Society, Miami, FL.

*** selected to receive the APS Travel Award for MacLean Scholars**

Woo, C. -W., Roy, M., & Wager, T. D. (October, 2012). *Deconstructing pain: Separate contributions of noxious input and top-down bias.* Oral presentation at the 42nd annual meeting of the Society for Neuroscience, New Orleans, LA.

*** selected to receive the UGGS Travel Award**

Pauli. W. M., Yarkoni, T., **Woo, C. -W.,** Wager, T. D., & O'Relly, R. C. (October, 2012). *Orchestrating prefrontal cortical areas: meta-analytic insights into the division of labor among striatal subregions.* Poster presented at the 42nd annual meeting of the Society for Neuroscience, New Orleans, LA.

Woo, C. -W., Roy, M., & Wager, T. D. (April, 2012) *Deconstructing pain: separate contributions of noxious input and top-down bias.* Presented at the 31st annual Ekstrand Memorial Mini-convention at the University of Colorado Boulder.

Woo, C. -W. & Kwon, S. -M. (October, 2010) *Feelings that something is wrong and error-related neural hyperactivity.* Poster presented at the 50th annual meeting of the Society for

Psychophysiological Research.

Woo, C. -W. & Shin, M. -S. (August, 2010) *Measuring insight in obsessive-compulsive disorder: psychometric properties of the Korean version of the overvalued idea scale and the overvalued idea self-report questionnaire.* Poster presented at the annual meeting of the Korean Psychological Association.

Woo, C. -W. & Shin, M. -S. (October, 2009). *Thought disorder and neuropsychological deficits in patients with obsessive-compulsive disorder: relation to overvalued ideas.* Poster presented at the semiannual symposium of the Korean Clinical Psychological Association.

Shin, M. -S. & **Woo, C. -W.** (May, 2009). *The relationships between symptoms of schizophrenia and the cognitive domains of MATRICS cognitive battery.* Poster presented at the annual meeting of the American Psychiatry Association.

Woo, C. -W., Shin, M. -S., & Kwon, S. -M. (October, 2007). *The Relationship between Error-related Doubt and Obsessive Compulsive Symptoms.* Poster presented at the semiannual symposium of the Korean Clinical Psychological Association.

Research Method Program Participation:

Fall 2015	fMRI analysis (one semester course) – teach: Tor D. Wager Flipped classroom methods (online video + discussion) were used.
Spring 2014	fMRI Image Acquisition and Analyses Course with SPM8 and ICA, Mind Research Network (MRN) (3 days) *attended as a helper
Fall 2012	fMRI analysis: Part 2 (one semester course) – teacher: Tor D. Wager Machine learning techniques as applied to fMRI data analysis
March 2012	fMRI Image Acquisition and Analyses Course with SPM8 and ICA, Mind Research Network (MRN) (3 days)
Fall 2011	fMRI analysis: Part I (one semester course) – teacher: Tor D. Wager Fundamentals of fMRI (fMRI physics, experimental design, GLM-based analyses)

TEACHING EXPERIENCE

Spring 2006	Teaching assistant, Abnormal Psychology (undergraduate course) Seoul National University
Spring 2008	Teaching assistant, Clinical Psychology (undergraduate course) School of Dentist, Seoul National University
Spring 2010	Teaching assistant, Counseling Psychology (undergraduate course) Seoul Digital University
Fall 2010	Teaching assistant, Counseling Psychology (undergraduate course) Seoul Digital University
Spring 2011	Lecturer, Cognitive Behavioral Therapy (undergraduate course) Seoul Digital University
Fall 2014	Teaching assistant, Cognitive Psychology (undergraduate course) University of Colorado at Boulder

Spring 2016 Advisory Board, Issues & Methods in Cognitive Sciences (graduate course)
University of Colorado at Boulder

SKILLS

Computer	Matlab (proficient), Python, Bash
Neuroimaging	SPM, AFNI
Statistics	R, SPSS, AMOS, CEFA (Comprehensive Exploratory Factor Analysis), Mplus (multivariate statistics including Structural Equation Modeling)

PROFESSIONAL REFERENCES

Tor D. Wager, Ph.D. (PhD research advisor)
Professor
Department of Psychology and Neuroscience
University of Colorado at Boulder
Tel) 303-492-7487
Email) Tor.Wager@Colorado.Edu

Martin A. Lindquist, Ph.D.
Professor
Department of Biostatistics
Johns Hopkins University
Tel) 410-614-5107
Email) mlindqui@jhsph.edu