

Kenneth Andrew Norman

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Employment

July 2012 – present
Associate Chair
Department of Psychology, Princeton University

July 2013 – present
Professor
Department of Psychology and Princeton Neuroscience Institute, Princeton University

July 2008 – June 2013
Associate Professor
Department of Psychology and Princeton Neuroscience Institute, Princeton University

July 2002 – June 2008
Assistant Professor
Department of Psychology, Princeton University

Education

June 1999
Ph.D. in Psychology, Harvard University
Advisor: Daniel Schacter, Ph.D.
Thesis: "Differential Effects of List Strength on Recollection and Familiarity"

June 1996
MA in Psychology, Harvard University

June 1993
BS with distinction, Stanford University
Advisors: John Gabrieli, Ph.D., Fred Dretske, Ph.D.
Honors Thesis: "Is Consciousness the Gatekeeper of Memory?"

Additional Education

June 1999 – June 2002
NIH NRSA postdoctoral fellow, University of Colorado, Boulder
Mentor: Randall O'Reilly, Ph.D.

1995
Fellow, McDonnell Summer Institute in Cognitive Neuroscience, Davis, CA

Research Interests

Using computational models to explore the neural basis of learning and memory

Testing the predictions of these models, using behavioral and neuroimaging measures

Developing multivariate methods for extracting information about cognitive states from neuroimaging data

Fellowships and Awards

Thomas A. Wasow Visiting Scholar, Stanford University, January 2014

Princeton Engineering Commendation List for Outstanding Teaching, 2011

President's Award for Distinguished Teaching, Princeton University, 2007

Lawrence S. Brodie University Preceptorship, Princeton University, 2006-2009

NIH NRSA Postdoctoral Fellowship, "Hippocampal and Neocortical Contributions to Recognition", Grant MH12582-01, February, 2000 to June, 2002

Harvard University Graduate Society Fellowship, 1998

Sackler Scholarship in Psychobiology, Harvard University, 1996-1998

National Defense Science & Engineering Fellowship, 1993-1996

National Science Foundation Graduate Fellowship (awarded), 1993

Grants: Active

The John Templeton Foundation, Proposal ID 36751, "Toward a scientific understanding of the human capacity for cognitive control", \$1,127,000 annual direct costs, J. Cohen, PI, 08/01/12 – 07/31/15

This project involves the construction of formal theoretical models and empirical tests of these models in behavioral and neuroimaging experiments studying higher-level forms of cognitive control. I am co-PI on two sub-projects (relating to prospective memory and development of advanced multivariate pattern analysis methods).

NSF IIS-1009542, "Text, neuroimaging, and memory: Unified models of corpora and cognition", D. Blei and K. Norman, co-PIs, 3 years, \$166,000 annual direct costs, 8/01/10 – 7/31/13

The goal of this research is to develop new machine learning algorithms that can infer (based on fMRI data, behavioral memory data, and text corpus statistics) how a person's mental state evolves as they encode and retrieve memories.

NIH 2R01 MH069456, "Computational, neural, and behavioral studies of competition-dependent learning", K. Norman, PI, 5 years, \$250,000 annual direct costs, 8/07/09 – 5/31/14

The goal of this research is to further develop neural network models of how the brain implements competition-dependent learning, and to test these models by running fMRI and EEG memory

experiments.

NSF BCS-1229597, "MRI: Acquisition of high performance compute cluster for multivariate real-time and whole-brain correlation analysis of fMRI data", J. Cohen, PI, 3 years \$527,978 direct costs, 8/15/12 – 7/31/15

This grant funded the purchase of a computer cluster to support real-time multivariate pattern analysis of fMRI data and also multivariate decoding of cognitive state information from functional connectivity data. I am a co-PI on this grant.

Princeton University, J. Insley Blair Pyne fund and Essig-Enright fund, "Integrating new information with existing knowledge in human decision making", K. Norman and R. Schapire, co-PIs, 2 years, \$35,000 annual direct costs, 6/23/12 – 6/22/14

The goal of this research is examine how periods of offline processing (such as sleep or quiet rest) affect reward-based decision making. To achieve this goal, we will develop a formal theory within a reinforcement-learning (RL) framework and we will test that theory using a newly developed decision-making task in humans.

NIH T32 MH065214,, "NRSA training grant in quantitative neuroscience", K. Norman and J. Cohen, co-PIs, 5 years, \$475,000 annual direct costs, 8/01/13 – 7/31/18

This grant is a renewal of Princeton's existing graduate & postdoctoral training program in quantitative and computational neuroscience.

Grants: Completed

NSF IIS-1146294, "CRCNS 2011 PI meeting at Princeton University", K. Norman, PI, 1 year, \$23,300 direct costs, 10/1/11 – 9/30/12

This grant funded the annual PI meeting for the NSF/NIH Collaborative Research in Computational Neuroscience program, which was held in Princeton in October 2011.

NIH R01 MH075706, "Analysis of Multi-Voxel Patterns of Activity in fMRI Data", J. Haxby, PI, 5 years, \$225,000 annual direct costs, 9/18/06 – 5/31/12

The goal of this research was to develop and refine multivariate methods for analyzing spatially distributed patterns of fMRI activity (e.g., applying pattern classifiers to fMRI data to read out the information represented in the subject's brain). I was a co-investigator on this grant.

NIH P50 MH062196, Project 3, "Dynamics of Decision Making and Control in Memory Retrieval", M. Kahana, PI, 5 years, \$250,000 annual direct costs, 9/21/05 – 8/31/11 (no-cost extension)

The goal of this research was to use new neuroimaging analysis methods, applied to fMRI and EEG data, to test computational models of how top-down control interacts with the accumulation of evidence during memory retrieval. I was a co-investigator on this grant.

