

October 18, 2010

Education

- 2009 – Present **Washington University in St. Louis**
Post-doctoral fellow with T. Braver and D. Barch in the Cognitive Control & Psychopathology Lab
- 2004 – 2009 **University of Pittsburgh and Carnegie Mellon University**
Ph.D. in Neuroscience and affiliated with the Center for the Neural Basis of Cognition
Dissertation: *The Biological Basis of Rapid Instructed Task Learning*
Advisor: Walter Schneider
Committee: Julie Fiez, Anthony Wagner, Mark Wheeler, Marc Sommer, Raymond Cho
- 1999 – 2003 **University of California, Berkeley**
B.A. in Cognitive Science (Highest Honors)

Research and Work Experience

- 2009 – Present Post-doctoral research with Todd Braver and Deanna Barch (Washington University in St. Louis)
Investigations of prefrontal cortex, cognitive control, learning, motivation, and schizophrenia
Methods: fMRI, MVPA, functional connectivity, individual difference measures
- 2004 – 2009 Ph.D. research with Walter Schneider, Ph.D. (University of Pittsburgh)
Investigations of prefrontal cortex, cognitive control, and learning/memory
Methods: fMRI, MEG, EEG, resting state connectivity, graph theory, Granger causality
- 2001 – 2004 Undergraduate and post-baccalaureate research with Mark D’Esposito, M.D. (UC Berkeley)
Investigations of prefrontal cortex and cognitive control
Methods: fMRI, GLM analysis, event-related time series analysis
- May 2003 – Aug. 2003 Undergraduate research with William DeBello, Ph.D. (UC Davis)
Investigations of the genetic basis of learning and memory
Methods: PCR, analysis of gene expression, gene sequence identification
- 2001 – 2003 Software engineering, networking, and web development for Apple Computer

Honors and Fellowships

- 2010 NeuroImage Editor’s Choice Award, Methods and Modeling Section
For Cole et al. 2010, “Identifying the brain’s most globally connected regions”
Awarded by the editors of NeuroImage in acknowledgement of a study’s importance and high impact
- 2005 – 2008 National Science Foundation Graduate Research Fellowship
Awarded to graduate students whose plans for research have “intellectual merit and beneficial implications for society”
- 2007 National Science Foundation Integrative Graduate Education and Research Traineeship (IGERT) Fellowship
Awarded to science graduate students “who will pursue careers in research and education, with the interdisciplinary backgrounds, deep knowledge in chosen disciplines, and technical, professional, and personal skills to become leaders and creative agents for change.”
- 2004 Honorable Mention, National Science Foundation Graduate Research Fellowship
- 2003 Highest Honors in Cognitive Science at UC Berkeley
Awarded highest honors based on significant contribution to a research project and high quality honors thesis as judged by professors Mark D’Esposito, M.D. and Robert Knight, M.D.

Professional Memberships

- 2004 – Present Society for Neuroscience
Cognitive Neuroscience Society
- 2009 – Present Neuroethics Society
- 2006 – Present Organization for Human Brain Mapping
- 2004 – 2009 Center for the Neural Basis of Cognition, Carnegie Mellon & University of Pittsburgh
Center for Neuroscience, University of Pittsburgh
Learning Research and Development Center
- 2006 – 2007 President of the Department of Neuroscience Graduate Student Organization, University of Pittsburgh
- 2002 – 2003 President of the Cognitive Science Student Association, UC Berkeley

