MARIANNE C. REDDAN, PHD

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http://appliedmarianne.com https://profiles.stanford.edu/marianne-reddan

Interests

emotion representations, biomarker development, fMRI, machine learning, affective computing, dyadic interaction, predictive coding, threat, pain, socioeconomic influence, clinical translation

Education

2019 **Ph.D., Psychology and Neuroscience,** *certificates in Cognitive Science & Quantitative Methods in Behavioral Sciences*
University of Colorado at Boulder
Faculty Advisor: Tor Wager, PhD

2016 **M.A., Psychology and Neuroscience**
University of Colorado at Boulder

2010 **B.A., Psychology** *with Honors*
New York University, College of Arts and Sciences
Lewis Rudin Scholar

Research Experience

2019 – Postdoctoral Fellow in Social Neuroscience, Stanford University
Faculty Advisor: Jamil Zaki, PhD

2013 – 19 Graduate Student in Cognitive and Affective Neuroscience, CU Boulder
Faculty Advisor: Tor Wager, PhD

2010 – 13 Lab Manager in Affective Neuroscience, Mount Sinai School of Medicine
Faculty Advisor: Daniela Schiller, PhD

2009 – 10 Undergraduate Research Assistant in Psychology, New York University
Faculty Advisor: Elizabeth Phelps, PhD
Project Mentor: Catherine Hartley, PhD

Publications (450 citations, h-index 10)

Selected Peer Reviewed Publications

Reddan, M.C. (2021). Recommendations for the development of socioeconomically-situated and clinically-relevant neuroimaging models of pain. *Frontiers in Neurology*, 12, 1529 – 1531.

Reddan, M.C., Young, H., Falkner, J., López-Solà, M., & Wager, T.D. (2020). Touch and social support influence interpersonal synchrony and pain. *Social Cognitive Affective Neuroscience*,*15* (10): 1064-1075. doi:10.1093/scan/nsaa048.

Kragel, P.A., **Reddan, M.C.,** LaBar, K.S., & Wager, T.D. (2019). Emotion schemas are embedded in the human visual cortex. *Scientific Advances*, *5* (7), https://doi.org/10.1126/sciadv.aaw4358.

Reddan, M.C., Wager, T.D., & Schiller, D. (2018). Attenuating Neural Threat Expression with Imagination. *Neuron, 100*, 994-1005.

Reddan, M.C. & Wager, T.D. (2018). Brain systems at the intersection of chronic pain and self-regulation. *Neuroscience Letters*, *702*, 24-33.

Reddan, M.C. & Wager, T.D. (2017). Modeling Pain Using fMRI: From Regions to Biomarkers. *Neuroscience Bulletin,* 1-8.

Reddan, M.C., Lindquist, M.A., & Wager, T.D. (2017). Effect Size Estimation in Neuroimaging. *JAMA Psychiatry.* doi:10.1001/jamapsychiatry.2016.3356.

Additional Peer Reviewed Publications

Ong, D. C., Wu, Z., Zhi-Xuan, T., **Reddan, M.,** Kahhale, I., Mattek, A., & Zaki, J. (2021). Modeling emotion in complex stories: the Stanford Emotional Narratives Dataset. *IEEE Transactions on Affective Computing.* 12 (3): 579-594.

Matthewson, G., Woo, C.W., **Reddan, M.C.**, & Wager, T.D. (2019). Cognitive self-regulation influences pain-related physiology. *PAIN*, *160* (10), 2338–2349.

Homan, P., **Reddan, M.C.**, Brosch, T., Koenigsberg, H.W., Schiller, D. (2017). Aberrant link between empathy and social attribution style in borderline personality disorder. *Journal of Psychiatric Research (94)*: 163-171.

Chang, L.J., **Reddan M.**, Ashar, Y.K., Eisenbarth H., & Wager, T.D. (2015). The Challenges of Forecasting Resilience. *Behavioral and Brain Sciences Commentary, 38*: 26-27.

Hildebrandt, T., Grotzinger, A., **Reddan, M.**, Greif, R., Levy, I., Goodman, W., & Schiller, D. (2015). Testing the Disgust Conditioning Theory of Food-Avoidance in Adolescents with Recent Onset Anorexia Nervosa. *Behaviour Research and Therapy, 71*,131-138.