NIH R01 MH069456-01, "Modeling the Neural Basis of Episodic Memory", K. Norman, PI, 5 years, \$200,000 annual direct costs, 2/01/04 – 1/31/09

The goal of this research was to further develop computational models of how hippocampus and perirhinal cortex contribute to recognition memory, and to test the predictions of these models by conducting memory experiments on normal and brain-damaged populations.

NIH R01 MH052864, "Functional MRI and Modeling Studies of Prefrontal Cortex", J. Cohen, PI, 5 years, \$250,000 annual direct costs, 9/25/03 – 6/30/08

The goal of this research was to use functional MRI and computational modeling to explore how hippocampus and prefrontal cortex interact during task switching paradigms. I was a co-investigator on this grant.

Publications

Research Papers (In Preparation / Submitted / Under Review)

deBettencourt, M. T., Cohen, J. D., Lee, R. F., Norman, K. A., & Turk-Browne, N. B. (in preparation). Closed-loop training of attention with real-time brain imaging.

Davis, T., LaRocque, K. F., Mumford, J., Norman, K. A., Wagner, A. D., & Poldrack, R. A. (in preparation). What do differences between multi-voxel and univariate analyses mean? How subject-, spatial-, and trial-level variance impact fMRI analyses.

Gershman, S. J., Jones, C. E., Norman, K. A., Monfils, M.-H., & Niv, Y. (under review). Gradual extinction prevents the return of fear. *Frontiers in Behavioral Neuroscience*.

Gershman, S. J., Monfils, M.-H., Norman, K. A., & Niv, Y. (in preparation). The computational nature of memory reconsolidation.

Gershman, S. J., Radulescu, A., Norman, K. A., & Niv, Y. (under review). Statistical computations underlying the dynamics of memory updating. *PLoS Computational Biology*.

Hulbert, J. C. & Norman, K. A. (in preparation). Alternating study and retrieval practice leads to differentiation of competing memories.

Kim, G., Lewis-Peacock, J. A., Norman, K. A., & Turk-Browne, N. B. (submitted). Pruning of memories due to context-based prediction error.

Lewis-Peacock, J. A., Cohen, J. D., & Norman, K. A. (in preparation). Neural evidence for the flexible use of working memory and episodic memory in prospective remembering.

Lewis-Peacock, J. A. & Norman, K. A. (under revision). Lingering activation of previous items in working memory leads to forgetting. *Nature Neuroscience*.

Manning, J. R., Ranganath, R., Norman, K. A., & Blei, D. M. (in preparation). Topographic factor analysis: matrix factorization with spatial constraints.

Poppenk, J., & Norman, K. A. (in preparation). Partial memory retrieval leads to inhibition of cortical memory representations.

Research Papers (In Press / Published)

Gershman, S. J., Schapiro, A. C., Hupbach, A., & Norman, K. A. (2013). Neural context reinstatement predicts memory misattribution. *Journal of Neuroscience*

Detre, G. J., Natarajan, A., Gershman, S. J., and Norman, K. A. (2013). Moderate levels of activation lead to forgetting in the think/no-think paradigm. *Neuropsychologia*.

Johnson, M. R., Higgins, J. A., Norman, K. A., Sederberg, P. B., Smith, T. A., & Johnson, M. K. (2013). Foraging for thought: an inhibition-of-return-like effect resulting from directing attention within working memory. *Psychological Science*.

Poppenk, J. & Norman, K. A. (2012). Mechanisms supporting superior source memory for familiar items: A multi-voxel pattern analysis study. *Neuropsychologia*.

Gershman, S. J., Moore, C. D., Todd, M. T., Norman, K. A., & Sederberg, P. B. (2012). The successor representation and temporal context. *Neural Computation*, *24*, 1553-1568.

Sederberg, P. B., Gershman, S. J., Polyn, S. M., and Norman, K. A. (2011). Human memory reconsolidation can be explained using the Temporal Context Model. *Psychonomic Bulletin and Review*, *18*, 455-468.

Gershman, S. J., Blei, D. M., Pereira, F., & Norman, K. A. (2011). A topographic latent source model for fMRI data. *Neuroimage*, *57*, 89-100.

Norman, K. A. (2010). How hippocampus and cortex contribute to recognition memory: Revisiting the Complementary Learning Systems model. *Hippocampus*, *20*, 1217-1227.

Quamme, J. R., Weiss, D. J., & Norman, K. A. (2010). Listening for recollection: A multi-voxel pattern analysis of recognition memory retrieval strategies. *Frontiers in Human Neuroscience*. doi: 10.3389/fnhum.2010.00061.

Newman, E. L., & Norman, K. A. (2010). Moderate excitation leads to weakening of perceptual representations. *Cerebral Cortex*. doi: 10.1093/cercor/bhq021.

Said, C. P., Moore, C. D., Norman, K. A., Haxby, J. V., & Todorov, A. (2010). Graded representations of emotional expressions in the left superior temporal sulcus. *Frontiers in Systems Neuroscience*. doi: 10.3389/fnsys.2010.00006.

Johnson, J. D., McDuff, S. G. R., Rugg, M. D., & Norman, K. A. (2009). Recollection, familiarity, and cortical reinstatement: A multivoxel pattern analysis. *Neuron*, *63*, 697-708.

McDuff, S. G. R., Frankel, H. C., & Norman, K. A. (2009). Multivoxel pattern analysis reveals increased memory targeting and reduced use of retrieved details during single-agenda source monitoring. *Journal of Neuroscience*, *29*, 508-516.

Migo, E., Montaldi, D., Norman, K. A., Quamme, J. R., and Mayes, A. R. (2009). The contribution of familiarity to recognition memory is a function of test format when using similar foils. *Quarterly Journal of Experimental Psychology*, *62*, 1198-1215.