Publications

- Cole M.W., Bagic A., Kass R., Schneider W. (2010). "Prefrontal Dynamics Underlying Rapid Instructed Task Learning Reverse With Practice". Journal of Neuroscience 30(42): 14245–14254. doi:10.1523/JNEUROSCI.1662-10.2010
- Cole M.W., Yeung N., Freiwald W., Botvinick M. (2010). "Conflict Over Cingulate Cortex: Between-Species Differences in Cingulate May Support Enhanced Cognitive Flexibility in Humans". Brain, Behavior, and Evolution 75(4): 239-240. doi:10.1159/000313860
- Braver T.S., Cole M.W., Yarkoni T. (2010). "Vive les differences! Individual variation in neural mechanisms of executive control", Current Opinion in Neurobiology 20(2): 242-250. doi: 10.1016/j.conb.2010.03.002
- Cole M.W., Pathak S., Schneider W. (2010). "Identifying the brain's most globally connected regions", NeuroImage 49(4): 3132-3148. doi: 10.1016/j.neuroimage.2009.11.001
- Cole M.W., Yeung N., Freiwald W., Botvinick M. (2009). "Cingulate Cortex: Diverging data from humans and monkeys". Trends in Neurosciences. 32(11): 566-574. doi: 10.1016/j.tins.2009.07.001
- Schneider, W., Pathak, S., Phillips J., and Cole, M. (2009). "High Definition Fiber Tracking Exposes Circuit Diagram for Brain Showing Triarchic Representation, Domain General Control, and Metacognitive Subsystems". In Samsonovich, A. V., Noelle, D., and Mueller, S. (Eds.). *Biologically Inspired Cognitive Architectures II: Papers from the AAI Fall Symposium*. AAI Technical Report FS-09-01, Menlo Park, CA: AAI Press.
- Schneider, W., Cole, M., and Pathak, S. (2008). "Reverse engineering the brain with a circuit diagram based on a segmented connectome and system dynamics". In Samsonovich, A. V., Khosla, D., Itti, L., Shanahan, M., Chella, A., Granger, R. H., Mueller, S., Goertzel, B., and Noelle, D. (Eds.). *Biologically Inspired Cognitive Architectures: Papers from the AAI Fall Symposium*. AAI Technical Report FS-08-04, Menlo Park, CA: AAI Press.
- Cole, M.W., Schneider, W. (2007). "The Cognitive Control Network: Integrated cortical regions with dissociable functions", NeuroImage. 37(1): 343-360. doi: 10.1016/j.neuroimage.2007.03.071
- Schumacher E.H., Cole M.W., D'Esposito M. (2007). "Selection and Maintenance of Stimulus-Response Rules during Preparation and Performance of a Spatial Choice-Reaction Task", Brain Research 1136(1):77-87.

Hester, R., D'Esposito M., Cole M.W., Garavan, H. (2007) "Neural mechanisms for response selection: comparing selection of an item with a response from working memory", NeuroImage 34(1):446-54.

Curtis C.E., Cole M.W., Rao V., Ollinger J., D'Esposito M. (2005). "Canceling Planned Action: An fMRI Study of Countermanding", Cerebral Cortex 15(9): 1281-9.

Manuscripts Submitted or in Preparation

Cole M.W., Anticevic A., Repovs G., and Barch D. (submitted) "Stochastic global dysconnectivity and individual differences in psychopathology"

Cole M.W., Etzel J., Braver T. (in preparation) "Decoding distributed neural task representations using multivariate pattern analysis"

Cole M.W., Savine A., Braver T. (in preparation) "Experimenter as a motivational factor enhancing cognitive control"

Cole M.W., Braver T. (in preparation) "Global brain connectivity mediates prefrontal contributions to fluid intelligence"

Cole M.W., Kass R., Bagic A., Wheeler M., Bostan A., Schneider W. (in preparation) "Validating Time-Variant Granger Causality in an Associative Memory Task using Combined MEG and fMRI"

Published Abstracts and Poster Presentations

Cole M.W., Anticevic A., Repovs G., Barch D. (August, 2010). Locus of dysconnectivity: Dorsolateral prefrontal connectivity correlates with the cardinal symptoms of schizophrenia. Poster presented at the Gordan Research Conference: Neurobiology of Cognition, Waterville Valley, NH.

Cole M.W., Bagic A., Kass R., Schneider W. (October, 2009). Rapid Task Learning as a Window into the Neural Basis of Executive Control. Poster presented at Society for Neuroscience, Chicago, IL.

Cole M.W., Schneider W. (June, 2009). From Symbols to Rules to Complex Behaviors: The Neural Basis of Rapid Instructed Task Learning. Poster presented at Human Brain Mapping, San Francisco, CA.

