

Center for Cognitive Neuroscience
Annual Report, June 2007

I. Overview.

Penn's Center for Cognitive Neuroscience embodies many of the university's highest ideals: interdisciplinary research crossing department and school boundaries, eminence in the wider academic community, and commitment to education at the undergraduate and graduate levels.

In this report we review the CCN's activities and accomplishments for the period 1/2006-6/2007, focusing on the faculty (Section II), our contributions to other programs on campus (Section III), our educational accomplishments (Section IV), external funding (Section V) and our needs going forward (Section VI).

II. Faculty

Our 10 core faculty members include 7 internationally respected senior leaders in the field of cognitive neuroscience and 3 outstanding junior colleagues whose work is already influential. Core faculty are evenly divided between Psychology in SAS (Russell Epstein, Martha Farah, Amishi Jha, Michael Kahana, and Sharon Thompson-Schill) and Neurology in SOM (Geoffrey Aguirre, Anjan Chatterjee, Branch Coslett, John Detre and Murray Grossman). This census takes into account the loss of one of our junior faculty members, Matthew Botvinick, who had been an Assistant Professor in Psychiatry. Matt left for a position in the Princeton University Psychology Department, attracted by the "hard money" salary and the better facilities available there. There are also 2 Research Assistant Professors in the CCN (Daniel Kimberg, Neurology and Ingrid Olson, Psychology) who contribute to the scientific vitality of the Center, and many associated postdocs, students and staff. As a group we divided between the 3808-3810 Walnut Street, 3401 Walnut Street and the Gates and Maloney buildings of HUP. In addition there are now 39 affiliated faculty members from 13 departments at Penn.

CCN faculty are investigating the central questions of cognitive neuroscience: How do we perceive, remember, communicate, reason, and learn? Our recent progress toward answering these questions is documented in the 128 refereed articles by us published or in press in this reporting period, which are listed in Appendix I.

Although research is the foundation of our scientific leadership, our many other professional activities provide a useful gauge of our standing in the field of cognitive neuroscience. These activities include editing journals, serving our professional societies through committee work, and teaching our peers at national and international workshops and meetings.

Editorial service. CCN core faculty have been appointed editors of some of our field's leading journals. From our group of 10 core faculty, 6 of us currently hold editorships or associate editorships:

Cognitive and Behavioral Neurology (Grossman)
Cognitive Psychology (Kahana)
Journal of Cognitive Neuroscience (Chatterjee)
Journal of Cognitive Neuroscience (Farah)

NeuroCase (Coslett)
Neuroscience Letters (Aguirre)

We also hold 16 additional editorial board positions:

American Journal of Bioethics-Neuroscience (Farah)
Behavioral and Cognitive Neuroscience Reviews (Farah)
Behavioral Neurology (Chatterjee)
Brain and Language (Coslett, Grossman)
Cognitive and Behavioral Neurology (Chatterjee)
Cognitive Neuropsychology (Chatterjee, Coslett, Farah)
Empirical Studies of the Arts (Chatterjee)
Journal of the International Neuropsychological Society (Grossman)
Journal of Neuroimaging (Detre)
Neuroethics (Farah)
Neurology (Grossman)
Neuropsychology (Chatterjee)
Psychonomic Bulletin and Review (Kahana)

Teaching and other service to national and international organizations. CCN faculty members are called upon by their peers to teach in professional courses and workshops at major national and international meetings. Major teaching venues this report period include the American Academy of Neurology (Chatterjee, Coslett, Detre), American Academy of Psychiatrists (Detre), American Academy of Psychiatry (Aguirre), the Center for Mindfulness Workshop (Jha), the National Institutes of Health Workshops (Detre), and the Wellcome Trust Bioethics Summer School (Farah).

In addition, we have all traveled to give invited talks in the past 18 months, including a number keynote and plenary addresses at meetings (Aguirre, Farah, Grossman, Thompson-Schill).

Other national and international service ranged from writing the cognitive neurology questions for medical board exams to updating the Dalai Lama on advances in neuroscience.

