Leigh Erik Nystrom
Curriculum Vitae

Education

Ph.D. (Cognitive Psychology), Carnegie-Mellon University, 1994
Committee: James McClelland (Chair), Roberta Klatsky, Jonathan D. Cohen

M.S. (Cognitive Psychology), Carnegie-Mellon University, 1989
Committee: James McClelland (Chair), John R. Anderson, Lynne Reder

B.S. (with Honors; Psychology), University of Wisconsin-Madison, 1987

Professional Experience

Director, Cognitive Neuroscience Facilities, Scully Center for the Neuroscience of Mind and Behavior, 2013 - present
Princeton Neuroscience Institute, Princeton University

Co-Director, Neuroscience of Cognitive Control Laboratory, Princeton University, 2002 - present
(with Jonathan D. Cohen, Director, 1998 - present)

Lecturer, Princeton University, 2016 - 2022
Princeton Neuroscience Institute

Senior Professional Specialist, Princeton University, 2006 - present
Center for the Study of Mind, Brain, and Behavior (2006 - 2008),
Princeton Neuroscience Institute (2008 - present)

Senior Technical Staff Member I - II, Princeton University, 2004 - 2006
Center for the Study of Mind, Brain, and Behavior

Research Staff Scientist, Princeton University, 1998 - 2004
Department of Psychology (1998 - 2004),
Center for the Study of Mind, Brain, and Behavior (2000 -2004)

Visiting Research Associate, Carnegie Mellon University, 1994 - 1998
Department of Psychology

Senior Research Principal, University of Pittsburgh Medical Center, 1997 - 1998
Western Psychiatric Institute and Clinic

Research Principal, University of Pittsburgh Medical Center, 1996 - 1997
Western Psychiatric Institute and Clinic

Senior Research Fellow, University of Pittsburgh Medical Center, 1994 - 1996
Western Psychiatric Institute and Clinic

Publications ***(# Citations: > 32,000; h-index = 31; i10-index = 32)***

1) Published books and or chapters in books

Goddard, N., Hood, G., Cohen, J.D., Nystrom, L.E., Eddy, W.F., Genovese, C.R., & Noll, D.C. (2000). Functional MRI datasets analyzed online. Koniges A., (Ed.), *Industrial Strength Parallel Computing*, (pp. 431-449). Morgan Kaufmann: San Francisco.

2) Articles (including review articles) published in refereed journals

Krueger P, van Vugt MK, Simen P, Nystrom L, Holmes P, P& Cohen (2017). Evidence accumulation detected in BOLD signal using slow perceptual decision making. *Journal of Neuroscience Methods, 281*, 21–32.

Field BA, Buck CL, McClure SM, Nystrom LE, Kahneman D, & Cohen JD. (2015). Attentional modulation of brain responses to primary appetitive and aversive stimuli. *PLoS ONE, 10,* e0130880, 1-13.

Van Vugt MK, Simen P, Nystrom LE, Holmes P, & Cohen JD. (2014). Lateralized readiness potentials reveal properties of a neural mechanism for implementing a decision threshold. *PLoS ONE*, *9*, e90943, 1-13.

Eppinger B, Schuck NW, Nystrom LE, & Cohen JD. (2013). Reduced striatal responses to reward prediction errors in older compared to younger adults. *Journal of Neuroscience, 33*, 9905-9912.

Todd, MT, Nystrom LE, & Cohen JD. (2013). Confounds in multivariate pattern analysis: Theory and rule representation case study. *NeuroImage*, *77*, 157-165.

D'Ardenne K, Eshel N, Luka J, Lenartowicz A, Nystrom LE, & Cohen JD. (2012). Role of prefrontal cortex and the midbrain dopamine system in working memory updating. *Proceedings of the National Academy of Sciences of the United States of America, 109 (49)*, 19900-19909.

Eppinger B, Nystrom LE, & Cohen JD. (2012). Reduced sensitivity to immediate reward during decision-making in older than younger adults. *PLoS ONE*, 7(5), e36953, 1-10.

van Vugt MK, Simen P, Nystrom LE, Holmes P, & Cohen JD. (2012). EEG oscillations reveal neural correlates of evidence accumulation. *Frontiers in Neuroscience*, 6 (106), 1-13.

