

# Luke J. Chang

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## *Academic Appointments*

2015 - Present      **Dartmouth College**, Hanover, NH  
Position:      Assistant Professor in Psychological and Brain Sciences

## *Education & Training*

2012-2015      **University of Colorado Boulder**, Boulder, CO  
Position:      Postdoctoral Fellow  
Advisor:      Tor Wager, PhD

2011 – 2012      **University of California Los Angeles Semel Institute for Neuroscience**, Los Angeles, CA  
Position:      Predoctoral Clinical Psychology Intern (Health Behavior Track)  
Advisor:      David Wellisch, PhD

2006 – 2012      **University of Arizona**, Tucson, AZ  
Degree:      Doctor of Philosophy in Clinical Psychology (Minor: neuropsychology)  
Advisor:      Alan Sanfey, PhD, John Allen, PhD  
Dissertation:      Deconstructing the role of expectations in social decision-making with Decision Neuroscience  
Committee:      Alan Sanfey, PhD (Chair), John Allen, PhD, Lee Ryan, PhD, Dave Sbarra, PhD

2004 – 2006      **New School for Social Research**, New York, NY  
Degree:      Master of Arts in Psychology  
Advisor:      David Silbersweig, MD, Marcel Kinsbourne, DM  
Thesis:      The structural correlates of affect regulation: A voxel-based morphometric study of borderline personality disorder.

1998 – 2002      **Reed College**, Portland, OR  
Degree:      Bachelor of Arts in Psychology  
Advisor:      Jennifer Henderlong-Corpus, PhD  
Thesis:      Cheating and self-handicapping: An examination of the relationship between academic dishonesty, self-handicapping behaviors, motivational goals, self-esteem, and academic integrity.

## *Funding*

Pending      **PI, National Science Foundation CAREER**  
Neural and computational basis of guilt in decision-making  
Total Amount: \$818,803

Pending      **PI, National Institute of Mental Health**  
Dynamic brain representations underlying emotional experience  
Total Amount: \$3,990,198

2017 – Present	<b>Co-PI</b> , Chiang Ching-kuo Foundation for International Scholarly Exchange Towards a computational understanding of social status and mianzi in Chinese and American Cultures <u>Total Amount: \$25,000</u>
2017 – Present	<b>PI</b> , The Nelson A. Rockefeller Center at Dartmouth College, Faculty Research Grant Improving healthcare decisions: Managing emotions in social decision-making with exogenous constraints <u>Total Amount: \$14,988</u>
2016 – Present	<b>PI</b> , Neukom Institute for Computational Science, CompX Grant Crowd sourced development and validation of Neuro-computational models of affect <u>Total Amount: \$25,000</u>
2014 – 2016	<b>Co-I</b> , National Institute of Health, Big Data to Knowledge (PI: Tor Wager) <i>fMRI-based Biomarkers for Multiple Components of Pain</i> <u>Total Amount: \$104,572</u>
2012 – 2015	<b>Co-I</b> , National Institute of Health (PI: Tal Yarkoni) <i>Large-scale automated synthesis of functional neuroimaging data</i> <u>Total Amount: \$2,754,805</u>
2009 – 2012	<b>PI</b> , National Institute of Mental Health, National Research and Service Award <i>Mechanisms Underlying Social Cooperative Behavior</i> <u>Total Amount: \$91,746</u>

## Publications

- 1) **Chang, L.J.** & Jolly, E. (In Press). Emotions as computational signals of goal error. In *Nature of Emotion*, Fox, D., Lapate, R., Shackman, A., & Davidson, R.J (Eds). Oxford Press.
- 2) Cheong, J.H., Jolly, E., Sul, S., & **Chang, L.J.** (In Press). Computational models in social neuroscience. In *Computational Models of Brain and Behavior*, Moustafa, A (Ed), Wiley-Blackwell.
- 3) Sul, S., Guroglu, B., Crone, E.A., & **Chang, L.J.** (2017). Medial prefrontal cortical thinning mediates shifts in other-regarding preferences during adolescence. *Scientific Reports*, 7(8510), 1-10.
- 4) Shermohammed, M., Mehta, P.H., Zhang, J., Brandes, C., **Chang, L.J.**, & Somerville, L.H. (2017). Does psychosocial stress impact cognitive reappraisal? Behavioral and neural evidence. *Journal of Cognitive Neuroscience*.
- 5) Taylor, V., **Chang, L.J.**, Rainville, P., & Roy, M. (2017). Learned Expectations and Uncertainty Facilitate Pain during Classical Conditioning. *Pain*, 158(8), 1528-1537.
- 6) Ashar, J.Y., **Chang, L.J.**, & Wager, T.D. (2017). Brain mechanisms of the placebo effect: An affective appraisal account. *Annual Reviews of Clinical Psychology*.
- 7) Woo, C.W., **Chang, L.J.**, Lindquist, M., & Wager, T.D. (2017). Brain signatures and models in translational imaging. *Nature Neuroscience*, 20 (3), 365-377.
- 8) Eisenbarth, H., **Chang, L.J.**, & Wager, T.D. (2016). Multivariate brain prediction of heart rate and skin conductance responses to social threat. *Journal of Neuroscience*, 36(47):11987-11998.