American Academy of Neurology
 Aging/Dementia and Cognition Working Group (Chatterjee)
 Executive Committee, Cognitive and Behavioral Neurology (Coslett)
American Board of Psychiatry and Neurology
 Question-writer (Chatterjee)
American Heart Association
 Stroke Council (Detre)
American Neurological Association
 Program Committee (Coslett)
Association for Frontotemporal Dementias
 Medical Science Committee (Grossman)
Cognitive Science Society
 Membership Committee (Farah)
Charles A. Dana Foundation

Grant Review (Detre)
Web Site Co-Editor (Grossman)
Foundation for the Advancement of Behavioral and Brain Science
Council member (Farah)
Garrison Institute
Program Committee (Jha)
Goldie Hawn Foundation
External Advisory Committee (Jha)
Haverford College
Board of Directors (Chatterjee)
Mind and Life Institute
Conference Planning Committee (Jha)
Dialogue leader, meeting w HH The Dalai Lama (Farah)
National Institutes of Health
Grant Review Panel Member (Coslett, Detre, Jha, Kahana, Thompson-Schill)
NINDS Progress Review Group (Detre)
NICHD Mental Retardation Research Subcommittee (Detre)
National Science Foundation
Grant Review Panel Member (Detre)
Neuroethics Society
Founding member (Chatterjee)
Founding member and Secretary (Farah)
Society for Neuroscience
Education Committee (Thompson-Schill)
Sundance Film Festival
Sloan Award Jury for Science in Film (Farah)

Other honors and recognition. We have been honored in other ways during this period, including being elected a Fellow of the American Neurological Association (Chatterjee), American Academy of Neurology (Coslett), and American Association for the Advancement of Science (Farah).

The outstanding quality of our teaching has been recognized with the Charles Ludwig Distinguished Teaching Award (Jha) and the Lindback Award for Distinguished Teaching (Thompson-Schill).

Our work continues to receive attention in the media including, during the period of this report, Time Magazine, the New York Times, the London Times, Science Magazine and Scientific American.

III. Links with other organizations on campus

The CCN enjoys many fruitful interactions and collaborations across the campus. From our list of 39 affiliated faculty from 13 departments, 33 individuals attended our full-day, off-campus retreat in January of this year. The retreat featured discussions of research infrastructure and educational programs for cognitive neuroscience at Penn, as well as opportunities to establish new research and teaching collaborations.

Our relations with the Institute for Research in Cognitive Science (IRCS) are close and collaborative. Among our joint projects are the Undergraduate Summer Workshop in Cognitive Science and Cognitive Neuroscience and the Brain and Language Discussion Group (both described later).

We continue to work closely with the Institute for Neurological Sciences (INS) and the Neuroscience Graduate Group (NGG), functioning as their cognitive “division” for purposes of graduate training and recruiting. Drs. Detre and Farah serve on the Advisory Board of the INS.

We also play leadership roles in our departments, with Dr. Coslett serving as Neurology’s Chief of Cognitive Neurology and Vice Chair for Research, and Dr. Thompson-Schill directing the Psychology Department’s undergraduate Honors Program.

Finally, we participate extensively in activities of the Center for Functional Neuroimaging (CfN). The CfN has become a vital asset to cognitive neuroscience research at Penn, and in addition to using its many valuable resources, we collaborate with them in teaching and fund-raising.

IV. Educational Impact

The CCN contributes to the educational mission of the University in a number of ways:

UNDERGRADUATE EDUCATION

In the past few years we have transformed the educational opportunities for mind-brain studies at the undergraduate level. The number of undergraduate course offerings in cognitive neuroscience has tripled, enrollments continue to climb, and our flagship introductory course is now taught both semesters.

The dedication of CCN faculty to undergraduate education is apparent in the new undergraduate image analysis laboratory facility developed by Amishi Jha, the two teaching awards won by Amishi Jha and Sharon Thompson-Schill, and the undergraduate thesis award won by Russell Epstein’s advisee, Whitney Parker.

Courses:

Undergraduate interest in cognitive neuroscience is high, and CCN faculty members are striving to satisfy the demand for courses and lab experiences. Since the founding of the CCN, two large introductory lecture courses have been developed, and one of them is now offered twice a year to meet growing demand.

PSY 149: Introduction to Cognitive Neuroscience, taught by Drs. Thompson-Schill and Epstein (Spring 06: 86 students; Fall 06: 57 students; Spring 07: 70 students).

COLL 002: Perspectives on Cognitive Neuroscience: Mind, Brain and Society, co-taught by Drs. Farah and Stephen Morse (not offered this period but typically enrolls about 90 students).

In addition, Penn undergraduates now have the opportunity to learn about cognitive neuroscience methods thanks to hands-on laboratory courses, including one that focuses specifically on functional neuroimaging. Undergraduate access to this cutting edge technology has been facilitated by an fMRI teaching lab designed by Dr. Jha.

PSY 349: Research Experience in Functional Neuroimaging, taught by Dr. Jha (Spring 07: 16 students)

As more undergraduates complete the introductory level courses there is increasing demand for advanced undergraduate instruction. Courses offered in this reporting period include:

PSY 159: Human Memory, taught by Dr. Kahana (Spring 07: 85 students)

PSY 249: Cognitive Neuroscience of Meditation, taught by Dr. Jha (Spring 06: 21 students)

PSY 270: Neuroethics, taught by Dr. Farah (Freshman Seminar version Spring 06: 10 students; Spring 07: 9 students)

Degree program:

Students can now major in Cognitive Neuroscience through Track 1 (Neuroscience) of the Cognitive Science (COGS) program. In addition, although BIBB does not feature tracks, many students focus their coursework and research on cognitive neuroscience.