Polyn, S. M., Norman, K. A., & Kahana, M. J. (2009). A context maintenance and retrieval model of organizational processes in free recall. *Psychological Review*, *116*, 129-156.

Polyn, S. M., Norman, K. A., & Kahana, M. J. (2009). Task context and organization in free recall. *Neuropsychologia*, *47*, 2158-63.

Socher, R., Gershman, S. J., Perotte, A. J., Sederberg, P. B., Blei, D. M., & Norman, K. A. (2009). A Bayesian analysis of dynamics in free recall. *Advances in Neural Information Processing Systems* 22.

Norman, K. A., Tepe, K., Nyhus, E. & Curran, T. (2008). Event-related potential correlates of interference effects on recognition memory. *Psychonomic Bulletin & Review*, 15 (1), 36-43.

Norman, K. A., Newman, E. L., & Detre, G. J. (2007). A neural network model of retrieval-induced forgetting. *Psychological Review*, 114, 887-953.

Howard, M. W., Venkatadass, V., Norman, K. A., and Kahana, M. J. (2007). Associative processes in immediate recency. *Memory & Cognition*, 35, 1700-11.

Quamme, J. R., Yonelinas, A. P., and Norman, K. A. (2007). The effect of unitization on associative recognition in amnesia. *Hippocampus*, 17, 192-200.

Norman, K. A., Newman, E. L., Detre, G. J., & Polyn, S. M. (2006). How inhibitory oscillations can train neural networks and punish competitors. *Neural Computation*, 18, 1577-1610.

Polyn, S. M., Natu, V. S., Cohen, J. D., & Norman, K. A. (2005). Category-specific cortical activity precedes recall during memory search. *Science*, 310, 1963-1966.

Norman, K. A., Newman, E. L., & Perotte, A. J. (2005). Methods for reducing interference in the complementary learning systems model: Oscillating inhibition and autonomous memory rehearsal. *Neural Networks*, 18, 1212-1228.

Gonsalves, B. D., Kahn, I., Curran, T., Norman, K. A., & Wagner, A. D., (2005). Memory strength and repetition suppression: Multimodal imaging of medial temporal cortical contributions to recognition. *Neuron*, 47, 751-761.

Atri, A., Sherman, S. J., Norman, K. A., Kirchoff, B. A., Nicolas, M. M., Greicius, M. D., Cramer, S., Breiter, H.C., Hasselmo, M. E., & Stern, C. E. (2004). Blockade of central cholinergic receptors impairs new learning and increases proactive interference in a word paired-associate memory task. *Behavioral Neuroscience*, 118, 223-236.

Mayes, A. R., Holdstock, J. S., Isaac, C. L., Montaldi, D., Grigor, J., Gummer, A., Cariga, P., Downes, J. J., Tsivilis, D., Gaffan, D., Gong, Q., & Norman, K. A. (2004). Associative recognition in a patient with selective hippocampal lesions and relatively normal item recognition. *Hippocampus*, 14, 763-784.

Norman, K. A. & O'Reilly, R. C. (2003). Modeling hippocampal and neocortical contributions to recognition memory: A complementary learning systems approach. *Psychological Review*, 110, 611-646.

Norman, K. A. (2002). Differential effects of list strength on recollection and familiarity. *Journal of Experimental Psychology: Learning, Memory, & Cognition*, 28(6), 1083-1094.

Holdstock, J. S., Mayes, A. R., Roberts, N., Cezayirli, E., Isaac, C. L., O'Reilly, R. C., & Norman, K. A. (2002). Under what conditions is recognition spared relative to recall after selective hippocampal damage in humans? *Hippocampus*, 12, 341-351.

O'Reilly, R. C., Norman, K. A., & McClelland, J. L. (1998). A hippocampal model of recognition memory. In M. I. Jordan, M. J. Kearns, & S. A. Solla (Eds.), *Advances in Neural Information Processing Systems 10*. Cambridge, MA: MIT Press.

Norman, K. A., & Schacter, D. L. (1997). False recognition in younger and older adults: Exploring the characteristics of illusory memories. *Memory & Cognition*, 25, 838-848.

Curran, T., Schacter, D. L., Norman, K. A., & Galluccio, L. (1997). False recognition after a right frontal lobe infarction: Memory for general and specific information. *Neuropsychologia*, *35*, 1035-1049.

Review Papers

Norman, K. A., Polyn, S. M., Detre, G. J., & Haxby, J. V. (2006). Beyond mind-reading: Multi-voxel pattern analysis of fMRI data. *Trends in Cognitive Sciences*, *10*(9), 424-430

Norman, K. A. (2006). Declarative memory: sleep protects new memories from interference. *Current Biology*, *16*(15), R596-7.

O'Reilly, R. C., & Norman, K. A. (2002). Hippocampal and neocortical contributions to memory: Advances in the complementary learning systems framework. *Trends in Cognitive Sciences*, *6*(12), 505-510.

Schacter, D. L., Norman, K. A., & Koutstaal, W. (1998). The cognitive neuroscience of constructive memory. *Annual Review of Psychology*, *49*, 289-318.

Schacter, D. L., Koutstaal, W., & Norman, K. A. (1997). False memories and aging. *Trends in Cognitive Sciences*, *1*, 229-236.

Schacter, D. L., Koutstaal, W., & Norman, K. A. (1996). Can cognitive neuroscience illuminate the nature of traumatic childhood memories? *Current Opinion in Neurobiology*, *6*, 207-214.

Book Chapters

Lewis-Peacock, J. A. & Norman, K. A. (in press). Multi-voxel pattern analysis. In M. Gazzaniga & R. Mangun, *The Cognitive Neurosciences V*. Cambridge, MA: MIT Press.

Manning, J. R., Norman, K. A., & Kahana, M. J. (in press). The role of context in episodic memory. In M. Gazzaniga & R. Mangun, *The Cognitive Neurosciences V*. Cambridge, MA: MIT Press.

