

# Marc N. Coutanche

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Assistant Professor

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## EMPLOYMENT AND EDUCATION

- 2015 – present      University of Pittsburgh  
Assistant Professor, Psychology and Center for the Neural Basis of Cognition  
Research Scientist, Learning Research & Development Center
- 2014 – 2015        Yale University  
Postdoctoral Fellow  
Advisor: Marvin Chun
- 2013 – 2014        University of Pennsylvania  
Postdoctoral Fellow  
Advisor: Sharon Thompson-Schill
- 2008 – 2013        University of Pennsylvania  
Ph.D., Psychology (2013) with M.A., Psychology (2009)  
Advisor: Sharon Thompson-Schill (committee: Russell Epstein; Joseph Kable)
- 2007 – 2008        Oxford University  
Research Psychologist  
Advisor: Anthony Bailey
- 2005 – 2007        iMPower Consulting Ltd.  
Public-Sector Management Consultant  
Role: Project management of large government projects
- 2002 – 2005        Oxford University  
B.A. (Hons), Experimental Psychology  
Thesis Advisor: Edmund Rolls

## RESEARCH INTERESTS

- Broad:              Cognitive neuroscience, memory, learning, perception, brain imaging
- Specific:            Neural basis of semantic memory, learning, memory consolidation, sleep,  
perception, fMRI methods, multivariate pattern analysis, informational connectivity

## FELLOWSHIPS

- National Institutes of Health Postdoctoral National Research Service Award      2014 - 2015
  - o Score in top 1%
- Howard Hughes Medical Institute International Student Research Fellowship      2011 - 2013
- Benjamin Franklin Fellowship, University of Pennsylvania      2008 - 2011

**GRANTS**

- Learning Research and Development Center Internal Awards Program (\$49,515) 2017
- Central Research Development Fund Award, University Research Council (\$15,042) 2016
- Key personnel (20%) on National Institutes of Health R21 grant 2014
- American Psychological Foundation F.J. McGuigan Dissertation Award (one awardee / year) 2012

**HONORS AND AWARDS**

- 2016 Faculty Honoree, 40<sup>th</sup> Annual Honors Convocation, University of Pittsburgh 2016
- Krieg Cortical Scholar, Cajal Club (awarded at SfN Annual Meeting) 2015  
*for conducting exemplary research on the structure and/or connections of the cerebral cortex*
- Elected Fellow of the Psychonomic Society 2013
- Anne Anastasi General Psychology Graduate Student Research Recognition Award, APA 2013
- Concepts, Actions, and Objects Workshop Abstract Award (Rovereto, Italy) 2013
- Routledge Cognitive Neuropsychology Student Travel Prize 2013
- Research Student Travel Prize, University of Pennsylvania 2013
- Research Travel Subvention, University of Pennsylvania 2013
- Ruth Roemer Award for *outstanding contributions to the UPenn psychology community* 2011

**STUDIES IN ANALYSIS AND PREPARATION (ALL POST-DATA COLLECTION):**

**Coutanche, M.N.,** T.C. Slopek, and Koch, G.E. (under analysis). Permutation testing can improve statistical reliability in psychology studies.

**Coutanche, M.N.** and Koch, G.E. (under analysis). The role of visual and conceptual properties in the organization of ventral temporal cortex.

**Coutanche, M.N.** and Koch, G.E. (under analysis). Anatomical correlates of individual differences in memory traits.

**Coutanche, M.N.** and Koch, G.E. (under analysis). Strong visualizers have greater visual cortex volume than weak visualizers.

**Coutanche, M.N.,** Bruett, H., and Koch, G.E. Interactions between verbalizing and semantic memory biases predict vocabulary acquisition.

Bruett, H. and **Coutanche, M.N.** (under analysis). Synchronized decoding in the scene processing brain network.

Carlos, B. ... **Coutanche, M.N.** (under analysis). Neural correlates of inversion sensitivity across readers.

Carlos, B. ... **Coutanche, M.N.** (under analysis). A novel method for calculating brain laterality with multivariate information.

**MANUSCRIPTS UNDER REVIEW**

**Coutanche, M.N.** and Koch, G.E. (submitted). Evaluating the hippocampal theory of fast mapping: Spatial memory predicts lexical integration following fast mapping but not following explicit or implicit encoding.

**Coutanche, M.N.** and Chun, M.M. (submitted). How information is learned influences how memory traces respond to attentional modulation and the testing effect.