GRADUATE EDUCATION

Ph.D. programs: Students can pursue a doctorate in Cognitive Neuroscience through either the Neuroscience or the Psychology Graduate Group. CCN faculty play an active role in both graduate groups, as primary advisors, committee members, and for neuroscience students, lab rotation advisors. For the past few years the cognitive neuroscience candidates have been among the strongest applicants to these two programs. An institutional training grant from NIMH, “A Training Program in Behavioral and Cognitive Neuroscience,” provides partial support for some cognitive neuroscience students.

This year we continued the new tradition of holding an annual graduate student research symposium series, jointly with Princeton University, called the “Cognitive Neuroscience at Penn and Princeton Graduate Student Symposium.” Penn hosted the event last November, which featured conference-type talks and symposia by graduate students from the two institutions.

M.D. programs: CCN faculty members play a key role in teaching medical students about the neural bases of cognition through guest lectures, rounds and supervision, as well as Dr. Detre’s course on functional neuroimaging, BMB/BE 581. Cognitive neurology is the most frequently specified interest among the top applicants to Penn’s residency program in neurology, and recent graduates of this program have gone on to top fellowships and faculty positions.

NONDEGREE EDUCATION

Undergraduate Summer Workshop in Cognitive Science and Cognitive Neuroscience. A joint program with IRCS, each June we bring 20-30 top students from colleges across the country to attend a two-week intensive residential course at Penn. We are currently teaching the 9th such workshop.

Cognitive Neuroscience Talk Series. We hold a monthly lunchtime talk series that is well attended by people from throughout the University.

Brain and Language Talk Series, another biweekly talk series, co-hosted with IRCS.

Neuroethics Lecture Series. A monthly speaker series featuring outside speakers.

Cognitive Neurology Rounds. Drs. Chatterjee and Coslett conduct biweekly Cognitive Neurology Rounds for residents and students at HUP.

V. Funding

Although basic science is harder to support these days than previously, the CCN is continuing to expand its funding base. Appendix II lists the current grants held by CCN faculty and shows the amount in each grant for the current grant year. Counting the no-cost extensions, our total grant funding for this year is almost \$10 million.

VI. Looking forward

Since its inception in 1999 the CCN has grown and flourished. We are excelling in our individual careers, interacting fruitfully with each other, and training the next generation of cognitive neuroscientists. In addition, we collaborate actively with a number of other organizations on campus, and our work brings benefits to our home departments of Psychology and Neurology.

In order to continue, we need more and better located space, specifically space in which the SAS and SoM faculty can be contiguous. As should be clear from this report, we are an unusually communal and collaborative group of researchers, and this has tangible benefits. These benefits include improved interdisciplinary science resulting from intensive interaction between those with primary expertise in neuroscience and those with primary expertise in cognitive science, a more interdisciplinary and intellectually supportive environment for graduate students, post docs, and undergraduate research students, and the economies of scale made possible with shared facilities and resources.

In the early years of the CCN the faculty, as well as many of their students and staff, had offices at 3810 Walnut Street. Unfortunately we have long since outgrown this space and are now split among 3 locations. Our current fragmentation is slowly but surely eroding the patterns of cooperation and collaboration that have made the CCN what it is today. We are encouraged by the recent progress in identifying space for us in the Goddard and Richards buildings, but note that much remains to be accomplished in terms of allocating sufficient space and preparing it for occupancy.