Hartley, C.A., Gorun, A., **Reddan, M.C.**, Ramirez, F., Phelps, E.A. (2013). Stressor controllability modulates fear extinction in humans. *Neurobiology of Learning & Memory, 113*,149-56.

Conference proceedings

Reddan, M. (2015). Developing Neural Signatures for Discrete Emotional States. *CU STEMinar Journal* 1(1)23-29.

Earl E, Demeter D., Mills K., Mihai G., Ruzic L., Ketz N., Reineberg A., **Reddan, M.,** Goddings A., Gonzalez-Castillo J., Krzysztof G. (2015). Human Connectomes Project Minimal Preprocessing Pipelines to Nipype. *Brainhack Project Report from OHBM Hackathon.* Project URL: https://github.com/ericearl/hcp2nipype-hack2015.

Book Chapters

Dutra, S. J., **Reddan, M**., Purcell, J. R., Devlin, H.C., & Welker, K. M. (2018). Indices and correlates of positive emotion in psychopathology: Methodological and design considerations In Gruber, J. (Ed.),*The Oxford Handbook of Positive Emotion and Psychopathology.* New York, NY: Oxford University Press.

Manuscripts In Preparation

Reddan, M.C., Ong, D., Mattek, A., Kahhale, I., & Zaki, J. (in prep) Brain signatures for interpersonal emotion inference.

Reddan, M.C., Gruber, J., Ibonie, S. & Zaki, J. (in prep) Neural biomarker for interpersonal emotion inference distinguishes between mood disorder patients and healthy controls.

Reddan, M.C., Garcia, S., Eberhardt, J. & Zaki, J. (in prep) Narrative stories reduce bias against incarcerated people: Evidence in beliefs, behavior, and facial expression.

Manuscripts Under Review

Jolly, E., Farrens, M, Greenstein, N., Eisenbarth, H., **Reddan, M.C.**, Andrews, E.A., Wager, T.D., & Chang, L.J. (under review). Recovering individual emotional states from sparse ratings using collaborative filtering. *PLoS Biology.*

van't Hof, S.R., Van Oudenhove, L., Klein, S., **Reddan, M.C.,** Kragel, P.A., Stark, R., & Wager, T.D. (under review). The Brain Activation-based Sexual Image Classifier (BASIC): A sensitive and specific fMRI activity pattern for sexual image perception. *bioRxiv*.

Presentations

Invited Talks

Reddan, M.C. Interpersonal support and society modulate the brain representation of pain at *Columbia University,* **Social Cognitive and Affective Neuroscience Lab Meeting (PI: Kevin Ochsner)***,* Virtual, September 2021.

Reddan, M.C. Brain mechanisms for the attenuation of fear and pain through self-regulation and social support at **Lab Meeting of Dr. Vilma Gabbay (Director of Psychiatry Research)**, Einstein College of Medicine, New York, NY, Virtual, August 2021.

Reddan, M.C. Recommendations for the Development of Socially-Situated and Clinically-Relevant Neuroimaging Models of Pain at **Stanford's Affective Seminar**. Virtual, April 2021.

Reddan, M.C., Young, H., Falkner, J., López-Solà, M., & Wager, T.D. Touch and social support influence interpersonal synchrony and pain at **University of California San Diego Empathy and Compassion Journal Club**. Virtual, February 2021.

Reddan, M.C., Schiller, D., Wager, T. Attenuating Threat Expression with Imagined Extinction at the **43rd Annual Meeting of the Japanese Neuroscience Society** at the Kobe Convention Center in Japan, Virtual, July 2020.

Reddan, M.C. & Zaki, J. Predicting Empathic Accuracy from Brain Activity. **Stanford Psychology Departmental Colloquium Flash Talk**. Stanford, CA, March 2020. [Cancelled due to COVID-19 pandemic]

Reddan, M.C. & Zaki, J. Predicting emotion inference from observer brain states at **Causality and Cognition Lab Meeting (PI: Tobias Gerstenberg)**, Stanford University, Stanford, CA, February 2020.

Reddan, M.C. & Zaki, J**.** Modal and Supramodal Representations of Emotion at **Stanford's Affective Seminar,** Stanford University, Stanford, CA, December 2019.

Reddan, M. Behavioral and Neural Evidence for Social- & Self-Regulation of Pain, **Cognitive Lunch Lecture Series**, Cognitive Psychology Department CU-Boulder, Boulder, CO, Apr 2019.