- 9) De La Vega, A., **Chang, L.J.**, Banich, M.T., Wager, T.D., & Yarkoni, T. (2016). Meta-analytic functional analysis of human medial frontal cortex reveals tripartite organization. *Journal of Neuroscience*.
- 10) Krishan, A., Woo, C.W.\*, **Chang, L.J.\***, Ruzic, L., Jackson, P., Wager, T.D. (2016). Somatic and vicarious pain are represented by dissociable multivariate brain patterns. *eLife*. \*denotes equal contributions.
- 11) Wager, T.D., Atlas, L.Y., Botvinick, M., **Chang, L.J.**, Coghill, R.C., Davis, K.D., Iannetti, G.D., Poldrack, R.A., Shackman, A.J., & Yarkoni, T. Pain in the ACC? Commentary on Lieberman and Eisenberger. (2016). *Proceedings of the National Academy of Science*.
- 12) Lindquist, M.A., Krishnan, A., Lopez-Sola, M., Jepma, M., Woo, C.W., Roy, M., Atlas, L.Y., **Chang, L.J.**, Losin, L., Eisenbarth, H., Ashar, Y.K., Koban, L., Delk, Z., & Wager, T.D. (2015). Group-regularized individual prediction: Theory and application to pain. *Neuroimage*.
- 13) **Chang, L.J.** & Smith, A. (2015). Social emotions and psychological games. *Current Opinions in Behavioral Sciences*, 5:133-140.
- 14) Yu, H., Shen, B., Yin, Y., Blue, P., & **Chang, L.J.** (2015). Dissociating guilt- and inequity-aversion in cooperation and norm compliance. *Journal of Neuroscience*, 35(24), 8973-8975.
- 15) Fareri, D.S.\*, **Chang, L.J.\***, Delgado, M.R. (2015). Neural and computational mechanisms underlying interpersonal collaboration. *Journal of Neuroscience*, 35(21), 8170-8180. \*denotes equal contributions.
- 16) **Chang, L.J.**, Gianaros, P., Manuck, S., Krishnan, K., & Wager, T.D. (2015). A sensitive and specific neural signature for picture induced affect. *PLoS Biology*, 13(6), 1-28.
- 17) **Chang, L.J.**, Reddan, M., Ashar, Y.K., Eisenbarth, H., & Wager, T.D. (2015). The challenges of forecasting resilience. *Behavioral Brain Sciences Commentary*, 38, 26-27.
- 18) Sanfey, A.G., Stallen, M., & **Chang, L.J.** (2014). Norms and expectations in social decision-making. *Trends In Cognitive Science*, 18(4), 172-174.
- 19) **Chang, L.J.** & Koban, L. (2013). Modeling emotion and learning of norms in social interactions. *Journal of Neuroscience*, 33(18), 7615-7617.
- 20) **Chang, L.J.**, Yarkoni, T., Khaw, M.W., & Sanfey, A.G. (2013). Decoding the role of the human insula in human cognition: Functional parcellation and large-scale reverse inference. *Cerebral Cortex*, 23(3), 739-749.
- 21) **Chang, L.J.**, & Sanfey, A.G. (2013). Great expectations: Neural computations underlying the use of social norms in decision-making. *Social Cognitive Affective Neuroscience*, 8(3), 277-284.
- 22) Brown, A.D., Root, J.C., Romano, T., **Chang, L.J.**, & Hirst, W. (2013). The limits of memory and imagination: Overgeneralized autobiographical Memory and future thinking in combat veterans with posttraumatic stress disorder. *Behavior Therapy and Experimental Psychiatry*, 44(1), 129-134.
- 23) Fareri, D.S., **Chang, L.J.**, Delgado, M.R. (2012). Effects of experienced social information on trust decisions and neural reward circuitry. *Frontiers in Decision Neuroscience*, 6, 1- 17.