Appendix I. Refereed Articles

1. **Aguirre, GK** (2007). Continuous carry-over designs for fMRI. *Neuroimage*, 35: 1480-1494.
2. **Aguirre GK**, Komáromy AM, Cideciyan AV, Brainard DH, Alemán TS, Roman AJ, Avants BB, Gee JC, Korczykowski M, Hauswirth WW, Acland GM, Aguirre GD, & Jacobson SG (in press). Visual Cortex Intact and Responsive Despite Early Retinal Blindness from RPE65 Mutation. *PLOS-Medicine*.
3. Ances BM, Roc AC, Wang J, Korczykowski M, Okawa J, Stern J, Kim J, Wolf R, Lawler K, Kolson DL, & **Detre JA** (2006). Caudate blood flow and volume are reduced in HIV+ neurocognitively impaired patients. *Neurology*, 66: 862-6.
4. Ash S, Moore P, Antani S, McCawley G, Work M, & **Grossman M** (2006). Trying to tell a tale: Discourse impairments in progressive aphasia and frontotemporal dementia. *Neurology*, 66: 1405-1413.
5. Barde LHF, Schwartz MF, & **Thompson-Schill SL** (2006). The role of left inferior frontal gyrus (LIFG) in semantic short-term memory: A comparison of two case studies. *Brain and Language*, 99: 71-72. [Winner of prize for Best Student Paper by the Academy of Aphasia.]
6. Barrett AM, Buxbaum L, **Coslett HB**, Heilman KM, Hillis, AE, & Milberg W (2006). Cognitive Rehabilitation Interventions for Neglect and Related Disorders: Moving from Bench to Bedside in Stroke Patients. *Journal of Cognitive Neuroscience*, 18: 1223-1236.
7. Bedny M & **Thompson-Schill SL** (2006). Neuroanatomically separable effects of imageability and grammatical class during single word comprehension. *Brain and Language*, 98: 127-139.
8. Bedny M, **Aguirre GK**, & **Thompson-Schill SL** (2007). Item analysis in functional magnetic resonance imaging. *NeuroImage*, 35: 1093-1102.
9. Bedny M, Hulbert JC, & **Thompson-Schill SL** (2007). Understanding words in context: The role of Broca's area in word comprehension. *Brain Research*, 1146: 101-114.
10. Biran I, Giovannetti T, Buxbaum LJ, & **Chatterjee A** (2006). The alien hand syndrome: what makes the alien hand alien? *Cognitive Neuropsychology*, 23: 563-582.
11. Bishop SJ, Cohen JD, Fossella J, Casey BJ & **Farah MJ** (2006). COMT genotype influences prefrontal response to emotional distraction. *Cognitive, Affective and Behavioral Neuroscience*, 6(1): 62-70.

12. Bozoki A, Smith EE, & **Grossman M** (2006). Implicit categorization in Alzheimer's disease. *Neuropsychologia*, 44: 816-827.
13. Burnett MG, Shimazu T, Szabados T, Muramatsu H, **Detre JA**, & Greenberg JH (2006). Electrical forepaw stimulation during reversible forebrain ischemia decreases infarct volume. *Stroke*, 37: 1327-31.
14. Buxbaum, LJ, Kyle KM, Tang K, & **Detre JA** (2006). Neural substrates of knowledge of hand postures for object grasping and functional object use: evidence from fMRI. *Brain Research*, 1117: 175-85.
15. Buxbaum LJ, Kyle K, Grossman M, **Coslett HB** (in press). Left inferior parietal representations for skilled hand-object interactions: Evidence from stroke and corticobasal degeneration. *Cortex*.
16. Buxbaum LJ, Palermo M, Mastrogiovanni D, Schmidt M, Rosenberg-Pitonyak E, Jax SA, **Coslett HB** (in press). Assessment of spatial attention and neglect with a virtual wheelchair navigation task. *Journal of Cognitive and Experimental Neuropsychology*.
17. **Chatterjee A**, Amorapanth PX, & Hamilton RH (2006). Art produced by a patient with Parkinson's Disease. *Behavioral Neurology*, 17: 105-108.
18. **Chatterjee A** (2007). Cosmetic neurology and cosmetic surgery: parallels, predictions and challenges. *Cambridge Quarterly of Healthcare Ethics*, 16: 129-137.
19. **Chatterjee A** (2006). The neuropsychology of visual art: Conferring capacity. The Neurobiology of Painting. Rose, C. (eds.). *Academic Press*: 39-49.
20. **Chatterjee A** (2006). The promise and predicament of cosmetic neurology. *Journal of Medical Ethics*, 32: 110-113.
21. Chepenik LG, Cornew LA, & **Farah MJ** (accepted pending minor revision). The influence of sad mood on cognition. *Emotion*.
22. Clark R & **Grossman M** (in press). Number sense and quantifier comprehension. *Topos*.
23. Clark R, McMillan C, & **Grossman M** (in press). Reply to: A note on some neuroimaging study of natural language quantifier comprehension. *Neuropsychologia*.
24. Connolly A., Gleitman LR, & **Thompson-Schill SL** (in press). A colorless cornucopia: The effect of congenital blindness on the semantic representation of fruits and vegetables and household items. *Proceedings of the National Academy of Science*.