Reddan, M. A Neural Basis for Embodied Emotion. **Cognitive Lunch Lecture Series**, Cognitive Psychology Department CU-Boulder, Boulder, CO, Apr 2018.

Reddan, M. The Practical Significance of Psychological Classifiers. **Cognitive Lunch Lecture Series**, Cognitive Psychology Department CU-Boulder, Boulder, CO, Sept 2017.

Reddan, M. The Prediction and Modification of the Neural Representation of Threat. **Cognitive Lunch Lecture Series**, Cognitive Psychology Department CU-Boulder, Boulder, CO, Feb 2016.

Reddan, M. 'Decoding' Emotion: How Machine Learning and Representational Similarity Analysis are Reshaping Psychology, **Positive Emotion Psychology Lab Meeting (PI: June Gruber),** University of Colorado-Boulder, CO. Feb 2016.

Reddan, M., Wager, T.D., and Schiller D. Influence of Imagined Extinction on Real-life Threat Expression. **CASL: Colorado Affective Science Laboratories Symposium**. University of Colorado-Denver, Denver, CO. April 2015.

Reddan, M., Chang L, and Wager, T. Development of Neural Signatures of Nuanced Emotional Events. **Interdisciplinary Science Short: Physics in Medicine**, University of Colorado-Boulder, Boulder, CO. November 2014.

Reddan, M, Chang L, and Wager, T. Application of Machine Learning Techniques to the Neural Processing of Human Emotion. **STEMinar**, University of Colorado-Boulder, Boulder, CO. November 2014.

Conference Talks

Reddan, M.C., Ong, D, & Zaki, J. Human and AI Emotion Inference in Naturalistic Environments at **Society for Personality and Social Psychology (SPSP)**, Virtual Symposium, February 2021.

Reddan, M.C., Ong, D, & Zaki, J. Multisensory information yields more abstract neural representations of emotion inference at **Social Affective Science (SAS)**. San Francisco, CA, March 2020 [rescheduled due to COVID-19 pandemic]

Reddan, M.C., Wager TD, & Schiller D. Attenuating Neural Threat Expression with Imagination. **Organization of Human Brain Mapping (OHBM)**, Rome, Italy, June 2019.

Reddan, M., Chang, L, & Wager, TD. A Neural Basis for Embodied Emotion. **Social Affective Neuroscience Society (SANS)**, Brooklyn, NY, May 2018.

Reddan, M. Neurolime: A tool for interpreting nonlinear predictions in neuroimaging. **Organization of Human Brain Mapping Hackathon *Unconference*,** Vancouver, CA, June 2017.

Reddan, M. WTF is Deep Learning? **Organization of Human Brain Mapping Hackathon *Unconference***, Vancouver, CA, June 2017.

Reddan, M., Schiller D., and Wager, T.D. Imagined Extinction Reduces Real-life Threat Expression. Emotion and Motivation Session, **Organization of Human Brain Mapping (OHBM)**, Honolulu, HI, June 2015.

Reddan, M., & Wager, T.D. Neural Patterns of Embodied Emotion. **34th Annual Ekstrand Mini-Convention.** University of Colorado-Boulder, Boulder, CO. April 2015.

Reddan, M., Schiller D., and Wager, T.D. Imagined Extinction Training Influences Fear Recovery. **33rd Annual Ekstrand Mini-Convention.** University of Colorado-Boulder, Boulder, CO. April 2014.

Reddan, M., Brosch T., Koenigsberg H., Schiller D. Emotion Dysregulation and the fundamental attribution error in borderline personality disorder. Nanosymposium: Fear, Stress, and Social Networks**. Society for Neuroscience Annual Meeting (SFN)**, San Diego, CA, November 2013.

Reddan, M., Levy D., Schiller D. The effects of imagination on fear extinction. Nanosymposium on Emotion: Neural Mechanisms of Regulation. **Society for Neuroscience Annual Meeting (SFN)**, New Orleans, LA, October 2012.

Reddan, M., Schiller, D. The effects of imagination on fear extinction**. Friedman Brain Institute Annual Neuroscience Retreat,** New York, NY. April 2012.

Poster Presentations

Reddan, M.C., Ong, D., & Zaki, J. A Comparison of Human and AI Emotion Inference in Naturalistic Social Environments. **Organization of Human Brain Mapping (OHBM)**, Virtual, June 2021.