Cole M.W., Pathak S., Schneider W. (June, 2009). Identifying the Brain's Most Globally Interactive Regions. Poster presented at Human Brain Mapping, San Francisco, CA

Cole M.W., Kunkel A., Martins B., Schneider W. (November, 2008). The Neural Basis of Rapid Instructed Task Learning. Poster presented at Society for Neuroscience, Washington, DC.

Pathak S.*, Cole M.W.*, Schneider W. (November, 2008). Identifying the Brain's Most Globally Interactive Regions. Poster presented at Society for Neuroscience, Washington, DC. **First two authors contributed equally*

Cole M.W., Laurent P. (November, 2008). Neurevolution: An Example Of Blogging To Enhance Scientific Communication. Poster presented at Society for Neuroscience, Washington, DC.

Cole M.W., Martins B., Schneider W. (April, 2008). The Neural Basis of Rapid Instructed Task Learning. Poster presented at Cognitive Neuroscience Society, San Francisco, CA.

Pathak S., Martins B., Cole M.W., Schneider W. (April, 2008). Anatomical and Functional Segmentation of the Cognitive Control Network: Supporting a preliminary cognitive control network connectome. Poster presented at Cognitive Neuroscience Society, San Francisco, CA.

Cole M.W., Pathak S., Schneider W. (April, 2008). Medial Frontal Cortex Directs Attention along Multiple Pathways to Resolve Perceptual Decision Difficulty. Poster presented at Cognitive Neuroscience Society, San Francisco, CA.

Cole M.W., Schneider W. (June, 2007). Perceptual Decision Making Is Mediated by the Cognitive Control Network via ACC/pre-SMA to DLPFC Connectivity. Poster presented at Human Brain Mapping, Chicago, IL.

Cole M.W., Schneider W. (May, 2007). Causal Connectivity Within a Cognitive Control Network During Perceptual Decision Making. Poster presented at Cognitive Neuroscience Society, New York, NY.

Cole M.W., Schneider W. (June, 2006). Dissociation of anterior cingulate, dorsolateral prefrontal, and premotor cortex during a visual search task reveals specialized roles within a commonly activated fronto-parietal network. Poster presented at Human Brain Mapping, Florence, Italy.

Schneider W., Siegle G., McHugo M., Gemmer L., Jones D., Fissell K., Koerbel L., Suzuki I., Jung K., Goldberg R., Wheeler M., Cole M.W., Hill N. (June, 2006). 2006 Pittsburgh Brain Activity Interpretation Competition: Inferring Experience Based Cognition from fMRI Data. Poster presented at Human Brain Mapping, Florence, Italy.

Cole M.W., Schneider W. (April, 2006). Dissociation of anterior cingulate, dorsolateral prefrontal, and fronto-polar cortex during a visual search task reveals specialized roles within a commonly activated fronto-parietal network. Poster presented at Cognitive Neuroscience Society, San Francisco, CA.

Schumacher E.H., Cole M.W., Singer A., D'Esposito M. (October, 2004). Distinguishing Response Selection Sub-processes with Functional Magnetic Resonance Imaging. Poster presented at Society for Neuroscience, San Diego, CA

Schumacher E.H., Cole M.W., Singer A., D'Esposito M. (April, 2004). Distinguishing Response Selection Sub-processes with Functional Magnetic Resonance Imaging. Poster presented at Cognitive Neuroscience Society, San Francisco, CA

Curtis C.E., Cole M.W., Rao V., Ollinger J., D'Esposito M. (April, 2004). Canceling planned action: An fMRI study of countermanding saccades. Poster presented at Cognitive Neuroscience Society, San Francisco, CA

Curtis C.E., Cole M.W., Rao V., Ollinger J., D'Esposito M. (October, 2003). Canceling planned action: An fMRI study of countermanding saccades. Poster presented at Society for Neuroscience, New Orleans, LA

Slide Presentations

Cole M.W. (March 3, 2010). Multiple Network Mechanisms Underlying Flexibility in Prefrontal Cortex. Talk presented at the Brain, Behavior, and Cognition seminar series, St. Louis, MO.