25. Cooke A, **Grossman M**, DeVita C, Gonzalez-Atavales J, Moore P, Chen W, Gee J & **Detre J** (2006). Large-scale neural network for sentence processing. *Brain Language*, 96: 14-36.
26. Cosentino S, Chute D, Libon D, Moore P, & **Grossman M** (2006). How does the brain represent scripts?: A study of executive processes and semantic knowledge in dementia. *Neuropsychology*, 20: 307-318.
27. Cosentino S, Chute D, Libon D, Moore P, & **Grossman M** (2006). How does the brain represent scripts?: A study of executive processes and semantic knowledge in dementia. *Neuropsychology*, 20: 307-318.
28. **Coslett HB** & Lie E (in press). Simultanagnosia: When a rose is not red". *Journal of Cognitive Neuroscience*.
29. Davis O, Rizzuto D, Geller AS, & **Kahana MJ** (2007). Temporal associative processes revealed by intrusions in paired-associate recall. Accepted pending revisions at *Psychonomic Bulletin & Review*.
30. **Detre JA** (2006). Clinical applicability of functional MRI. *Journal of Magnetic Resonance Imaging*, 23: 808-815.
31. Dolcos F, Miller B, **Jha AP**, & McCarthy G (in press). Regional Brain Differences in the Effect of Distraction During the Delay Interval of a Working Memory Task. *Brain Research*.
32. Dove A, Manly T, **Epstein R**, & Owen AM (in press). The engagement of mid-ventrolateral prefrontal cortex and posterior brain regions in intentional cognitive activity. *Human Brain Mapping*.
33. Ekstrom A, Viskontas I, **Kahana MJ**, Jacobs J, Upchurch K, Bookheimer S, & Fried I (2007). Complementary Roles of Neurons and Local Field Potentials During Human Spatial Learning and Retrieval. *Hippocampus*.
34. Ellenbogen JM, Hulbert JC, Stickgold R, Dinges DF, & **Thompson-Schill SL** (2006). Interfering with theories of sleep and memory: Sleep, declarative memory and associative interference. *Current Biology*, 16: 1290-1294.
35. **Epstein RA** & Higgins JS (2006). Differential parahippocampal and retrosplenial involvement in three types of visual scene recognition. *Cerebral Cortex*, published online (doi: 10.1093/cercor/bhl079).
36. **Epstein RA**, Higgins JS, Jablonski K, & Feiler A (in press). Visual scene processing in familiar and unfamiliar environments. *Journal of Neurophysiology*.

37. **Epstein RA**, Higgins JS, Parker W, Aguirre GK & Cooperman S (2006). Cortical correlates of face and scene inversion: A comparison. *Neuropsychologia*, 44: 1145-1158.
38. Eslinger PJ, Moore P, Antani S, Troiani V, & **Grossman M** (in press). Oops! Resolving social dilemmas in frontotemporal dementia. *Journal of Neurology, Neurosurgery, and Psychiatry*.
39. Ezzyat Y & **Olson IR** (accepted, pending revisions, 2007). The medial temporal lobe and visual working memory. *Cognitive, Affective, and Behavioral Neuroscience*.
40. **Farah MJ** & Heberlein AS (2007). Personhood and neuroscience: Naturalizing or nihilating? *American Journal of Bioethics – Neuroscience*. (Target Article) 7: 37-48.
41. **Farah MJ**, Shera DM, Savage JH, Betancourt L, Giannetta JM, Brodsky NL, Malmud EK & Hurt H (2006). Childhood poverty: Specific associations with neurocognitive development. *Brain Research*, 1110: 166-174.
42. Fellows LK & **Farah MJ** (in press). The role of ventromedial prefrontal cortex in decision making: Judgment under uncertainty, or judgment per se? *Cerebral Cortex*.
43. Fernandez-Seara MA, Techawiboonwong A, **Detre JA**, & Wehrli FW (2006). MR susceptometry for measuring global brain oxygen extraction. *Magnetic Resonance Medicine*, 55: 967-73.
44. Ford S, **Farah MJ**, Shera D, & Hurt H (in press). Neurocognitive Correlates of Problem Behavior in Environmentally At-Risk Adolescents. *Journal of Developmental and Behavioral Pediatrics*.
45. Forman MS, Farmer J, Johnson JK, Clark CM, Arnold SA, **Coslett HB**, **Chatterjee A**, Hurtig HI, Karlawash JH, Rosen HJ, Van Deerlin V, Lee, VMY, Miller BL, Trojanowski JQ, **Grossman M** (2006). Frontotemporal dementia: clinicopathological correlations. *Annals of Neurology*, 59(6): 952-962.
46. Gillihan S, Kessler J, & **Farah MJ** (in press). Memories Affect Mood: Evidence From Covert Experimental Assignment to Positive, Neutral, and Negative Memory Recall. *Acta Psychologica*.
47. Gillihan SJ, **Farah MJ**, Sankoorikal GMV, Breland J, & Brodtkin ES (in press). Association between serotonin transporter genotype and extraversion. *Psychiatric Genetics*.
48. **Grossman M**, Libon DJ, Forman MS, Massimo L, Wood E, Moore P, Anderson C, Farmer J, **Chatterjee A**, Clark CM, **Coslett HB**, Hurtig HI, Lee VM-Y, & Trojanowski JQ (in press). Distinct antemortem profiles in pathologically-defined patients with fronto temporal dementia. *Archives of Neurology*.