**Coutanche, M.N.** and Thompson-Schill, S.L. (ready for submission). Learning real-world size modulates early visual cortex during future viewing.

**PUBLICATIONS**

**Coutanche, M.N.**, Solomon, S.H., and Thompson-Schill, S.L. (2016). A meta-analysis of fMRI decoding: Quantifying influences on human visual population codes. *Neuropsychologia*, 82, 134–141.

**Coutanche, M.N.** and Thompson-Schill, S.L. (2015). Rapid consolidation of new knowledge in adulthood via fast mapping. *Trends in Cognitive Sciences*, 19(9), 486–488.

**Coutanche, M.N.** and Thompson-Schill, S.L. (2015). Creating concepts from converging features in human cortex. *Cerebral Cortex*, 25(9), 2584–2593.

**Coutanche, M.N.** and Thompson-Schill, S.L. (2014). Fast mapping rapidly integrates information into existing memory networks. *Journal of Experimental Psychology: General*, 143(6), 2296–2303.

**Coutanche, M.N.** and Thompson-Schill, S.L. (2014). Using informational connectivity to measure the synchronous emergence of fMRI multi-voxel information across time. *Journal of Visualized Experiments* (89), e51226.

**Coutanche, M.N.** (2013). Distinguishing multi-voxel patterns and mean activation: Why, how, and what does it tell us? *Cognitive, Affective and Behavioral Neuroscience (CABN)*, 13(3), 667–673.

**Coutanche, M.N.** Gianessi, C.A., Chanales, A.J.H., Willison, K.W., and Thompson-Schill, S.L. (2013). The role of sleep in forming a memory representation of a two-dimensional space. *Hippocampus*, 23(12), 1189–1197.

**Coutanche, M.N.** and Thompson-Schill, S.L. (2013). Informational Connectivity: Identifying synchronized discriminability of multi-voxel patterns across the brain. *Frontiers in Human Neuroscience*, 7:15, 1–14.

**Coutanche, M.N.** and Thompson-Schill, S.L. (2012). The advantage of brief fMRI acquisition runs for multi-voxel pattern detection across runs. *NeuroImage*, 61(4), 1113–1119.

**Coutanche, M.N.** and Thompson-Schill, S.L. (2012). Reversal without remapping: What we can (and cannot) conclude about learned associations from training-induced behavior changes. *Perspectives on Psychological Science*, 7(2), 118–134.

Kylliäinen, A., Wallace, S., **Coutanche, M.N.**, Leppänen, J.M., Cusack, J., Bailey, A.J., and Hietanen, J. (2012). Affective-motivational brain responses to direct gaze in children with autism spectrum disorder. *Journal of child psychology and psychiatry, and allied disciplines*, 53(7), 790-797.

**Coutanche, M.N.** Thompson-Schill, S.L., and Schultz, R.T. (2011). Multi-voxel pattern analysis of fMRI data predicts clinical symptom severity. *NeuroImage*, 57(1), 113–123.

Casey, J.P., Magalhaes, T., Conroy, J.M., Regan, R., Shah, N., Anney, R., Shields, D.C., et al. (2012). A novel approach of homozygous haplotype sharing identifies candidate genes in autism spectrum disorder. *Human Genetics*, 131(4), 565–579.

## CONFERENCE PRESENTATIONS

**Coutanche, M.N.** (symposium under consideration). Probing neural mechanisms of conceptual knowledge: Current approaches.

Carlos, B.J. and **Coutanche, M.N.** (submitted). Testing a new method for assessing lateralization using multi-voxel pattern analysis.

Bruett, H. and **Coutanche, M.N.** (submitted). Informational connectivity as a method for measuring synchrony in the processing of visual information.

**Coutanche, M.N.** and Koch, G.E. (May 2017). The interaction of conceptual dimensions for animate items in the human ventral stream. Workshop on Concepts, Actions and Objects: Functional and Neural Perspectives, Rovereto, Italy.

**Coutanche, M.N.** and Koch, G.E. (March 2017). Neural correlates for trait memory differences. Poster presented at Cognitive Neuroscience Society Annual Meeting, San Francisco, CA.

**Coutanche, M.N.** and Thompson-Schill, S.L. (November 2016). The influence of recent semantic learning on human visual cortex. Poster presented at Society for Neuroscience Annual Meeting, San Diego, CA.

**Coutanche, M.N.** and Koch, G.E. (November 2016). The neural basis for trait memory differences. Poster presented at University of Pittsburgh Brain Day 2016, Pittsburgh, PA.