Reddan, M.C., Ong, D., & Zaki, J. Modal and Supramodal Representations of Emotion Inference. **Social Affective Neuroscience Society (SANS)**, Virtual, May 2021.

Reddan, M., Chang, L., & Wager, T.D. A Neural Basis for Embodied Emotion. **Organization of Human Brain Mapping (OHBM)**, Rome, Italy, June 2019.

Kragel, P.A., **Reddan, M.C.,** LaBar, K.S., & Wager, T.D. Decoding convolutional neural network representations of emotion schemas from distributed patterns of brain activity in the human visual system. **Social Affective Neuroscience Society (SANS)**, Miami, FL, May 2019.

Reddan, M., Lindquist, M. & Wager, T.D. Understanding Bias in Neuroimaging Effect Sizes. **Organization of Human Brain Mapping (OHBM)**, Vancouver, CA, June 2017.

Reddan, M., Young, H. & Wager T.D. Supportive Touch Induces Interpersonal Physiological Synchrony and Reduces Perceived Pain. **Social Affective Neuroscience Society (SANS)**, Los Angeles, CA, March 2017.

Reddan, M. & Wager T.D. The Neural Basis of Embodied Emotion. **Human and Animal Emotions Conference**, Erice, Sicily, May 2016.

Reddan, M., Wager, T.D., Schiller, D. Imagine That! Simulated Extinction Training Reduces the Expression of Fear in the Brain and Body. **Social Affective Neuroscience Society (SANS)**, New York, NY, April 2016.

Reddan, M., Levy, D., Schiller, D. The Efficacy and Neural Correlates of Imagined Extinction. **Wisconsin Symposium on Emotion**, Madison, WI, April 2013.

Schiller, D., Manson, K., **Reddan, M.**, Jackson, E., Levy, I., Harpaz-Rotem, I. Reversal of fear and safety in PTSD patients. **Talk**. Nanosymposium on Emotion: Neural Mechanisms of Regulation, **Society of Neuroscience Annual Meeting (SFN)**, New Orleans, LA, October 2012.

Reddan, M., Levy, D., Schiller, D. Extinguishing learned fear by imagination. **The Pavlovian Society Annual Meeting**, Jersey City, NJ, September 2012.

Reddan, M., Thompson, C., Schiller, D. The "Positive" Role of the Negative System. **Translational and Molecular Imaging Institute Conference**. Icahn School of Medicine at Mount Sinai. New York, NY. May 2011

Hartley, C.A., Gorun, A., **Reddan, M.**, Phelps, E.A. The Influence of Stressor Controllability on Conditioned Fear Expression in Humans. **The Pavlovian Society Annual Meeting**, Baltimore, MD. October 2010

Teaching Experience

UNIVERSITY OF COLORADO-BOULDER

LAB INSTRUCTOR

2018 *Cognitive Neuroscience,* Professor: **Tim Curran, PhD.** 50 students.

GUEST LECTURER

2017 *Affective Neuroscience*, Professor: **Tor Wager, PhD**. 30 students.
"The Social and Basic Neuroscience of Touch"

2015 *Affective Science*, Professor: **June Gruber, PhD**. 30 students.
"Affective Computing and Wearable Technology"

TEACHING ASSISTANT

2017 *Human Emotion*, Professor: **June Gruber, PhD**. 80 students.

2017 *fMRI Acquisition & Analysis 3-Day Training Course*, Instructors: **Tor Wager, Kent Kiehl, & Vince Calhoun**. 40 attendees at CU Boulder.

2016 *Introduction to Psychology,* Professor: **Joseph Berta, PhD**. 200 students.

2016 *Personality*, Professor: **Chelsea Pierotti, PhD**. 200 students.

2015 *Human Emotion*, Professor: **June Gruber, PhD**. 80 students.

2014 *Psychological Statistics*, Professor: **Diane Martichuski, PhD**. 200 students.

2014 *Cognitive Psychology*, Professor: **Joseph Berta, PhD**. 200 students.

INSTRUCTOR

2019 *fMRI Club: Neuroimaging Workshop for Beginners*, Stanford University. 7 attendees.
2016 *Rapid Prototyping; Lasting Lessons,* Science Discovery Program. 20 students.
2016 *Interactive Circuits & Wearable Technology,* Science Discovery Program. 20 students.
2015 *STEM Academy: 3D Printing and Design*, Science Discovery Program. 20 students.