49. **Grossman M**, Koenig P, Kounios J, McMillan C, Work M, & Moore P (2006). Category-specific effects in semantic memory: Category-task interactions suggested by fMRI. *NeuroImage*, 30: 1003-1009.
50. **Grossman M**, Murray R, Koenig P, Ash S, Troiani V, Cross K, & Moore P (in press). Verb acquisition and representation in Alzheimer's disease. *Neuropsychologia*.
51. **Grossman M**, Troiani V, Koenig P, Work M, & Moore P (2007). How necessary area the stripes of a tiger? Diagnostic and characteristic features in an fMRI study of word meaning. *Neuropsychologia*, 45: 1055-1064.
52. **Grossman M**, Wood EM, Moore P, Neumann M, Kwong L, Forman MS, Clark CM, McCluskey LF, Miller BL, Lee VM-Y, & Trojanowski J.Q (in press). TDP-43 pathology and clinical phenotype in frontotemporal lobar degeneration with ubiquitin inclusions. *Archives of Neurology*.
53. Halpern C, Clark R, Moore P, Cross K, & **Grossman M** (in press). Too much to count on: Impaired very small numbers in corticobasal degeneration. *Brain and Cognition*.
54. Hamilton RH, Shenton JT, & **Coslett HB** (2006). An acquired deficit of audiovisual speech processing. *Brain and Language*, 98: 66-73.
55. Harris A, & **Aguirre GK** (in press). The Representation of Parts and Wholes in Face-Selective Cortex. *Journal of Cognitive Neuroscience*.
56. Hirshorn EA & **Thompson-Schill SL** (2006). Role of the left inferior frontal gyrus in covert word retrieval: Neural correlates of switching during verbal fluency. *Neuropsychologia*, 44: 2547-2557.
57. Hon N, **Epstein RA**, Owen AM, & Duncan J (2006). Frontoparietal activity with minimal decision and control. *Journal of Neuroscience*, 26: 9805-9809.
58. Howard MW, Venkatadass V, Norman KA, & **Kahana MJ** (2007). Associative Processes in Immediate Recency. *Memory & Cognition*.
59. Howard MW, Wingfield A, & **Kahana MJ** (2006). Aging and contextual binding: modeling recency and lag-recency with the Temporal Context Model. *Psychonomic Bulletin & Review*, 13: 439-445.
60. Hurt H, Giannetta JM, Korczyowski M, Hoang A, Betancourt L, Brodsky NL, Shera DM, **Farah MJ**, & **Detre JA** (in press). Functional magnetic resonance imaging and working memory in adolescents with gestational cocaine exposure. *Journal of Pediatrics*.

61. Jacobs J, Hwang G, Curran T, & **Kahana MJ** (2006). EEG oscillations and recognition memory: Theta correlates of memory retrieval and decision making. *NeuroImage*, 32: 978-987.
62. Jacobs J, **Kahana MJ**, Ekstrom AD, & Fried I (2007). Brain oscillations synchronize single-neuron activity in humans. *Journal of Neuroscience*, 27: 3839-3844.
63. Jacobson SG, Aleman TS, Cideciyan AV, Khanna H, Sumaroka A, **Aguirre GK**, Schwartz SB, Windsor EAM, He S, Chang B, Stone, EM, & Swaroop, A (in press). Ciliary-centrosomal gene CEP290/NPHP6 mutations cause early retinal rod death and laminopathy but spare foveal cones and visual brain. *Human Mutation*.
64. Jefferson AL, Glosser G, **Detre JA**, Sinson G, & Liebeskind DS (2006). Neuropsychological and perfusion MR imaging correlates of revascularization in a case of moyamoya syndrome. *American Journal of Neuroradiology*, 27: 98-100.
65. **Jha AP**, Giuliani N, & Ranucci MR (2006). Organization of Mnemonic and Response Functions in Prefrontal Cortex. *Brain Research*, 2(39).
66. **Jha AP**, Klein R, Krompinger J, & Baime MJ (in press). The Effects of Mindfulness Training on Attentional Subsystems. *Cognitive Affective and Behavioral Neuroscience*.
67. Jones CE, Wolf RL, **Detre JA**, Das B, Saha PK, Wang J, Zhang Y, Song HK, Wright AC, Mohler EM, Fairman 3r, Zager EL, Velazquez OC, Golden MA, Carpenter JP & Wehrli FW (2006). Structural MRI of carotid artery atherosclerotic lesion burden and characterization of hemispheric cerebral blood flow before and after carotid endarterectomy. *NMR in Biomedicine*, 19: 198-208.
68. Kable J & **Chatterjee A** (2006). The specificity of action representations in lateral occipitotemporal cortex. *Journal of Cognitive Neuroscience*, 18: 1498-1517.
69. **Kahana MJ** (2006). The cognitive correlates of human brain oscillations. *Journal of Neuroscience*, 26: 1669-1672.
70. **Kahana MJ**, Zhou F, Geller A, & Sekuler R (2007). Lure-similarity affects visual episodic recognition: Detailed tests of a noisy exemplar model. *Memory & Cognition*.
71. Kan IP, Biran I, **Thompson-Schill SL**, & **Chatterjee A** (2006). Letter selection and letter assembly in acquired dysgraphia. *Cognitive and Behavioral Neurology*, 19: 225-236.
72. Kan IP, Kable JW, Van Scoyoc A, **Chatterjee A**, & **Thompson-Schill SL** (2006). Fractionating the left frontal response to tools: dissociable effects of motor experience and lexical competition. *Journal of Cognitive Neuroscience*, 18: 267-277.