- 24) Kahnt, T., **Chang, L.J.**, Park, S.Q., Heinzle, J., Haynes, J.D. (2012). Connectivity based parcellation of the human orbitofrontal cortex. *Journal of Neuroscience*, 32(8), 6240-6250.
- 25) Harle, K.M., **Chang, L.J.**, van't Wout, M., & Sanfey, A.G. (2012). The neural underpinnings of mood-driven biases in social economic decision-making. *Neuroimage*, 61(1), 32-40.
- 26) **Chang, L.J.**, Smith, A., Dufwenberg, M., & Sanfey, A.G. (2011). Triangulating the neural, psychological, and economic bases of guilt aversion. *Neuron*, 70, 560-572.
- 27) Van't Wout, M., **Chang, L.J.**, & Sanfey, A.G. (2010). Emotion regulation and social interactive decision-making. *Emotion*, 10(6), 815-821.
- 28) **Chang, L. J.**, Doll, B., Van't Wout, M., Frank, M., Sanfey, A.G. (2010). Seeing is believing: Trustworthiness as a dynamic belief. *Cognitive Psychology*, 61(2), 87-105.
- 29) **Chang, L.J.**, & Sanfey, A.G. (2009). Unforgettable Ultimatums? Expectation violations promote enhanced social memory following economic exchange. *Frontiers in Behavioral Neuroscience*, 3, 1-12.
- 30) **Chang, L.J.** & Sanfey, A.G. (2008). Emotion, decision-making, and the brain. In D. Houser & K. McCabe (Eds.), *Neuroeconomics*. Elsevier, 31-53.
- 31) Sanfey, A.G. & **Chang, L.J.** Multiple systems in decision-making. (2008). In W.T. Tucker, S. Ferson, A. Finkel, T.F. Long, D. Slavin, P. Wright (Eds.), *Strategies for risk communication: Evolution, evidence, experience*. New York: Annals of the New York Academy of Science, 1128, 53-62.
- 32) Protopopescu, X., Pan, H., Tuescher, O., Root, J., **Chang, L.**, Altemus, M., Polanecsky, M., McEwen, B., Stern, E., & Silbersweig, D. (2008). Toward a Functional Neuroanatomy of Premenstrual Dysphoric Disorder: Differential Amygdalar, Orbitofrontal and Ventral Striatal Activity. *Journal of Affective Disorders*, 108, 87-94.
- 33) Butler, T., Pan, H., Tuescher, O., Engelien, A., Goldstein, M., Epstein, J., Weisholtz, D., Protopotescu, X., Root, J. C., Cunningham-Bussell, A.C., **Chang, L.**, Xie, X.H., Chen, Q., Phelps, E.A., Ledoux, J.E., Stern, E., Silbersweig, D.A. (2007). Human fear-related motor neurocircuitry. *Neuroscience*, 150 (1) 1-7.
- 34) Butler, T., Imperato-McGinley, J., Pan, H., Voyer, D., Cunningham-Bussell, A. C., **Chang, L.**, Zhu, Y. S., Cordero, J., Stern, E., Silbersweig, D. (2007). Sex specificity of ventral anterior cingulate cortex suppression during a cognitive task. *Human Brain Mapping*, 28 (11), 1206-12.
- 35) Root, J.C., Robbins, R., **Chang, L.**, & Van Gorp, W.G. (2006). Detection of suboptimal effort on the California Verbal Learning Test, Second Edition: analysis and normative data for forced choice recognition. *Journal of the International Neuropsychological Society*, 12 (5), 688-96.

### *Manuscripts Under Review*

- Jolly, E. & **Chang, L.J.** Gossip drives vicarious learning and facilitates robust social connections. Manuscript Under Review.
- Fox, A.S., **Chang, L.J.**, Gorgolewski, K., & Yarkoni, T. *Bridging genetics and psychology using large-scale spatial analysis of neuroimaging and neurogenetic data*. Manuscript Under Revision at Nature Neuroscience

Shvil, E., Papini, S., Markowitz, J.C., Schafer, S., Sullivan, G.M., **Chang, L.J.**, Rusch, H.L., van der Hoorn, K.R., Milad, M.R., Wager, T.D., & Neria, Y. *Impaired hippocampal-dependent context modulation in posttraumatic stress disorder*. Manuscript Under Review.