NEW YORK UNIVERSITY

2009 – 2010 Teaching Assistant / Recitation Leader
Introduction to Psychology, Professor: **Ted Edgar Coons, PhD**. 300 students.

Mentoring Experience

Ayomide Olu-Odumosu, Undergraduate, University of California Berkeley, Berkeley, CA.
Project: Changing beliefs about racial bias in the US prison system with narrative storytelling

Isabel Dibble, Undergraduate, Stanford University, Stanford, CA.
Project: Increasing empathy for the incarcerated with narrative storytelling
2021 Stanford Psychology Department Summer Research Fair

Layo Laniya, Undergraduate, Stanford University, Stanford, CA.
Project: Emotion Granularity in the Stanford Emotional Narratives Dataset
2020 Stanford Psychology Department Summer Research Fair

Gigi Keziah, Fairview High School, Boulder, CO.
Project: Feature Weighting in Multimodal Affect Prediction and Emotion Inference
2019 Boulder Valley Science Fair
2019 Intel Science Engineering Fair, 3rd Place in Behavioral & Social Sciences at CSEF

Huilin Han, Monarch High School, Louisville, CO.
Project: Neural Evidence for Embodied Emotion: A Neuroimaging Study
2018 Boulder Valley Science Fair

Kate Nakasato and Madison Risi, Monarch High School, Louisville, CO
Project: Meta-Analysis of Brain and Immune Interactions during Anger
2017 Boulder Valley Science Fair

Natalie 'LeeJay' Guyton, Nederland High School, Nederland, CO.
Project: Genetic and Environmental Contributions to Misaphonia
2016 Boulder Valley Science Fair

Emily Tarbush, University of Colorado, Boulder, CO.
Project: Gender Effects in Touch Analgesia
2016 Boulder Valley Science Fair

Hannah Young, University of Colorado, Boulder, CO.
Project: Analgesic Effects of Gentle Touch and Social Support
2015 CU Boulder Undergraduate Research Conference

Julia Falkner & Tess Rudd, Monarch High School, Louisville, CO.
Project: Influence of Interpersonal Interactions on Pain Perception
2015 ISEF special award from the American Psychological Association

Abigail Orlando, East Chester High School, Eastchester, NY.
Project: The cognitive and psychological effects of the emoticon.
2013 Intel Science Talent Search: Report Badge
2013 Intel International Science and Engineering Fair finalist
1st Place Behavior Category
1st Place American Psychological Association Competition
2nd Place Psi Chi Honor Society
2013 Junior Humanities and Science Symposium
2013 Westchester Science and Engineering Fair

May Yuan, Great Neck South High School , Long Island, NY.
Project: How disgust influences social decision making.
2012 Long Island Science and Engineering Fair
2012 Social & Affective Neuroscience Annual Meeting. Poster

Awards & Recognitions

Grants & Fellowships

Beverly Sears Graduate Student Grant ($1000)	2018
NSF Graduate Research Fellowship Honorable Mention	2014
STEMinar Graduate Research Grant ($500)	2014
NYU Collegiate Research Scholar ($1000)	2010

Academic Recognition

Quantitative Methods in Behavioral Sciences Certificate, CU Boulder	2018
Dosier/Muenzinger Award for Teaching, CU Boulder	2018
fMRI Acquisition and Analysis Certificate	2016
Psi Chi the New York University Chapter	2009-10
New York University Lewis Rudin Scholarship	2006-10

Travel and Poster Awards

Social Affective Neuroscience Society (SANS) Poster Award	2021
Institute for Cognitive Science Travel Award ($500)	2017
Social Affective Neuroscience Conference Registration Award (Design)	2016
CU Boulder Graduate School Travel Award ($500)	2016
University of Wisconsin-Madison Emotion Symposium Travel Award ($300)	2013
Friedman Brain Institute Neuroscience Retreat: 'Best Presentation' Award	2012
NYU Undergraduate Research Conference: 'Best Poster' Award	2010

Memberships

Social and Affective Neuroscience Society (SANS)	2011 - Present
Society for Personality and Social Psychology (SPSP)	2020 - Present
Society for Affective Science (SAS)	2020 - Present
Organization of Human Brain Mapping (OHBM)	2013 - Present