73. Kim J, Whyte J, Wang J, Rao H, Tang KZ, & **Detre JA** (2006). Continuous ASL perfusion fMRI investigation of higher cognition: Quantification of tonic CBF changes during sustained attention and working memory tasks. *NeuroImage*.
74. Kimball DR, Smith TA & **Kahana MJ** (2007). Modeling false recall: Beyond a simple associative model. *Psychological Review*.
75. Kimberg DY, **Coslett HB**, & Schwartz MF (in press). Power in Voxel-Based Lesion Mapping. *Journal of Cognitive Neuroscience*.
76. Koenig P, Moore P, Glosser G, Smith EE, & **Grossman M** (in press). Categorization of novel animals by patients with Alzheimer's disease and corticobasal degeneration. *Neuropsychology*.
77. Koenig PL, Smith EE, **Grossman M** (2006). Semantic categorization of novel objects in frontotemporal dementia. *Cognitive Neuropsychology*, 23: 541-562.
78. Lamar M, Price CC, Libon DJ, Penney DL, Kaplan E, **Grossman M**, & Heilman KM (2006). Alterations in working memory as a function of leukoaraiosis in dementia. *Neuropsychologia*, 45: 245-254.
79. Libon DJ, Price CC, Heilman KM, & **Grossman M** (2006). Alzheimer's "other dementia." *Cognitive and Behavioral Neurology*, 19: 112-116.
80. Libon DJ, Xie SX, Moore P, Farmer J, Antani S, McCawley G, Cross K, **Grossman M** (2007). Patterns of neuropsychological impairment in frontotemporal dementia. *Neurology*, 68: 369-375.
81. Lippa CF, Duda JE, Grossman M, Hurtig HI, Aarsland D, Boeve BF, Brooks DJ, Dickson DW, Dubois B, Emre M, Fahn S, Farmer JM, Galasko D, Galvin JE, Goetz CG, Growdon JH, Gwinn-Hardy KA, Hardy J, Heutink P, Iwatsubo T, Kosaka K, Lee VM-Y, Leverenz JB, Masliah E, McKeith IG, Nussbaum RL, Olanow CW, Ravina BM, Singleton AB, Tanner CM, Trojanowski JQ, Wszolek ZK, for the DLB/PDD working Group (2007). DLB and PDD Boundary Issues: Diagnosis, Treatment, Molecular Pathology, and Biomarkers. *Neurology*, 68: 812-819.
82. McCrae SM, Buxbaum LJ, & **Coslett HB** (2006). Illusory conjunctions in simultanagnosia. Course coding of visual feature location? *Neuropsychologia*, 44: 1724-1736.
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Appendix II: Current Grants