**Coutanche, M.N.** and Thompson-Schill, S.L. (November 2016). The influence of recent semantic learning on human visual cortex. Poster presented at University of Pittsburgh Brain Day 2016, Pittsburgh, PA.

**Coutanche, M.N.** and Chun, M.M. (July 2016). Exploring the nature of fast mapped knowledge through divided attention. Symposium presentation at International Conference on Memory, Budapest, Hungary.

Herholz, P., Schuster, V., **Coutanche, M.N.**, & Jansen, A. (June, 2016). fMRI as a new fertility monitor? Influences of sex hormones on brain organization revealed by MVPA. Annual Meeting of the Organization for Human Brain Mapping, Geneva, Switzerland.

**Coutanche, M.N.** (May 2016). The rapid consolidation of new knowledge into cortical networks through fast mapping. Talk at Context and Episodic Memory Symposium, Philadelphia, PA.

Ruscio, A.M., Hallion, L.S., **Coutanche, M.N.**, Wu, H., Thompson-Schill, S.L., & Rauch, S.L. (April 2016). Neural substrates of worry and rumination in generalized anxiety disorder and major depressive disorder. Anxiety and Depression Association of America Annual Meeting, Philadelphia, PA.

Tamez, E.R., Trueswell, J.C., **Coutanche, M.N.**, and Thompson-Schill, S.L. (October 2015). fMRI activity during a spontaneous dialogue task. Society for the Neurobiology of Language Annual Meeting, Chicago, IL.

Parma, V.\*, **Coutanche, M.N.\*** (\*equal contributions), Seubert, J., Fondberg, R., Hackl, L., Åhs, F., and Lundström, J.N. (April 2015). Anxiety-dependent modulation of olfactory fear conditioning: A multidimensional approach. Association for Chemoreception Sciences Annual Meeting, FL.

**Coutanche, M.N.** and Thompson-Schill, S.L. (November 2014). Fast mapping rapidly integrates information into existing memory networks. Symposium speaker (“Memory, Sleep and Dreams”), Psychonomic Society Annual Meeting, Long Beach, CA.

Parma, V.\*, **Coutanche, M.N.\*** (\*equal contributions), Seubert, J., Fondberg, R., Hackl, L., Åhs, F., and Lundström, J.N. (November 2014). Multidimensional approach to the study of olfactory fear conditioning in individuals with low and high trait anxiety vulnerability. Clinical Chemosensation Annual Meeting, Dresden, Germany.

**Coutanche, M.N.**, Solomon, S.H., and Thompson-Schill, S.L. (May 2014). A meta-analysis of multi-voxel patterns in the ventral stream. Poster presented at Vision Sciences Society Annual Meeting, St. Pete Beach, FL.

**Coutanche, M.N.** and Thompson-Schill, S.L. (May 2014). Fast mapping rapidly integrates information into existing memory networks. Talk at Context and Episodic Memory Symposium, Philadelphia, PA.

**Coutanche, M.N.** and Thompson-Schill, S.L. (April 2014). Fast mapping rapidly integrates information into existing memory networks. Poster presented at Cognitive Neuroscience Society Annual Meeting, Boston, MA.

**Coutanche, M.N.** and Thompson-Schill, S.L. (May 2013). Converging on a convergence zone: concurrent feature decoding predicts identity decoding for anticipated objects. Talk at Workshop on Concepts, Actions, and Objects: Functional and Neural Perspectives, Rovereto, Italy.

**Coutanche, M.N.** and Thompson-Schill, S.L. (May 2013). Functional activity patterns encoding the identity of anticipated objects are marked by converging shape and color decoding in early visual areas during preparatory visual attention. Talk at Vision Sciences Society, Naples, FL.

**Coutanche, M.N.**, Gianessi, C.A., Chanals, A.J.H., Willison, K.W., and Thompson-Schill, S.L. (November 2012). Sleep aids the consolidation of spatial relational memories. Poster presented at Psychonomic Society Annual Meeting, Minneapolis, MN.

**Coutanche, M.N.** and Thompson-Schill, S.L. (April 2012). The advantage of brief functional magnetic resonance imaging acquisition runs for multi-voxel pattern detection. Poster presented at Cognitive Neuroscience Society Annual Meeting, Chicago, IL.