Greene JD, Cushman FA, Stewart LE, Lowenberg K, Nystrom LE & Cohen JD. (2009). Pushing moral buttons: The interaction between personal force and intention in moral judgment. *Cognition*, 111, 364-371.

D'Ardenne K, McClure SM, Nystrom LE, & Cohen JD. (2008). BOLD responses reflecting dopaminergic signals in the human ventral tegmental area. *Science*, 319, 1264-1267.

Greene JD, Morelli SA, Lowenberg K, Nystrom LE, & Cohen JD. (2008). Cognitive load selectively interferes with utilitarian moral judgment. *Cognition*, 107, 1144-1154.

Kroger JK, Nystrom LE, Cohen JD, & Johnson-Laird PN. (2008). Distinct neural substrates for deductive and mathematical processing. *Brain Research*, 1243, 83-103.

Pochon J-B, Riis J, Sanfey AG, Nystrom LE, & Cohen JD. (2008). Functional imaging of decision conflict. *Journal of Neuroscience*, 28, 3468-3473.

Yeung N, Nystrom LE, Aronson JA, & Cohen JD. (2006). Between-task competition and cognitive control in task switching. *Journal of Neuroscience,* 26, 1429-1438.

Greene JD, Nystrom LE, Engell AD, Darley JM, & Cohen JD. (2004). The neural bases of cognitive conflict and control in moral judgment. *Neuron*, 44, 389-400.

Holroyd CB, Nieuwenhuis S, Yeung N, Nystrom L, Mars R, Coles MGH, & Cohen JD. (2004). Dorsal anterior cingulate cortex is sensitive to internal and external sources of error information: a functional magnetic resonance imaging study. *Nature Neuroscience*, 7, 497-498.

Rilling JK, Sanfey AG, Aronson JA, Nystrom LE, & Cohen JD. (2004). The neural correlates of theory of mind within interpersonal interactions. *NeuroImage*, 22, 1694-1703.

Rilling JK, Sanfey AG, Aronson JA, Nystrom LE, & Cohen JD. (2004). Opposing BOLD responses to reciprocated and unreciprocated altruism in putative reward pathways. *Neuroreport*, 15, 2539-2543.

Sanfey AG, Rilling JK, Aronson JA, Nystrom LE, & Cohen JD. (2003). The neural basis of economic decision-making in the ultimatum game. *Science*, 300, 1755-1758.

Cho RY, Nystrom LE, Brown E, Jones A, Braver TS, Holmes P, & Cohen JD. (2002). Mechanisms underlying performance dependencies on stimulus history in a two-alternative forced choice task. *Cognitive, Affective, & Behavioral Neuroscience,* 2, 283-299.

Jones AD, Cho RY, Nystrom LE, Cohen JD, & Braver TS. (2002). A model of anterior cingulate activity, conflict monitoring, and control adjustments in choice-discrimination tasks. *Cognitive, Affective, & Behavioral Neuroscience,* 2, 300-317.

Casey BJ, Forman SD, Franzen P, Berkowitz A, Braver TS, Nystrom LE, Thomas KM, & Noll DC. (2001). Sensitivity of prefrontal cortex to changes in target probability: A functional MRI study. *Human Brain Mapping,* 13, 26-33.

Greene JD, Sommerville RB, Nystrom LE, Darley JM, & Cohen JD. (2001). An fMRI investigation of emotional engagement in moral judgment. *Science,* 293, 2105-2108.

Delgado MR, Nystrom LE, Fissell C, Noll DC, & Fiez JA. (2000). Tracking the hemodynamic responses to reward and punishment in the striatum. *Journal of Neurophysiology,* 84, 3072-3077.

Nystrom LE, Braver TS, Sabb FW, Delgado MR, Noll DC, & Cohen JD. (2000). Working memory for letters, shapes and locations: fMRI evidence against stimulus-based regional organization in human prefrontal cortex. *NeuroImage,* 11, 424-446.