Sederberg, P. B. & Norman, K. A. (2010). Learning and memory: Computational models. In G. Koob, M. Le Moal, & R. Thompson (Eds.), *Encyclopedia of Behavioral Neuroscience, Volume 2*. Oxford: Academic Press (pp. 145-153).

Norman, K. A., Quamme, J. R., & Newman, E. L. (2009). Multivariate methods for tracking cognitive states. In F. Roesler, C. Ranganath, B. Roder, & R. Kluwe (Eds.), *Neuroimaging of human memory: Linking cognitive process to neural systems*. New York: Oxford University Press (pp. 299-330).

Norman, K. A., Detre, G. J., & Polyn, S. M. (2008). Computational models of episodic memory. In R. Sun (Ed.), *The Cambridge handbook of computational psychology*. New York: Cambridge University Press.

Norman, K. A. (2002). Computational models of episodic memory. In L. Nadel (Ed.), *Encyclopedia of cognitive science*. London: Macmillan.

Schacter, D. L., Norman, K. A., & Koutstaal, W. (1997). The recovered memories debate: A cognitive neuroscience perspective. In M. A. Conway (Ed.), *Recovered memories and false*

memories. New York: Oxford University Press.

Norman, K. A., & Schacter, D. L. (1996). Implicit memory, explicit memory, and false recollection: A cognitive neuroscience perspective. In L. M. Reder (Ed.), *Implicit memory and metacognition*. Mahwah, NJ: Erlbaum.

Conference Presentations

Chan, S. C. Y., Applegate, M. C., Morton, N. W., Polyn, S. M., & Norman, K. A. (2013, May). Recall order is predicted by category-specific neural activity of preceding items at study. *Poster presented at the Context and Episodic Memory Symposium, Philadelphia, PA.*

Hulbert, J. C. & Norman, K. A. (2013, May). Alternating study and retrieval practice leads to differentiation of competing memories. *Poster presented at the Context and Episodic Memory Symposium, Philadelphia, PA.*

Lositsky, O., Toker, D., Chen, J., Honey, C., Hasson, U, & Norman, K. A. (2013, May). Time perception and contextual drift with a naturalistic stimulus. *Poster presented at the Context and Episodic Memory Symposium, Philadelphia, PA.*

Manning, J. R., Blei, D. M., & Norman, K. A. (2013, May). A probabilistic temporal context model for tracking mental context using neural and behavioral data. *Poster presented at the Context and Episodic Memory Symposium, Philadelphia, PA.*

Manning, J. R., Gershman, S. J., Norman, K. A., & Blei, D. M. (2012, December). Factor topographic latent source analysis: factor analysis for brain images. *Poster presented at the Neural Information Processing Systems Conference, Workshop on Machine Learning and Interpretation in Neuroimaging, Lake Tahoe, NV.*

deBettencourt, M. T., Lee, R. F. , Cohen, J. D., Norman, K. A., & Turk-Browne, N. B. (2012, October). Decoding and training sustained attention with real-time fMRI. *Poster presented at the Annual Meeting of the Society for Neuroscience, New Orleans, LA.*

Gershman, S. J., Schapiro, A. C., Hupbach, A., & Norman, K. A. (2012, October). Neural context reinstatement predicts memory misattribution. *Poster presented at the Annual Meeting of the Society for Neuroscience, New Orleans, LA.*

Lewis-Peacock, J. A., Cohen, J. D., & Norman, K. A. (2012, October). Neural evidence for the flexible use of working memory and episodic memory in prospective remembering. *Poster presented at the Annual Meeting of the Society for Neuroscience, New Orleans, LA.*

Lewis-Peacock, J. A. & Norman, K. A. (2012, October). Deactivation of items in working memory can weaken long-term memory. *Talk presented at the Annual Meeting of the Society for Neuroscience, New Orleans, LA.*

Manning, J. R., Blei, D. M., & Norman, K. A. (2012, October). Decoding topic vectors during memory encoding and retrieval. *Poster presented at the Annual Meeting of the Society for Neuroscience, New Orleans, LA.*

Poppenk, J. & Norman, K. A. (2012, October). Suppression of word-scene paired associate memories using an RSVP task. *Poster presented at the Annual Meeting of the Society for Neuroscience, New Orleans, LA.*

Schapiro, A. C., Norman, K. A., & Rogers, T. T. (2012, October). The role of sleep in consolidating semantic knowledge. *Poster presented at the Annual Meeting of the Society for Neuroscience, New Orleans, LA.*

Kim, G., Lewis-Peacock, J. A., Norman, K. A., & Turk-Browne, N. B. (2012, October). Context-based prediction and memory suppression. *Poster presented at the Annual Meeting of the Society for Neuroscience, New Orleans, LA.*

Schapiro, A. C., Trippe, A. M., Herd, S. A., O'Reilly, R. C., Rogers, T. T., & Norman, K. A. (2012, July). The computational mechanisms underlying learning during sleep. *Poster presented at the Neural Computation and Psychology Workshop, San Sebastian, Spain.*

Lewis-Peacock, J.A. & Norman, K.A. (2012, May). Deactivation of items in working memory can weaken long-term memory. *Poster presented at the Context and Episodic Memory Symposium, Bloomington, IN.*

Manning, J.R., Blei, D.M. & Norman, K.A. (2012, May). Tracking item representations during free recall. *Poster presented at the Context and Episodic Memory Symposium, Bloomington, IN.*

Lewis-Peacock, J.A. & Norman, K.A. (2012, March). Deactivation of items in working memory can weaken long-term memory. *Poster presented at the Cognitive Neuroscience Society meeting, Chicago, IL.*

Poppenk, J. & Norman, K.A. (2011, November). Familiarization helps contextual features stick to item features: A multi-voxel pattern analysis study. *Poster presented at the Annual Meeting of the Society for Neuroscience, Washington, DC.*