Vavra, P., & **Chang, L.J.**, & Sanfey, A.G. *Expectations in the Ultimatum Game*. Manuscript Under Review.

Van Baar, J., **Chang, L.J.**, & Sanfey, A.G. Neural and computational substrates of moral phenotypes in social decision-making. Manuscript Under Review

Taylor, V., Roy, M., **Chang, L.J.**, & Rainville, P. Reduced Fear-Conditioned Pain Modulation in Experienced Meditators. Manuscript Under Review

### *Manuscripts In Preparation*

Cheong, J.H., Brooks, S., & **Chang, L.J.** Open source framework for recording facial expressions in single and multi-person experiments with automated synchronization of videos. Manuscript in Preparation

**Chang, L.J.**, Eisenbarth, H., Reddan, M., Andrews, E., & Wager, T.D. *Recovering sparse emotional ratings with collaborative filtering*. Manuscript in Preparation.

**Chang, L.J.**, Burnashev, A., & Wager, T.D. Crowd sourced training and validation of multivariate models of psychological states with neuro-learn. Manuscript in Preparation.

Chang, L.J. Gianaros, P.J., Gross, J., Manuck, S., & Wager, T.D. *Reappraisal alters the construction of negative affect*. Manuscript in Preparation

Jolly, E., & **Chang, L.J.** *Overcoming the flatland fallacy: the importance of computational models*. Manuscript in Preparation.

Yarkoni, T, De La Vega, A., & **Chang, L.J.** Fully automated meta-analytic clustering and decoding of human brain activity. Manuscript in Preparation.

**Chang, L.J.**, Smith, A., Dufwenberg, M., Wager, T.D., & Sanfey, A.G. *Computational substrates of guilt*. Manuscript in Preparation.

Rossi, F., Fasel, I., Bartlett, M., Sanfey, A.G & **Chang, L.J.** Affective mechanisms of reinforcement-learning in social and non-social decision-making.

### *White Papers*

Chang, L.J. (2017). *The science of trust*. Commission on Trust, Media, and American Democracy. The Aspen Institute.

### *Chaired Symposia, Workshops, & Summer Schools*

2017	Co-Organizer of 8-day Methods in Neuroscience at Dartmouth Computational Summer School, Hanover, NH
2017	Co-Organizer of Dartmouth BrainHack (4-day department neurosciencehackathon), Hanover, NH

2016	Co-Organizer of Dartmouth Affective Neuroscience Symposium, Hanover, NH
2016	<i>"Insights into human cognition and emotion using large-scale neuroinformatics"</i> Nanosymposium, Society for Neuroscience Meeting, San Diego, CA
2016	Co-Chair for Dartmouth Affective Neuroscience Symposium, Hanover, NH
Apr 2014	Computational approaches to social affective neuroscience (co-chaired with Damian Stanley) The 7th Annual Social Affective Neuroscience Society Meeting, Denver, CO
2010	Co-Organizer of a 3-day introductory workshop on the R statistical language to the University of Arizona School of Arts and Sciences, Tucson, AZ.