Botvinick M, Nystrom L, Fissell K, Carter C, & Cohen JD. (1999). Conflict monitoring vs. selection-for-action in anterior cingulate cortex. *Nature,* 402, 179-181.

Barch DM, Braver TS, Nystrom LE, Forman SD, Noll DC, & Cohen JD. (1997). Dissociating working memory from effort in human prefrontal cortex. *Neuropsychologia,* 35, 1373-1380.

Braver TS, Cohen JD, Nystrom LE, Jonides J, Smith EE, & Noll DC. (1997). A parametric study of prefrontal cortex involvement in human working memory. *NeuroImage,* 5, 49-62.

Casey BJ, Trainor RJ, Orendi JL, Schubert AB, Nystrom LE, Giedd JN, Castellanos X, Haxby J, Noll DC, Cohen JD, Forman S, Dahl RE, & Rapoport JL. (1997). A developmental functional MRI study of prefrontal activation during performance of a go-no-go task. *Journal of Cognitive Neuroscience,* 9, 835-847.

Cohen JD, Perlstein WM, Braver TS, Nystrom LE, Noll DC, Jonides J, & Smith EE. (1997). Temporal dynamics of brain activation during a working memory task. *Nature,* 386, 604-608.

Goddard NH, Hood G, Cohen JD, Eddy WF, Genovese CR, Noll DC, & Nystrom LE. (1997). Online analysis of functional MRI datasets on parallel platforms. *Journal of Supercomputing,* 11, 295-318.

Noll DC, Genovese CR, Nystrom L, Vazquez A, Forman SD, Eddy WF, & Cohen JD. (1997). Estimating test-retest reliability in functional MR imaging II: Application to motor and cognitive activation studies. *Magnetic Resonance in Medicine,* 38, 508-517.

Nystrom LE, & McClelland JL. (1992). Trace synthesis in cued recall. *Journal of Memory and Language,* 31, 591-614.

3) Articles published in non-refereed journals; non-refereed reports; abstracts of papers delivered at meetings; miscellaneous publications

Krueger P, Van Vugt M, Simen P, Nystrom L, Holmes P, & Cohen J. (2016). Evidence accumulation detected in BOLD signal using slow perceptual decision making. *Cosyne 2016.*

Eppinger B, Nystrom L, & Cohen JD. (2010). Age-related changes in reward sensitivity during decision-making and learning. *Society for Neuroscience Abstracts.*

Todd MT, Nystrom LE, Niv Y, & Cohen JD. (2010). Identifying internal representations of context in fMRI. *Society for Neuroscience Abstracts.*

Getz SJ, Tomlin D, Nystrom LE, Cohen JD, & Conway ARA. (2010). The effect of working memory load on intertemporal choice. *Abstracts of the Psychonomics Society*.

Getz S, Tomlin D, Nystrom LE, Cohen JD, & Conway ARA. (2010). Working memory and intertemporal choice. *Abstracts of the 8th Annual Meeting of the Society for Neuroeconomics.*

van Vugt MK, Simen P, Nystrom L, Holmes P, Cohen JD. (2010). Decision dynamics in scalp-recorded EEG during a 2AFC random dot motion task. *Abstracts of the 7th FENS Forum of European Neuroscience.*

Simen P, Nystrom L, van Vugt M, Krueger P, & Cohen JD. (2009). Event-related fMRI during slow decision making can reveal temporal structure in neural activity. *Society for Neuroscience Abstracts*.

Getz SJ, Tomlin D, Nystrom LE, Cohen JD, & Conway ARA. (2009). Executive control of intertemporal choice: Effects of cognitive load on impulsive decision-making. *Abstracts of the Psychonomics Society*.