Lewis-Peacock, J.A., Salesi, M.R., Cohen, J.D. & Norman, K.A. (2011, November). Decoding the use of working memory & episodic memory in prospective remembering. *Poster presented at the Annual Meeting of the Society for Neuroscience, Washington, DC.*

Gershman, S. J., Blei, D. M., & Norman, K.A. (2011, October). New tools for decoding mental representations from neuroimaging data. *Poster presented at the Collaborative Research in Computational Neuroscience Principal Investigators Meeting, Princeton, NJ.*

Detre, G.J., Natarajan, A., & Norman, K.A. (2010, November). Moderate memory activation leads to forgetting in the think-no think paradigm. *Poster presented at the Annual Meeting of the Society for Neuroscience, San Diego, CA.*

Socher, R., Gershman, S. J., Perotte, A. J., Sederberg, P. B., Blei, D. M., & Norman, K. A. (2009, December). A Bayesian analysis of dynamics in free recall. *Poster presented at the Neural Information Processing Systems conference, Vancouver, Canada.*

Saxe, A. & Norman, K. A. (2009, November). Stop-learning systems: Unifying levels of abstraction in associative memory models. *Poster presented at the Computational Cognitive Neuroscience conference, Boston, MA.*

McDuff, S.G.R., Frankel, H.C. & Norman, K.A. (2008, November). Multi-voxel pattern analysis reveals increased memory targeting and reduced use of retrieved details during single-agenda source monitoring. *Poster presented at the Annual Meeting of the Society for Neuroscience, Washington, DC.*

Newman, E.L. & Norman, K.A. (2008, November). Weakening perceptual representations through

moderate excitation. *Poster presented at the Annual Meeting of the Society for Neuroscience, Washington, DC.*

Sederberg, P.B. & Norman, K.A. (2008, November). The dynamics of semantic and temporal cuing during episodic memory retrieval. *Poster presented at the Annual Meeting of the Psychonomic Society, Chicago, IL.*

Quamme, J. R., Weiss, D. J., & Norman, K. A. (2008, April). Pattern classification of fMRI retrieval states in recognition memory. *Poster presented at the Annual Meeting of the Cognitive Neuroscience Society, San Francisco, CA.*

Quamme, J. R., Weiss, D. J., & Norman, K. A. (2007, November). Pattern classification of fMRI retrieval states in recognition memory. *Poster presented at the Annual Meeting of the Psychonomic Society, Long Beach, CA.*

Detre, G. J., Polyn, S. M., Bannert, M. M., & Norman, K. A. (2007, November). Context in free recall - multi-voxel pattern analysis of fMRI. *Poster presented at the Annual Meeting of the Society for Neuroscience, San Diego, CA.*

Sederberg, P. B. & Norman, K. A. (2007, November). Tracking episodic and semantic retrieval with fMRI pattern classification. *Poster presented at the Annual Meeting of the Society for Neuroscience, San Diego, CA.*

Newman, E. L. & Norman, K. A. (2007, November). Reading minds: Using EEG pattern classification to predict behavior in negative priming. *Poster presented at the Annual Meeting of the Society for Neuroscience, San Diego, CA.*

Newman, E. L. & Norman, K. A. (2007, May). Using EEG pattern classification to track competition in negative priming. *Poster presented at the Annual Meeting of the Cognitive Neuroscience Society, New York, NY.*

Polyn, S. M., Morton, N. W., Kogen, D., Norman K. A., & Kahana, M. J. (2007, May). Task context and memory accessibility in free recall. *Poster presented at the Annual Meeting of the Cognitive Neuroscience Society, New York, NY.*

Polyn, S. M., Morton, N. W., Kogen, D. K., Norman, K. A., & Kahana, M. J. (2006, November). Task effects on memory accessibility in free recall. *Poster presented at the Annual Meeting of the Psychonomic Society, Houston, TX.*

Frankel, H. C., Robison, S. G., & Norman, K. A. (2006, October). fMRI correlates of retrieval orientation: Tracking contextual reinstatement using pattern classification. *Poster presented at the Annual Meeting of the Society for Neuroscience, Atlanta GA.*

Newman, E. L. & Norman, K. A. (2006, October). Tracking the sub-trial dynamics of cognitive competition. *Poster presented at the Annual Meeting of the Society for Neuroscience, Atlanta, GA.*

Polyn, S. M., Norman, K. A. , & Kahana, M. J. (2006, October). Tracking the stimulus representation in an fMRI study of free recall. *Poster presented at the Annual Meeting of the Society for Neuroscience, Atlanta, GA*

Quamme, J. R. & Norman, K. A. (2006, October). Using fMRI pattern classification of recollection and familiarity to predict false alarms in recognition memory. *Poster presented at the Annual*

Meeting of the Society for Neuroscience, Atlanta, GA.

Robison, S. G., Osherson, D. N., Norman, K. A. & Cohen, J. D. (2006, October). Pattern classification of attentional control states. *Poster presented at the Annual Meeting of the Society for Neuroscience, Atlanta GA*

Polyn, S. M., Norman, K. A., & Kahana, M. J. (2006, July). Context and episode in a model of human memory. *Society for Mathematical Psychology Meeting, Vancouver, BC.*

Carroll, M. K., Norman, K. A., Haxby, J. V., & Schapire, R. E. (2006, June). Exploiting spatial information to improve fMRI pattern classification. *Poster presented at the Annual Meeting of the Organization for Human Brain Mapping, Florence, Italy.*

Detre, G., Polyn, S. M., Moore, C. D., Natu, V. S., Singer, B. D., Cohen, J. D., Haxby, J. V., & Norman, K. A. (2006, June). The Multi-Voxel Pattern Analysis (MVPA) toolbox. *Poster presented at the Annual Meeting of the Organization for Human Brain Mapping, Florence, Italy.*