### *Invited Talks*

July 2017	Beyond the Lab Psychonomics Workshop, Madison, WI
May 2017	New England Research Decision-Making Group (Brown University)
May 2017	Boston Area Moral Cognition Group (MIT)
May 2017	Affectiva
Apr 2017	Society for Affective Neuroscience
Mar 2017	Society for Social and Affective Neuroscience
Jan 2017	Society for Social and Personality Psychology
Nov 2016	Society for Neuroscience Nanosymposium
Jun 2016	Dartmouth Affective Neuroscience Symposium
May 2016	Hanover Rotary Club, Hanover, NH
Nov 2015	Yale University, New Haven, CT
Oct 2015	Harvard University, Cambridge, MA
Oct 2015	The 45 <sup>th</sup> Annual Society for Neuroscience Meeting, Chicago, IL
Sep 2015	University of New Hampshire, Durham, NH
May 2015	University of College London, London, UK
May 2014	The 26 <sup>th</sup> Annual American Psychological Science Meeting, SF, CA
Apr 2014	The 7th Annual Social Affective Neuroscience Society Meeting, Denver, CO Jan 2014
Jan 2014	University of California Santa Barbara, Santa Barbara, CA
Dec 2013	Princeton University, Princeton, NJ
Nov 2013	University of Colorado, Boulder, CO
Nov 2013	Dartmouth College, Hanover, NH
Oct 2013	Harvard University, Cambridge, MA
Sep 2013	University of Amsterdam, Amsterdam, The Netherlands
Sep 2013	Donders Institute for Brain, Cognition, and Behavior, Nijmegen, The Netherlands
Aug 2013	European Society for Cognitive Psychology, Budapest, Hungary
Apr 2013	University of Denver, Denver, CO
Jan 2013	University of Colorado, Boulder, CO
May 2012	UCLA, Department of Psychiatry, Los Angeles, CA
Apr 2012	Duke University, Durham, NC
Apr 2012	Virginia Tech Carilion Research Institute, Roanoke, VA
Mar 2012	University of Colorado, Boulder, CO
Feb 2012	Stanford University, Palo Alto, CA
Jun 2010	Leiden University, Leiden, Netherlands
Sep 2009	The 5 <sup>th</sup> Annual Society for Neuroeconomics Meeting, Evanston, IL.
Nov 2006	Clinical Psychology Datablitz, Tucson, AZ.

### *Awards & Fellowships*

Summer 2010	<b>Cognitive Science Center Neuroeconomics Summer School</b> , University of Amsterdam
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2009	<b>Graduate and Professional Student Council Student Showcase - 1<sup>st</sup> place in Social Sciences &amp; Law</b> , University of Arizona
2009	<b>Technology Research Initiative Fund Graduate Student Imaging Fellowship</b> , University of Arizona
Summer 2008	<b>Neuroimaging Training Program</b> , University of California Los Angeles
Summer 2007	<b>Summer Institute in Cognitive Neuroscience Fellowship</b> , University of California Santa Barbara
2006 – 2007	<b>Graduate Minority Fellowship</b> , University of Arizona
2006 – 2007	<b>Deans Fellowship</b> , New School for Social Research (Declined)
2004 – 2006	<b>University Scholars Award</b> , New School for Social Research

### *Ad-hoc Reviewing (Papers, Grants, Proposals)*

Behavioral Sciences  
 Brain and Cognition  
 Brain Research  
 Cerebral Cortex  
 Cognitive Affective Behavioral Neuroscience  
 Cognitive Computation  
 DFG – German Research Federation  
 eLife  
 Emotion  
 Rotterdam School of Management, Erasmus University  
 Evolution and Human Behavior  
 Frontiers in Neuroscience  
 Journal of Cognitive Neuroscience  
 Journal of Neuroscience  
 Journal of Economic Psychology  
 Human Brain Mapping  
 Nature Human Behavior  
 Nature Neuroscience  
 Neuroimage  
 Neuron  
 NSF – National Science Foundation  
 PLoS One  
 PLoS Computational Biology  
 Proceedings for the National Academy of Science  
 Psychological Science  
 Psychological Review  
 Science  
 Scientific Reports  
 Social Cognitive Affective Neuroscience  
 Trends in Cognitive Science  
 University of Trento  
 Vermont Genetic Network

### *Professional Service*

2016	Reviewer Cosyne Meeting
2016 – Present	Review Editor for Emotion
2015- 2016	Organizing Committee Social Affective Neuroscience Meeting
2014 – Present	Review Editor Frontiers in Emotion Science

Summer 2013	Guest Lecturer in University of Colorado Science Discovery Program for adolescents
2008	Psychology Department Mini-Convention Organizer
2006 – 2008	Psychology Department Graduate Student Representative

*Software/Programming Skills* (<http://github.com/ljchang>)

Scientific Computing (Python, Matlab, Bash), Statistics (R, Stan, SPSS, SAS), Brain Imaging (Nipy, FSL, SPM, BrainVoyager, EPrime), Web Development (HTML, CSS, Flask, Meteor, Javascript, JQuery)

*Professional Memberships*

Society for Neuroscience  
Society for Affective Neuroscience  
Society for Social Neuroscience  
Society for Social Affective Neuroscience  
Affective Computing  
Society for Social and Personality Psychology  
Society for Neuroeconomics  
Organization for Human Brain Mapping  
Cognitive Neuroscience Society  
American Psychological Society