Getz S, Tomlin D, Nystrom LE, Cohen JD, & Conway ARA. (2009). Executive control of intertemporal choice: Effects of cognitive load on impulsive decision-making. *Abstracts of the 7th Annual Meeting of the Society for Neuroeconomics.*

Eshel N, Luka J, Lenartowicz A, Nystrom LE, & Cohen JD. (2008). Transiently disrupting right prefrontal cortex interferes with updating working memory. *Neuroimage.*

Lenartowicz A, Nystrom LE, & Cohen JD. (2008). Representation of situational context during preparation in task switching as mediated by task specific and behaviorally significant functional connectivity. *Neuroimage.*

van den Bos W, McClure SM, Harris LT, Nystrom LE, Fiske ST, & Cohen JD. (2007). Motivational significance of social stimuli contributes to activation in MPFC. *Journal of Cognitive Neuroscience Supplement.*

Greene JD, Paxton JM, Nystrom LE, & Cohen JD. (2007). Dissociation between affective and cognitive moral disapproval. *Society for Neuroscience Abstracts.*

D'Ardenne K, McClure SM, Nystrom LE, & Cohen JD. (2007). BOLD responses in the dopaminergic ventral tegmental area. *Society for Neuroscience Abstracts.*

McClure KD, McClure SM, Nystrom LE, & Cohen JD. (2006). Functional MRI of midbrain dopamine nuclei. *Neuroimage.*

Sanfey AG, Pochon J-P, Riis J, Nystrom LE, & Cohen JD. (2006). Functional imaging of decision conflict. *Neuroimage.*

Lenartowicz A, Detre G, Polyn SM, Chein J, Yeung N, Nystrom L, Norman KA, & Cohen JD. (2005). Characterization of brain states during task-switching using a neural network classifier. *Journal of Cognitive Neuroscience Supplement.*

Greene JD, Lowenberg K, Nystrom LE, Darley JM, & Cohen JD. (2005). Saving lives versus keeping promises: an fMRI investigation of consequentialist and deontological moral judgment. *Society for Neuroscience Abstracts.*

Rilling JK, Sanfey AG, Aronson JA, Nystrom LE, & Cohen JD. (2004). Neural correlates of theory of mind within interpersonal interactions. *Neuroimage.*

Rilling JK, Sanfey AG, Aronson JA, Nystrom LE, Cohen JD, Gutman D, Zeh T, Pagnoni G, Berns G, & Kilts C. (2004). Imaging the social brain with fMRI and interactive games. *International Journal of Neuropsychopharmacology*, 7, S477-S478.

Polyn SM, Nystrom LE, Norman KA, Haxby JV, Gobbini MI, & Cohen JD. (2004). Using neural network algorithms to investigate distributed patterns of brain activity in fMRI. *Neuroimage.*

Greene J, Nystrom L, Darley J, & Cohen J. (2003). Neural activity correlated with outcome of moral decision. *Journal of Cognitive Neuroscience Supplement,* 166.

Nieuwenhuis S, Holroyd CB, Yeung N, Nystrom LE, Cohen JD, Mars RB, & Coles MGH. (2003). Neural correlates of reinforcement learning and error processing: a functional magnetic resonance imaging study. *Society for Neuroscience Abstracts.*

Greene JD, Nystrom LE, Engell AD, Darley JM, & Cohen JD. (2003). Patterns of neural activity correlated with individual differences in moral judgment. *Society for Neuroscience Abstracts.*

Yeung N, Nystrom LE, Aronson JA, & Cohen JD. (2003). Dissociable functions of prefrontal cortex in task switching. *Society for Neuroscience Abstracts.*

Yeung, N, Nystrom, L, Kitazono, M, & Cohen, J. (2002). An fMRI study of switching attention between tasks. *NeuroImage,* 14.

Greene J, Sommerville R, Nystrom L, Darley J, & Cohen J. (2002). Cognitive and affective conflict in moral judgment. *Journal of Cognitive Neuroscience Supplement,* 49.

Nystrom LE, Yeung NP, Kitazono MT, & Cohen JD. (2002). Anterior cingulate activity: From conflict or motor planning? *Society for Neuroscience Abstracts.*

Rilling JK, Sanfey AG, Aronson JA, Nystrom LE, & Cohen JD. (2002). Mapping the brain's response to reciprocated and unreciprocated social cooperation. *Society for Neuroscience Abstracts.*

Sanfey AG, Rilling JK, Aronson JA, Nystrom LE, & Cohen JD. (2002). An investigation of the neural dynamics of fairness and unfairness. *Society for Neuroscience Abstracts.*

Li, TQ, Nystrom, LE, & Cohen, JD. (2001). Ultra-fast trial-based fMRI using amplitude modulated stimuli. *NeuroImage,* 13, S27.