Detre, G., Natu, V. S., Schneider, K., DeSimone, K., Kastner, S., & Norman, K. A. (2005, November). Reading out the location being stored in spatial working memory with fMRI. *Poster presented at the Annual Meeting of the Society for Neuroscience, Washington, DC.*

Quamme, J. R., Yonelinas, A. P., & Norman, K. A. (2005, November) Associative recognition in amnesia: spared performance is related to unitization and familiarity capacity. *Poster presented at the Annual Meeting of the Society for Neuroscience, Washington, DC.*

Robison, S. G. & Norman, K. A. (2005, November). Pattern classification of memory encoding tasks. *Poster presented at the Annual Meeting of the Society for Neuroscience, Washington DC.*

Polyn, S., Detre, G., Takerkart, S., Natu, V., Benharrosh, M., Singer, B., Cohen, J., Haxby, J., & Norman, K. A. (2005, June). A Matlab-based toolbox to facilitate multi-voxel pattern classification of fMRI data. *Poster presented at the Annual Meeting of the Organization for Human Brain Mapping, Toronto, Canada.*

Lenartowicz, A., Detre, G., Polyn, S., Chein, J., Yeung, N., Nystrom, L., Norman, K. A., & Cohen, J. D. (2005, April). Characterization of brain states during task-switching using a neural network classifier. *Poster presented at the Annual Meeting of the Cognitive Neuroscience Society, New York, NY.*

Norman, K. A., Newman, E., & Detre, G. (2004, November). Further predictions from a neural network model of retrieval induced forgetting. *Poster presented at the 45th Annual Meeting of the Psychonomic Society, Minneapolis, MN.*

Polyn, S. M., Cohen, J., & Norman, K. A. (2004, October). Detecting distributed patterns in an fMRI study of free recall. *Poster presented at the Annual Meeting of the Society for Neuroscience, San Diego, CA.*

Polyn, S. M., Nystrom, L. E., Norman, K. A., Haxby, J. V., Gobbini, M. I., & Cohen, J. D. (2004, June). Using neural network algorithms to investigate distributed patterns of brain activity in fMRI. *Poster presented at the Annual Meeting of the Organization for Human Brain Mapping, Budapest, Hungary.*

Norman, K. A., Newman, E. L., Detre, G. J., & Polyn, S. M. (2004, April). How inhibitory oscillations can train neural networks and punish competitors. *Poster presented at the Annual*

Meeting of the Cognitive Neuroscience Society, San Francisco, CA.

Norman, K. A., Newman, E. L., Detre, G. J., & Polyn, S. M. (2004, March). How inhibitory oscillations can train neural networks and punish competitors. *Poster presented at the Computational and Systems Neuroscience Meeting, Cold Spring Harbor, NY.*

Newman, E. L. & Norman, K. A. (2003, November) Oscillations drive learning in retrieval induced forgetting. *Poster presented at the Annual Meeting of the Society for Neuroscience, New Orleans, LA.*

Polyn, S. M., Norman, K. A., & Cohen, J. D. (2003, March). Modeling prefrontal and medial temporal contributions to episodic memory. *Poster presented at the Annual Meeting of the Cognitive Neuroscience Society, New York, NY.*

Newman, E. L. & Norman, K.A. (2003, April). A neural network model of retrieval induced forgetting. *Poster presented at the Annual Meeting of the Cognitive Neuroscience Society, New York, NY.*

Polyn, S. M., Norman, K. A., & Cohen, J. D. (2002, November). Connectionist modeling of source memory phenomena. *Poster presented at the Annual Meeting of the Society for Neuroscience, Orlando, FL.*

Norman, K. A., Curran, T., & Tepe, K. (2002, April). Event-related potential correlates of interference effects on recognition memory. *Poster presented at the Annual Meeting of the Cognitive Neuroscience Society, San Francisco, CA.*

Norman, K. A. (2000, November). Differential effects of list strength on recollection and familiarity. *Poster presented at the Annual Meeting of the Psychonomic Society, New Orleans, LA.*

Kirchhoff, B. A., Norman, K. A., Nicolas, M. M., Greicius, M., Breiter, H. C., Hasselmo, M. E., & Stern, C. E. (2000, November). Effect of cholinergic blockade on paired-associate learning in humans. *Poster presented at the Annual Meeting of the Society for Neuroscience, New Orleans, LA.*

Huber, D. E., O'Reilly, R. C., & Norman, K. A. (2000, May). Understanding memory strengthening in a model of neocortex: The deepening and sharpening of item attractors. *Poster presented at the Fourth International Conference on Cognitive and Neural Systems, Boston University, Boston, Massachusetts.*

Norman, K. A., O'Reilly, R. C., & Huber, D. E. (2000, April). Modeling hippocampal and neocortical contributions to recognition memory. *Poster presented at the Annual Meeting of the Cognitive Neuroscience Society, San Francisco, CA.*

Savage, C. R., Schacter, D. L., Norman, K. A., Fislser, R. E., Rauch, S. L., Benson R. L., & Albert, M. S. (1997, March). A functional MRI study of episodic memory retrieval. *Poster presented at the Annual Meeting of the Cognitive Neuroscience Society, Boston, MA.*

Current Graduate and Postdoctoral Supervision

Ph.D. advisor, Anna Schapiro, 8/2009 – present
Ph.D. advisor, Megan deBettencourt, 6/2011 – present
Ph.D. advisor, Stephanie Chan, 8/2011 – present
Ph.D. advisor, Olga Lositsky, 8/2012 – present

secondary Ph.D. advisor, Ghootae Kim, 8/2011 – present

postdoctoral supervisor, Jordan Poppenk, 9/2010 – present

postdoctoral supervisor, Jeremy Manning, 8/2011 – present

postdoctoral supervisor, Justin Hulbert, 9/2011 – present

postdoctoral co-supervisor, Ida Momennejad, 6/2013 – present

postdoctoral co-supervisor, Aaron Bornstein, 8/2013 – present

Prior Graduate and Postdoctoral Supervision

Greg Detre (graduated with Ph.D. in Psychology, 2010), founder of Memrise, Inc.
(www.memrise.com)