Science Community Service & Outreach

Reviewing

Neuroimage
Cognitive Affective and Behavioral Neuroscience
Cognition and Emotion
Cerebral Cortex
Nature Scientific Reports
PLOS One
American Psychological Association (APA) Conference Abstracts
Organization of Human Brain Mapping (OHBM) Conference Abstracts

Coding Tutorials & Analysis Walkthroughs

CANLab Repos Guide: http://www.appliedmarianne.com/canlab-repos-guide.html
I wrote an extensive (50 pg) walkthrough to imaging analysis with Tor Wager's MATLAB Package "CANLabRepos"
CANLab Help Examples: https://github.com/canlab/CANlab_help_examples
I contributed to code-based walkthrough guides & example scripts for neuroimaging analysis
How to 3D Print Your Brain: http://www.appliedmarianne.com/how-to-3d-print-your-brain.html

Elementary & High School Special Lectures on the Brain

Watershed School — Boulder, CO
8th Grade Class: The Neuroscience of Controlling Fear — Feb 15, 2018

Academy of St. Dorothy's — Staten Island, NY
3rd Grade Class: Brain anatomy, learning, memory, and sleep — *yearly* 2013 - 2017

Bay Ridge Preparatory High School — Brooklyn, NY
Special Education Seniors: Learning, Memory, and Neuroplasticity — Dec 19, 2013
Advanced Seniors: Current Research on Threat Learning and Fear — Dec 19, 2013

Northern Manhattan Public Schools: Brain Awareness Week
Mount Sinai School of Medicine — New York, NY — March 2013
K – High School Students attended an event I co-organized, where our laboratory and others hosted interactive booths demonstrating neurophysiological recording techniques, and played games that revealed principles of learning and memory

Community Presentations & Workshops

Smooth Brain: Laidback Neuroscience Podcast — Co-founded Sep 2020
video podcast series that brings together neuroscience researchers and lay people with life experience relevant to the study objectives

Podcast Guest on End of the Road Podcast: **Episode 107: Dr. Marianne Reddan: Neuroscience/Imagination/Extinction Therapy** Feb 2020

Podcast Guest on End of the Road Podcast **Episode 129: Dr. Marianne Reddan: The Neuroscience of Touch/Pain Amelioration/Empathy/Synchrony** June 2020

Speaker. **Moving towards a culture of transformative justice**: a discussion of alternatives to policing to reduce harm to marginalized communities
Denver Art Society — Denver, CO — June 2018
The Base — Brooklyn, NY — June 2018

Speaker. **Socioeconomic Contributions to Chronic Pain and Anxiety**
ISO Community Meetings Denver, CO June 10, 2017

Organizer. **CU Boulder Graduate STEMinar**: seminar series for STEM grad students. 2014 - 17

Founder & Speaker: **Brain Hacks & a Movie Series**
Solid State Depot Boulder, CO Monthly, 2014

Speaker. **'Hacking' Your Brain**: a computational perspective on learning and memory
Make Staten Island Staten Island, NY May 16, 2013

Diversity, Equity, & Inclusion Commitments

Women in Computing (WIC) at CU Boulder, *Member*, 2016-19
Women in Science and Engineering (WiSE) at CU Boulder, *Member*, 2016-19
Committee on Rights & Compensation at CU Boulder, *Board Member,* 2016-19
Grad Action: a Social Justice Mobilization Network at CU Boulder, *Founder*, 2016-19
#MeToo in Higher Education, Coalition of Graduate Employees Conference, *Panelist*, 2018
Reducing the Silencing Role of Harassment in Online Feminism Discussions, *Co-Author* (with J. Nathan Matias & Tyler Simko), Citizens & Technology Lab, 2020
Solid State Depot Makerspace in Boulder, Colorado, *Board Member*, 2013 – 14

Media Coverage

Study: Reddan, M.C., Wager, T.D., & Schiller, D. (2018) Attenuating Neural Threat Expression with Imagination. *Neuron.*
EurekAlert from AAAS
Science Daily
Thrive Global
Daily Camera
Elemental
CU Boulder Today

Study: Kragel, P.A., Reddan, M.C., LaBar, K.S., & Wager, T.D. (2019). Emotion schemas are embedded in the human visual cortex. *Scientific Advances*.
The Daily Beast

Topic: Pain Empathy
The American Scholar