Cho, RY, Nystrom, LE, Holmes, P, Brown, E, Casey, BJ, & Cohen, JD. (2000). A connectionist model of conflict and control in a forced-choice task. *Society for Neuroscience Abstracts,* 26.

Greene, JD, Sommerville, RB, Nystrom, LE, Darley, JM, & Cohen, JD. (2000). Dissociation between categories of moral judgment revealed by fMRI. *Society for Neuroscience Abstracts,* 26.

Kroger, JK, Nystrom, LE, Li, T, Holmes, BD, & Cohen, JD. (2000). Differential cortical responses to memory load and representational structure. *Journal of Cognitive Neuroscience Supplement,* 145.

Delgado MR, Fissell K, Nystrom LE, Noll DC, & Fiez JA. (1999). An fMRI study of reward-related activity during a game-playing task. *Society for Neuroscience Abstracts,* 25, 2148.

Nystrom LE, Delgado MR, Sabb FW, Noll DC, & Cohen JD. (1998). Dynamics of fMRI: Broca's area activation reflects independent effects of duration and intensity of working memory processes. *NeuroImage,* 7, S7.

Cohen JD, Nystrom LE, Braver TS, Sabb FW, Delgado MR, and Noll DC. (1998). FMRI studies of the topographic organization of working memory representations in prefrontal cortex. *Journal of Cognitive Neuroscience Supplement,* 87.

Nystrom LE, Delgado MR, Sabb FW, Noll DC, & Cohen JD. (1998). Dynamics of fMRI activation under manipulations of duration and intensity of working memory processes in the Sternberg task. *Journal of Cognitive Neuroscience Supplement,* 86.

Chein JM, Noll DC, Cohen JD, Fissell K, Nystrom LE, Sabb F, & Fiez JA. (1998). An fMRI study of verbal working memory: Effects of length lexicality, and phonological similarity. *Society for Neuroscience Abstracts,* 24, 1896.

Barch DM, Braver TS, Nystrom LE, Noll DC & Cohen, JD. (1997). Activation of prefrontal cortex by the representation and maintenance of context information. *Schizophrenia Research,* 24, 163.

Braver TS, Barch DM, Nystrom LE, Forman SD, Noll DC, & Cohen JD. (1997). Dissociating working memory from effort in human prefrontal cortex. *NeuroImage,* 5, S64.

Casey BJ, Badgaiyan RD, Franzen PL, King SW, Kye C, Schubert AB, Nystrom LE, & Noll DC. (1997). Prefrontal activation as a function of response set. *NeuroImage,* 5, S602.

Casey BJ, Cohen JD, King SW, Franzen PL, Nystrom LE, Badgaiyan RD, Schubert AB, & Noll DC. (1997). A developmental functional MRI study of cortical activation during a spatial working memory task. *NeuroImage,* 5, S69.

Cohen JD, Nystrom LE, Sabb FW , Braver TS, & Noll DC. (1997). Tracking the dynamics of fMRI activation in humans under manipulations of duration and intensity of working memory processes. *Society for Neuroscience Abstracts,* 23, 1678.

Braver TS, Cohen JD, Nystrom LE, Jonides J, Smith EE, & Noll DC. (1996). A parametric study of prefrontal cortex involvement in human working memory. *NeuroImage,* 3, S532.

Casey BJ, Cohen JD, Trainor RJ, Nah GE, Nystrom LE, Orendi JL, Schubert AB, & Noll DC. (1996). A functional MRI study of hierarchical cortical activation as a function of task complexity. *NeuroImage,* 3, S536.

Casey BJ, Trainor RJ, Orendi JL, Schubert AB, Nystrom LE, Cohen JD, & Noll DC. (1996). A pediatric functional MRI study of prefrontal activation during performance of a go-no-go task. *NeuroImage,* 3, S593.

Cohen JD, Noll DC, & Nystrom LE. (1995). Qualitative and quantitative assessment of test-retest reliability of functional MRI data. *Proceedings of the Third Annual Scientific Meeting of the Society for Magnetic Resonance,* 234.