Sam Gershman (graduated with Ph.D. in Psychology, 2012), current postdoctoral fellow in the Tenenbaum lab at MIT

Christopher D. Moore (graduated with Ph.D. in Psychology, 2010), currently working as an analyst at WorldQuant

Susan McDuff (graduated with Ph.D. in Psychology, 2009), currently medical student at UCSD

Ehren Newman (graduated with Ph.D. in Psychology, 2008), currently postdoctoral fellow in the Hasselmo lab at Boston University

Jarrod Lewis-Peacock (postdoctoral advisee, 2010-2013), currently Assistant Professor of Psychology at the University of Texas, Austin

Sean Polyn (graduated with Ph.D. in Psychology, 2005), currently Assistant Professor of Psychology at Vanderbilt University

Joel Quamme (postdoctoral advisee, 2004-2008), currently Assistant Professor of Psychology at Grand Valley State University

Per Sederberg (postdoctoral advisee, 2006-2010), currently Assistant Professor of Psychology at the Ohio State University

Professional Membership

American Psychological Society
Cognitive Neuroscience Society
Memory Disorders Research Society
Psychonomic Society
Society for Neuroscience

Reviewing

Editorial Board member, *Psychonomic Bulletin & Review*, 2005 - present

Ad-hoc reviewer for:

Army Research Office
Behavioral and Brain Sciences
Biological Psychiatry

Brain Research
Cerebral Cortex
Cognition
Cognitive, Affective, & Behavioral Neuroscience
Cognitive Neuropsychology
Cognitive Science
Current Biology
Developmental Psychology
Frontiers in Human Neuroscience
Hippocampus
Journal of Cognitive Neuroscience
Journal of Experimental Psychology: General
Journal of Experimental Psychology: Learning, Memory, & Cognition
Journal of Gerontology: Psychological Sciences
Journal of Memory & Language
Journal of Neuroscience
Learning & Memory
Medical Research Council, UK
Memory & Cognition
National Science Foundation
Nature Neuroscience
Network: Computation in Neural Systems
Neural Information Processing Systems Conference
Neuroimage
Neuron
Neuroscience Letters
Neuropsychologia
PLoS Biology
PLoS One
PNAS
Psychological Review
Psychological Science
Psychology & Aging
Science
Wellcome Trust

Professional Activities

Co-organizer (with William Bialek), Collaborative Research in Computational Neuroscience (CRCNS) Principal Investigators meeting, October, 2011, Princeton, NJ

Member, NIH CP grant review panel, July 2011 – June 2017

Ad-hoc panelist, NIH CP grant review panel, June 2010

Panelist, NSF Perception, Action, and Cognition panel (three times)

Editor, special issue of *Neuropsychologia* on Multivariate Pattern Analysis and Cognitive Theories (published in March, 2012).

Member, Faculty of 1000 Biology, Theoretical Neuroscience section, July 2008 – December 2009

Organizer, Symposium on Computational Models of Memory, Memory Disorders Research

Society, Chapel Hill, NC, October, 2009

Member, Computational Cognitive Neuroscience Conference organizing committee, January 2008 – present

Member, Context and Episodic Memory Symposium organizing committee, October 2008 – present

Panelist, NIH special emphasis grant review panels BBBP-E (January 2011), BBBP-E (November 2010), BBBP-D (June 2009), BBBP-L (March 2009)

Member, NIH ZRG1 F02A (20) study section (Neuroscience predoctoral & postdoctoral fellowships), March 2004 – June 2004

Co-organizer (with Michael Kahana), Second Annual Episodic Memory Symposium, New Orleans, LA, November 2003

Co-organizer (with Michael Kahana), First Annual Episodic Memory Symposium, Orlando, FL, November 2002

Consultant on NIH R01 grant, Tim Curran PI, “ERP studies of dual processes in human recognition memory”, January 2002 – December 2006

Co-organizer (with Ken Malmberg), Symposium on New Approaches to Dual-Process Models of Recognition, Annual Interdisciplinary Conference, Jackson, WY, January 2001

Teaching

Spring 2004-05, Fall 2005-06, Fall 2007-08, Spring 2009-10, Fall 2011-12: PSY 306, “Memory and Cognition”

This course provides an integrative treatment of learning and memory in humans and animals. We explore working memory (our ability to actively maintain thoughts in the face of distraction) and episodic memory (our ability to rapidly memorize specific details so we can recall them later), as well as more incremental forms of learning. In studying these topics, we consider the behavioral paradigms used to extract learning and memory data, as well as techniques from cognitive neuroscience (e.g., neuroimaging, lesion studies, computational modeling) that shed light on how the brain gives rise to learning and memory.

Fall 2003-04: FRS 165, “Memory Distortion and Forgetting”

This freshman seminar course provides an introduction to the neural basis of memory, and then applies this knowledge to the (closely related) problems of why we fail to remember things that happened and why we sometimes remember things that did not happen.

Spring 2002-03, Spring 2003-04, Spring 2005-06, Spring 2007-08, Spring 2008-09, Spring 2011-12: PSY 330, “Introduction to Connectionist Models: Bridging Between Brain and Mind”

This course provides an introduction to the use of connectionist models (also known as neural network or parallel distributed processing models) as a tool for exploring how psychological functions are implemented in the brain. The goal of this course is to give students the theoretical background and practical skills that they will need to pursue further independent research in computational modeling of cognition.