**Coutanche, M.N.** and Thompson-Schill, S.L. (April 2011). Informational Connectivity: A novel fMRI analysis method for identifying brain areas that share distributed encoding principles. Poster presented at Cognitive Neuroscience Society Annual Meeting, San Francisco, CA.

**Coutanche, M.N.**, Thompson-Schill, S.L., and Schultz, R.T. (October 2009). An application of multi-voxel pattern analysis to investigating patient groups: face classification in the autism fusiform face area. Poster presented at Society for Neuroscience Annual Meeting, Chicago, IL.

**Coutanche, M.N.**, Wallace, S., White, K.B., Foley, S., Bailey, A., and I.M.G.S.A.C. (May 2008). Face and gaze processing in the broader autism phenotype: Independent differences in ASD relatives. Poster presented at International Meeting for Autism Research, London, UK.

White, K.B., Wallace, S., Parr, J., **Coutanche, M.N.**, Foley, S., Bailey, A., and I.M.G.S.A.C. (May 2008). Social cognition in the broader autism phenotype. Poster presented at International Meeting for Autism Research, London, UK.

#### **INVITED TALKS**

November, 2016. Adding meaning to perception: Forming integrated knowledge in human cortex. Carnegie Mellon University Cognitive Psychology Symposium, Pittsburgh, PA.

October 2016. The employment of neural systems in human learning: Determinants and implications for memory. Center for the Neural Basis of Cognition Annual Retreat, Seven Springs, PA.

January 2016. Sleep and memories. Panther Psychology Club, University of Pittsburgh, Pittsburgh, PA.

September 2015. Adding meaning to perception: The impact of learning in distributed activity patterns in human sensory cortex. Cognitive Psychology Brown Bag, University of Pittsburgh, Pittsburgh, PA.

December 2014. Decoding conceptual and perceptual representations across networks of the human brain. fMRI Brown Bag Symposium Series, Dartmouth College, Hanover, NH.

September 2014. The integration of knowledge into cortical memory networks. Current Works in Cognitive Psychology Series, Yale University, New Haven, CT.

May 2014. Talk discussant at Context and Episodic Memory Symposium, Philadelphia, PA.

May 2013. The role of sleep in forming a memory representation of a two-dimensional space. Cognitive Science Guest Lecture, ETH Zürich, Switzerland.

January 2013. Synchronous decoding of multi-voxel patterns in visual object processing. Center for Cognitive Neuroscience Talk Series, University of Pennsylvania, Philadelphia, PA.

May 2011. Decoding patterns in the active human brain. Art of Research Graduate Symposium, University of Pennsylvania, Philadelphia, PA.

April 2008. The broader autism phenotype. International Molecular Genetics Study of Autism Consortium Annual Conference, Oxford, UK.

**TEACHING EXPERIENCE**

## Instructor of Graduate Courses

- Cognitive Neuroscience of Learning and Memory (University of Pittsburgh) Spring 2017

## Instructor of Undergraduate Courses

- Introduction to Cognitive Neuroscience (University of Pittsburgh) Spring 2016, Fall 2016
- Memory (University of Pennsylvania) 2011, 2012, 2013
- Cognitive Neuroscience (University of Pennsylvania) 2010

## 3-day Workshop Instructor

- Theory and Application of MVPA (University of Pennsylvania) 2013, 2014
- Theory and Application of MVPA (University of Oregon) 2013

Teaching Assistant Trainer (University of Pennsylvania) 2014

College-level Teaching Certificate (University of Pennsylvania) 2012

## Teaching Assistant

- Cognitive Neuroscience (Instructor: Sharon Thompson-Schill) 2010
- Learning (Instructor: Robert Rescorla) 2009

English-language Teacher (Shenzhen, China) 2004

**MENTORING**

## Graduate Student Advisees

- Heather Bruett (Psychology, University of Pittsburgh) 2016 - present

## Fellowships to increase representation of underrepresented groups

- Brandon Carlos, Post-Bac Fellow (University of Pittsburgh) 2016 - present
- Ariel Rosario, Summer Undergraduate Research Fellow (Yale University) 2015

## Lab Staff

- Griffin Koch, Lab Coordinator Jan 2016 - present

## Senior Thesis Undergraduate Students

- Avi Chanales (University of Pennsylvania), Cognitive Science Major 2011 - 2012
  - o *Awarded Alumni Society Prize for Excellence in Research*
  - o *Co-author: Coutanche, Gianessi, Chanales, Willison & Thompson-Schill (2012)*
  - o *Subsequent position: PhD student at New York University*