Nystrom LE, & McClelland JL. (1991). Blend errors during cued recall. *Proceedings of the Thirteenth Annual Conference of the Cognitive Science Society.* Lawrence Erlbaum Associates, 185-190.

4) Professional activities, special achievements and innovations if applicable

Director

Cognitive Neuroscience Facilities, Scully Center for the Neuroscience of Mind and Behavior

Related activities:
MRI Operator Certifier, MRI Safety Officer, MRI Emergency Contact, MRI Medical Anomaly Contact, Chair of Biweekly Imaging Meetings, Manager of Scully Staff (2-3 additional FTEs), Scully Center Facilities Budget Manager

Project Manager

Templeton Foundation Grant (2012-2022; most recently a $7.5 million award, 2019-2022):
Managed initial and competitive renewal applications plus ongoing administration of our program's largest-ever cognitive neuroscience grants

Board Member

Princeton Institutional Review Board (2013 - 2019)
Have continued since 2019 as an ad-hoc consultant, providing expert review of protocols relating to human cognitive neuroscience technologies, as well as helping to develop new policies and requirements for COVID-era human subjects research

Lecturer

NEU 502B Graduate core course, teaching all lectures on connectionism, fMRI, and EEG
Between 2019-2022, overhauled original lab syllabus and replaced with new labs using Python / JupyterLab notebooks

Research Support

Key Personnel, Project Manager, 2019-2022
"Toward a Scientific Understanding of the Human Capacity for Autonomy"
The John Templeton Foundation, Grant # 62454

Key Personnel, Project Manager, 2012-2015, 2015-2018
"Toward a Scientific Understanding of the Human Capacity for Cognitive Control"
The John Templeton Foundation, Grant # 36751, 57876

Key Personnel, 2011-2013
"Behavioral and fMRI Studies of Economic Preference"
National Institute of Aging, P30AG024361

Key Personnel, 2006-2012
"Neural Mechanisms and Social Influence in Delay Discounting and Impulsive Choice"
National Institute of Aging, R01AG030310

Key Personnel, 2007-2012
"Dynamic Decision Making in Complex Task Environments: Principles and Neural Mechanisms"
Air Force Office of Scientific Research, MURI FA9550-07-1-0537

Co-Investigator, 2004-2011
"Behavioral and Neuroscientific Studies of Attention and Emotion in Buddhist Adepts"
Mind and Life Institute Research Award

Co-PI, 2000-2005; Co-Investigator, 2005-2011
"Cognitive and Neural Mechanisms of Decision and Control"
National Institute of Mental Health, P50MH62196

Key Personnel, 1996-2002; Co-Investigator, 2003-2008
"Functional MRI Studies of Prefrontal Cortex"
National Institute of Mental Health, R01MH052864

Key Personnel, 2002-2007
"Framework for Modeling Human Cognition Mechanisms of Cognitive Control."
National Institute of Mental Health, P50MH64445

Classes Taught

"NEU 502B: From Molecules to Systems to Behavior"
First-year graduate core course, teaching connectionist modeling, fMRI, and EEG methods
Princeton Neuroscience Institute
Princeton University, Spring Semester 2014 – 2022, annually

"Introduction to fMRI experimental design and analysis"
Center for the Study of Brain, Mind and Behavior
Princeton University, September, 1999 – 2008, annually

"Introduction to fMRI experimental design"
John Merck Fund Summer Institute on the Biology of Developmental Disabilities
Princeton University, July, 2004, 2005

Service

Member, Institutional Review Board
Princeton University (2013 – 2019)
Ad-hoc committee member, consultant (2020 – present)

Director, Summer Research Internship Programs
Princeton Neuroscience Institute (2013 – 2016)
Cognitive Neuroscience labs, Psychology Department (2011 – 2012)
Neuroscience of Cognitive Control Laboratory (2006 – 2012)

Ad-hoc Journal Referee
Science
Nature Neuroscience
Cognitive, Affective, & Behavioral Neuroscience
Neuron
Journal of Neuroscience
Journal of Cognitive Neuroscience