Spring 2010-11, Spring 2012-13: ELE/NEU/PSY 480, “fMRI Decoding: Reading Minds Using Brain Scans”

This course (co-taught with Peter Ramadge in Electrical Engineering) teaches students how to use sophisticated pattern-classification algorithms, applied to patterns of functional MRI data, to decode the information that is represented in the subject's brain at a particular point in time. In lectures, students learn about cutting-edge techniques for finding meaningful patterns in large, noisy datasets; in weekly computer labs, students use these techniques to gain insight into fMRI datasets.

Spring 2009-10, Spring 2010-11, Spring 2011-12, Spring 2012-13: NEU 502, “Neuroscience: From Molecules to Systems to Behavior”

This class is the Spring-semester portion of the year-long proseminar for Neuroscience Ph.D. students. I assist with teaching modules on neural networks and fMRI, and I teach a two-week-long module on memory.

Fall 2011-12: Junior Paper Laboratory, “Sleep and Memory”

This course provides hands-on experience in experimental design, experiment programming, participant testing, and data analysis, with the goal of preparing Psychology juniors to carry out their senior thesis experiments. Students learned about the effects of sleep on memory, decided on a specific research topic (looking at the role of sleep in updating existing knowledge structures based on new information), and learned how to program experiments in Psychtoolbox; each student came up with their own variant of the same “core” experiment, ran at least 8 participants, and analyzed the data from these participants.

Other Research Activities

Faculty sponsor of Princeton Experience Based Cognition (EBC) team. Supervised cross-departmental team of researchers (from Psychology, Physics, Computer Science, Applied Math, and Electrical Engineering) who participated in the Pittsburgh Brain Activity Interpretation Competition in 2006 and 2007. The goal of the competition was to predict subjects' cognitive state from functional MRI data acquired while they were watching a movie (in 2006) and while they were playing a virtual reality video game (in 2007). In both 2006 and 2007, the Princeton team won second prize overall, and had three entries in the top ten. For more information on the competition see: <http://www.braincompetition.org>

University and Departmental Service

Member, Committee on Undergraduate Admission and Financial Aid, September 2011 – present

Director, Quantitative and Computational Neuroscience Training, Princeton Neuroscience Institute Ph.D. program, 2012 – present

Member, Princeton Neuroscience Institute graduate admissions committee, 2011– present

Member, Princeton Neuroscience Institute curriculum committee, 2012 – present

Advisory board member, Keller Center for Innovation in Engineering Education, Princeton University, 2008 – present

Chair, Cognitive Psychology faculty search committee, 2011-2012

Member, Princeton Neuroscience Institute faculty search committee, 2011-2012

Member, Princeton Experimental Research Committee, Department of Psychology (this committee oversees the undergraduate subject pool), 2005 – 2012

Freshman & sophomore advisor, Wilson College, 2003-04 academic year

Invited Talks

Mind, Brain, Behavior Symposium, Harvard University, September 2013

NIMH Summer Institute in Cognitive Neuroscience, Squaw Valley, CA, July 2013

Psychology Department Colloquium, UCSD, May 2013

NIMH Summer Institute in Cognitive Neuroscience, UC Santa Barbara, July 2012

Psychology Department Colloquium, Stanford University, June 2012

Tsukuba International Conference on Memory, Tokyo, Japan, March 2012

Yale Magnetic Resonance Research Center, Yale University, January 2012

Conference on Executive Function, University of Colorado at Boulder, January 2012

Advanced fMRI Educational Session, OHBM Conference, Quebec City, Canada, June 2011

Rotman Research Institute Rounds, Baycrest Hospital, Toronto, Canada, January 2011

Chaucer Club Symposium, MRC-CBU, Cambridge, UK, December, 2010

Recognition Memory Symposium, University of Bristol, Bristol, UK, July 2010

Psychology Department Colloquium, Brown University, May, 2010

Cognition and Perception Seminar, New York University, March, 2010

Center for the Neural Basis of Cognition Colloquium, Carnegie Mellon University, January, 2010

Symposium on fMRI and Source Memory, Psychonomic Society meeting, Boston, MA, November, 2009

Brain and Cognition Seminar, University of Illinois Urbana-Champaign, April, 2009

Neuroscience Institute Seminar, Princeton University, December, 2008

IPAM summer school on Mathematics in Brain Imaging, Los Angeles, CA, July 2008

Symposium on Neuroethics, Society for Philosophy and Psychology meeting, Philadelphia, PA, June 2008

Psychological and Brain Sciences Colloquium, Johns Hopkins University, March 2008

Symposium on Context and Episodic Memory, Tampa, FL, January 2008

Symposium on Computationally-Based Brain Imaging, Computational Cognitive Neuroscience conference, San Diego, CA, November 2007

Conference on Neuroimaging and Theories of Memory, Marburg, Germany, August 2006

Merck Summer Institute for the Study of Developmental Disabilities, June 2006

Episodic Memory Symposium, Computational Cognitive Neuroscience conference, Washington DC, November 2005

Institute for Research in Cognitive Science Colloquium, University of Pennsylvania, October 2005

Workshop on Computational Modeling of Inhibitory Processes, Arlington, TX, March 2005

Behavior, Brain, & Cognition Colloquium, Washington University in St. Louis, December 2004

Liverpool Memory Symposium, Liverpool, UK, June 2004

NACS Colloquium, University of Maryland, March 2004

Cognitive Lunch, Yale University, March 2004

Departmental Colloquium, Rutgers-Newark, October 2003

Center for Cognitive Neuroscience Colloquium, University of Pennsylvania, December 2002

Taught a neural network workshop at the Merck Summer Institute for the Study of Developmental Disabilities, July 2003

Personal Information

Date of Birth: October 15, 1971

Citizenship: USA