Cole M.W. (January 4, 2010). Network Mechanisms Underlying Flexibility in Prefrontal Cortex. Invited talk presented as part of the Center for Mind and Brain seminar series, Davis, CA.

Cole M.W. (May 13, 2008). Source Localization with MEG: An MNE Software Overview. Talk presented for the University of Pittsburgh MEG center, Pittsburgh, PA.

Cole M.W. (January 22, 2008). Connectomics of the Human Cognitive Control Network. Invited talk presented for Beatriz Luna's lab, Pittsburgh, PA.

Cole M.W. (October 28, 2006). Using functional MRI to inform neural models of decision making. Talk presented at the annual CNBC retreat, Pittsburgh, PA.

Cole M.W. (October 2, 2006). Specialization and integration within a cortical cognitive control network. Talk presented at the CNBC 'Brain Bag', Pittsburgh, PA.

Cole M.W. (March 27, 2006). Innate functional connectivity from resting state linear correlations. Invited talk presented at the Clinical Cognitive Neuroscience Lab's Methods Monday forum, Pittsburgh, PA.

Cole M.W., Schneider W. (November 2005). Less Working Memory, More Control: Greater BOLD Response to Overcoming Prepotency in Prefrontal and Parietal Cortices. Talk presented at Society for Neuroscience, Washington, D.C.

Cole M.W. (November 2, 2005). Dissociations in Cognitive Control: The Specialized Roles of Lateral and Medial Prefrontal Cortex. Talk presented at the Cognitive Psychology 'Brown Bag', Pittsburgh, PA.

Cole M.W. (October 1, 2005). Results and statistics in fMRI. Talk presented at the 2005 CNBC fMRI Workshop, Pittsburgh, PA.

Co-authored Presentations by Others

Schneider W., Hill N., Cole M.W. (November 2005). Native and supported mode processing in attentional control network. Talk presented at Psychonomics, Toronto, Canada.

Schneider W., Hill N., Chein J., McHugo M., Cole M.W. (November, 2004). Subsystems supporting attention, decision making, learning, and skilled performance. Talk presented at Psychonomics, Minneapolis, MN.

Reviewer for Journals

Journal of Neuroscience, Brain, NeuroImage, Cerebral Cortex, Human Brain Mapping

Grants Written / Contributed To

- Beyond Localization of Memory Functions: Learning Statistical Methods for Estimating Directed Connectivity among Cortical Regions Using Multiple Neuroimaging Technologies. *NSF IGERT grant*. PI: Michael W. Cole (2007)
- *NSF Graduate Research Fellowship*. PI: Michael W. Cole (2004 & 2005)
- Anatomically & Functionally Segmented Connectome of the Human Brain. *NIH R21*. PI: Walter Schneider (2008)
- BrainSpec: High Resolution Full Brain Mapping Technology. *DARPA grant*. PI: Walter Schneider (2008)
- Brain System Mapping for Pre-Surgical Planning and Brain Assessment. *NIH SBIR*. PI: Anthony P. Zuccolotto (2008)
- Biologically Accelerated Learning Technology (BALT). *DARPA grant*. PI: Walter Schneider (2007)

Teaching Experience

Guest lecturer (Spring, 2010) for *Cognitive Neuroscience* (Instructor: Todd Braver), Washington University in St. Louis

Teaching assistant (Fall, 2006) for *Introduction to Neuroscience* (Instructor: David Wood), University of Pittsburgh

Guest lecturer (Spring, 2006) for *Laboratory on fMRI Data Acquisition and Analysis* (Instructor: Walter Schneider), University of Pittsburgh

Lectures:

Jitter, Deconvolution, and Mixed Designs (March 13, 2006)

Brain Connectivity Using fMRI (March 29, 2006)

Teaching assistant (Spring, 2003) for *The Neural Basis of Language and Thought* (Instructors: Jerome Feldman and George Lakoff), UC Berkeley