- Carol Gianessi (University of Pennsylvania), Psychology Major 2010 - 2011
  - o *Awarded Morris Viteles Award for Excellence in Undergraduate Psychology Research*
  - o *Co-author: Coutanche, Gianessi, Chanales, Willison & Thompson-Schill (2012)*
  - o *Subsequent position: PhD student at Yale University*

**Graduate Student Committee Member**

- Joshua J. Tremel (Psychology, University of Pittsburgh)
- Robert J. Vargas (Psychology, Carnegie Mellon University)
- Ven Popov (Psychology, Carnegie Mellon University)
- Xiaoping Fang (Psychology, University of Pittsburgh)
- Ruizhe Liu (Psychology, University of Pittsburgh)
- Brian Knox (Accounting and Neuroscience, University of Pittsburgh)
- Gabriela Terrazas (Psychology, University of Pittsburgh)

**REVIEWING**

Journals: Neuron, Nature Neuroscience, Journal of Neuroscience, Cerebral Cortex, NeuroImage, Journal of Cognitive Neuroscience, Cortex, Neuropsychologia (“*Outstanding Reviewer*”), Memory and Cognition, Human Brain Mapping, NeuroImage: Clinical, Brain Connectivity, PLOS ONE, IEEE Transactions on Medical Imaging, Autism Research, Neuroscience

Grants: Fund for Scientific Research (FNRS), Autistica, Alzheimer’s Society

**SCIENCE OUTREACH**

- Featured Scientist, Cerebella Design’s ‘Celebrating Brains’ Initiative 2016 - present
- Yale “Pathways to Science” summer program for high school students (lecturer) 2015
- Yale “Science Diplomats” public talks (3 public libraries) 2015
- Howard Hughes Medical Institute ‘Ask a Scientist’ online service 2012

**DEPARTMENTAL AND PROFESSIONAL SERVICE**

- Psychology colloquium committee 2016 - 2017
- Symposium Co-organizer, International Conference of Memory 2016 2016
- Faculty search committee 2015 - 2016
- Cognitive psychology graduate student recruitment committee 2015 - 2016
- Organizer, University of Pennsylvania Psychology graduate student interview weekends 2012
- Organizer, Series of Psychology faculty panels, University of Pennsylvania 2010 - 2011

**OTHER INTELLECTUAL CONTRIBUTIONS**

**Contributor to textbooks**

- Author of lecture slides and practice questions, *Cognition* 6<sup>th</sup> ed. (W.W. Norton) 2015
- Author of test-bank practice questions, *Psychological Science* 5<sup>th</sup> ed. (W.W. Norton) 2014
- Author of test-bank practice questions, *Cognitive Neuroscience* 4<sup>th</sup> ed. (W.W. Norton) 2013

**SOFTWARE**

- Creator, Informational Connectivity MATLAB Toolbox ([www.informationalconnectivity.org](http://www.informationalconnectivity.org))



- Contributor, Princeton Multi-Voxel Pattern Analysis (MVPA) MATLAB Toolkit

**MEDIA CONTRIBUTIONS**

Dague, T. (2016, July 6). We go inside the escape-room phenomenon. *Pittsburgh City Paper*.  
<http://www.pghcitypaper.com/pittsburgh/we-go-inside-the-escape-room-phenomenon/Content?oid=1934005>

Carroll, L. (2016, March 26). How did I get here!? What to do when your brain goes on autopilot. *Today*. <http://www.today.com/health/how-unconscious-memory-trips-us-t66431>

Carroll, L. (2015, December 30). What's your memory style? Why we recall every detail or just the facts. *Today*. <http://www.today.com/health/what-your-memory-style-brain-wiring-may-control-how-we-t62226>

Coutanche, M.N. (2014, September 4). Using Fruits and Veggies to Break Down How We Remember and Identify Objects. *Cognitive Neuroscience Society Blog*.  
[https://www.cogneurosociety.org/decoding\\_fruit\\_coutanche/](https://www.cogneurosociety.org/decoding_fruit_coutanche/)

The Perils of Trying to Unlearn. (2012, May). *Observer*, 25(5).  
<http://www.psychologicalscience.org/index.php/publications/observer/2012/may-june-12/the-perils-of-trying-to-unlearn-2.html>

**PROFESSIONAL AFFILIATIONS**

Fellow of the Psychonomic Society  
Cognitive Sciences Society  
Cognitive Neuroscience Society  
Society for Neuroscience  
Association for Psychological Science