Roberto Vargas

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Education

07.2016 – present	PhD., Cognitive Neuroscience, Carnegie Mellon University *Advisor*: Timothy Verstynen / Marcel Just
07.2016 – 08.2020	Center for the Neural Basis of Cognition Graduate Training
07.2016 – 05.2018	MS., Psychology, Carnegie Mellon University *Advisor*: Marcel Adam Just
07.2008 – 08.2012	B.A., Psychology, University of Texas at San Antonio *Cum Laude*

Honors and Awards

2021	**Dick Hayes Graduate Student Service Award**
2021	**Herb Simon Graduate Student Teaching award**
2020 – present	**Eberly Center Future Faculty Program**
2017 – 2019	**Behavioral Brain (B2) Research Training Program**
2017	**Ford Foundation Predoctoral Fellowship: Honorable Mention List**
2010	**COLFA Research Conference, University of Texas at San Antonio** Research Poster, *1st Place*

Academic Service

2020 – present   CMU Diverse Recruitment Committee (Co-founder)
· Establishing Carnegie Mellon's inaugural presence at ABRCMS
· Centralizing and coordinating diverse recruitment efforts across departments
· Compiling admissions resources for applicants from underrepresented backgrounds

2017 – 2020   CMU Psychology Diversity & Inclusion Committee

Teaching Experience

Fall 2020   Cognitive Neuroscience Research Methods (Instructor)
· Flipped lecture format
· Remote-only instruction

Spring 2019   Cognitive Neuroscience Research Methods (Teaching Assistant)
Spring 2018   Cognitive Neuroscience Research Methods (Teaching Assistant)
Spring 2017   Cognitive Brain Imaging (Laboratory Instructor)

Grants and Awards

Amount: $20,352   BRIDGE Center Developmental Fund Seed Grant
Award date: 1-21-2021   Project funded: The neural representation of societal concepts across black and white individuals: a comparative investigation of emotional and personal attitudes towards domains of racial disparities.

Research Interests and skills:

My research explores the neural instantiation of knowledge and experience by examining the semantic similarity of individual concepts based on their neural similarity. The neural similarity between concepts can then be used to define underlying semantic primitives and their organization in the brain. I have recently begun to extend my research to understand how our experiences and the experiences of

groups we belong to change the neural representations and organization of concepts. Specifically, I am interested in how the ethnic/racial groups we belong to affect the way we neurally organize concepts central to the communities, careers, and country we are a part of.

Research skills: MVPA analyses of fMRI data (including RSA, decoding and encoding modeling, and dimension reduction techniques); SPM; fMRI experimental design; fMRI preprocessing; algorithm development in Matlab; intermediate proficiency with time series analyses and analyses of EEG data.

Current Projects

Examination of the concept geometry of societal concepts and decisions to engage across multiple social groups.

Using fMRI-measured Attitudes and Actions to Predict Biased Decisions to Punish among White and Chinese Americans

Peer-reviewed Publications

Vargas, R. & Just, M. (under review) Similarities and Differences in the Neural representations of Abstract Concepts across English and Mandarin: Comparison of Underlying Dimensions of Meaning

Cherkassky, V., Yang, Y., Walsh, M.M., **Vargas, R.**, Just, M.A. (under review). Decoding concepts from their EEG signature using machine learning and fMRI-based weights. *Neuroimage.*

Vargas, R. & Just, M.A. (In press). The Neural Representation of Concrete and Abstract Concepts. In Barbey, A.K., Karama, S. & Heier, R.J. (Eds.) **The Cambridge Handbook of Intelligence and Cognitive Neuroscience.**

Vargas, R. & Just, M.A. (2019). Neural representations of Abstract Concepts: Identifying Underlying Neurosemantic Dimensions. *Cerebral Cortex.* doi.org/10.1093/cercor/bhz229

Wang, J., Cherkassky, V. L., Yang, Y., Chang, K. K., **Vargas, R.**, Diana, N., Just, M.A. (2016) Identifying thematic roles from neural representations measured by functional magnetic resonance imaging. *Cognitive Neuropsychology, 1-8.* (Special Issue on Conceptual Knowledge Representation)

Price, L.R., **Vargas, R.**, Behroosmand, R., Parkinson, A.L., Larson C.R., Greenlee, J.D.W., & Robin, D.A. (2016) Dynamic Connectivity Mapping of Electrocorticographic Data using Bayesian Differential Structural Equation Modeling. *Biometrics and Biostatistics International Journal, 4.*

Flagmeier, S.J., Ray, K.L., Parkinson, A.L., Li, K., **Vargas, R.**, Laird, A., Larson, C.R. & Robin, D.A. (2014). The Neural Changes in Connectivity of the Voice Network During Error Detection and Correction. *Brain and language*, *132*, 7-13.

Fernandez, E., Arevalo, I., Torralba, A., & **Vargas, R.** (2014). Norms for five parameters of anger: How do incarcerated adults differ from the community? *International Journal of Forensic Mental Health,* 13, 18-24

Fernandez, E., **Vargas, R.**, Mahometa, M., Ramamurthy, S. & Boyle, G.J. (2012). Descriptors of Pain Sensation: A Dual Hierarchical Model of Latent Structure. *The Journal of Pain, 13*, 532-536.

Invited Lectures

Vargas, R. (August, 2020) MVPA approaches for understanding the neurosemantics structure of concepts. Presented at Northwestern lecture series on fMRI methodologies.

Vargas, R. (February, 2020) Examination of the Neural and Semantic Structure of Abstract Concepts. CNBC Brain Bag series, Center for the Neural Basis of Cognition, Pittsburgh, Feb 2019.

Conference Presentations

Vargas, R. Just, M.A. (2020) Neural representations of Abstract Concepts across English and Mandarin: Similar Neural Infrastructure with Differing Utilization. Poster presentation at the annual

convention of the Cognitive Neuroscience Society. Virtual Conference.

Vargas, R. Just, M. (2019). Combining fMRI activation patterns and semantic vector representations to predict activation patterns for new concepts. Poster presentation at the annual convention of the Society for Neuroscience. Chicago, IL.

Vargas, R. Just, M. (2019). How abstract concepts are neurally represented between English and Mandarin Chinese. Poster presentation at the annual convention of the Cognitive Neuroscience Society. San Francisco, CA.

Vargas, R. & Just, M. A. (2018) How abstract concepts neutrally represented? Poster presented at the Cognitive Neuroscience Society Meeting, Boston, MA.

Coyle, T. R., Purcell, J., Snyder, A., **Vargas, R**. & Richmond, M. (2013, May). Predictive validity of ability tilt on the SAT and ACT. Poster presented at the annual convention of the Association for Psychological Science, Washington, DC.

Snyder, A., Purcell, J., **Vargas, R**., Konur, A. & Coyle, T. (2012, May). Relations among general intelligence, the general factor of personality, and college GPA. Poster presented at the annual convention of the Association for Psychological Science, Chicago, IL.

Garza, C., Fernandez, E. & **Vargas, R**. (2011, May). The Five Parameters of Anger: A Configural Analysis. Poster presentation at the annual convention of the Association for Psychological Science, Washington, DC.

Fernandez, E., **Vargas, R**. & Garza, C. (2010, May). Five parameters for mapping the angry person: Results from a community sample. Poster presentation at the annual convention of the Association for Psychological Science, Boston, MA.

Garcia, A.M., **Vargas, R**. & Fernandez, E. (2009). Anger: Community Norms and Gender Differences. Paper presented at the MKN McNair Heartland Research Conference, Kansas City, MO.