PI / Role on Project	Grant	Title	Start Date	End Date	Directs	Indirects	Total
PI: Geoffrey K. Aguirre, M.D., Ph.D.	NIH 1-K08-MH72926	fMRI of neural information processing of face perception	1/1/2007	12/31/2007	\$167,995	\$13,440	\$181,435
PI: Geoffrey K. Aguirre, M.D., Ph.D.	Burroughs-Wellcome Career Development Award	fMRI of neural information processing of face perception	9/1/2006	8/31/2007	\$128,000	\$0	\$128,000
PI: Geoffrey K. Aguirre, M.D., Ph.D.	Dana Foundation--Brain and Immuno-Imaging Program	Perceptual learning and consolidation studied with perfusion fMRI	1/1/2007	12/31/2007	\$33,330	\$0	\$33,330
PI: Anjan Chatterjee, M.D.	NIH-NIDCD, R01 DC04817	Concepts and Language	8/1/2006	7/31/2007	\$222,154	\$116,964	\$339,118
PI: Anjan Chatterjee, M.D.	NIH-HD, R01 HD050199	Spatial Language Developmental and Neural Studies	8/1/2006	7/31/2007	\$174,270	\$70,259	\$244,529
PI: H. Branch Coslett, M.D.	NIH 1-R01-NS046049	Motor Imagery as a Measure of Pain Severity	2/1/2007	1/31/2008	\$131,560	\$76,963	\$208,523
PI: H. Branch Coslett, M.D.	NIH 1-R01-NS08130	The Cognitive Neuroscience of Body Knowledge	6/1/2006	5/31/2007	\$204,127	\$104,789	\$308,916
PI: H. Branch Coslett, M.D.	R01MH076227-01	Cognitive Neuroscience of Temporal Processing	7/1/2006	6/30/2007	\$225,000	\$122,829	\$347,829
Subcontract: H. Branch Coslett, M.D. (PI: Myrna Schwartz, Ph.D.)	R01DC000191-25	Psycholinguistic Analysis of Aphasic Syndromes	9/1/2006	8/31/2007	\$90,013	\$53,018	\$143,031
Subcontract (Penn): H. Branch Coslett, M.D. (PI: M. Naeser)	R01DC005672-05	Transcranial Magnetic Stimulation to Improve Aphasia	4/1/2006	3/31/2008	\$78,150	\$44,838	\$122,988
PI: John A. Detre, M.D.	NIH R01 DA015149-03	Perfusion fMRI in Cocaine Addiction	9/1/2005	8/31/2007	\$250,000	\$146,250	\$396,250
PI: John A. Detre, M.D.	NSF BCS 0224007	Perfusion fMRI for Cognitive Neuroscience	9/1/2005	8/31/2007	\$157,544	\$92,163	\$249,707
PI: John A. Detre, M.D.	NIH P30 NS045839	Neuroscience Neuroimaging Center	6/1/2006	5/31/2007	\$347,421	\$203,241	\$550,662
PI of Core: John A. Detre, M.D. (PI of parent grant: John Whyte, M.D.)	NIH/NICHD R24 HD050836	Functional Neuroimaging Core, Research Methods for Cognitive Rehabilitation	8/1/2006	7/31/2007	\$142,125	\$81,011	\$223,136
PI: Russell A. Epstein, Ph.D.	Whitehall Foundation, Inc. 2004-05-99-APL	Place Learning in the Human Cortex	6/1/2006	5/31/2007	\$67,125	\$6,875	\$74,000
PI: Russell A. Epstein, Ph.D.	NIH 1-RO1-EY-016464-02	Place Representations in the Human Visual System	3/1/2007	2/28/2008	\$218,475	\$125,259	\$343,734

Appendix II: Current Grants

PI / Role on Project	Grant	Title	Start Date	End Date	Directs	Indirects	Total
PI: Russell A. Epstein, Ph.D.	Temple University	Spatial Intelligence and Learning Center	10/1/2006	9/30/2007	\$61,703	\$35,170	\$96,873
PI: Martha J. Farah, Ph.D.	Department of the NAVY	Performance Enhancement with Stimulants: Individual Differences and Neurocognitive Mechanisms	11/1/2006	10/31/2009	\$195,694	\$111,545	\$307,239
PI of subcontract: Martha J. Farah, Ph.D. (PI of parent grant: Hallam Hurt, M.D.)	NIH 1-R01-DA018913 CHOP Subcontract	Adolescent Drug Use: Exploring Neurocognitive Precursors	9/1/2006	8/31/2007	\$37,468	\$21,388	\$58,856
PI: Martha J. Farah, Ph.D.	NIH 5-R01-HD043078-03 * Minority Supplement	Poverty and the Brain: A Cognitive Neuroscience Analysis	6/1/2006 *	5/31/2007 5/31/2006	\$191,004 \$77,226	\$54,107 \$45,177	\$245,111 \$122,403
PI: Martha J. Farah, Ph.D.	NIH 5-R21-DA015856	Normal Impulsivity: A Cognitive Neuroscience Analysis	7/1/2005	6/30/2007	\$100,000	\$58,500	\$158,500
PI: Martha J. Farah, Ph.D.	Dana Foundation	Coordinator for Neuroethics Society	12/1/2006	11/30/2007	\$25,000	\$0	\$25,000
PI: Martha J. Farah, Ph.D.	John Templeton Foundation	Neuroethics: Ethical, Social and Spiritual Perspectives	1/1/2006	12/31/2007	\$10,500	\$0	\$10,500
PI: Martha J. Farah, Ph.D. Seth Gillihan Fellowship	NIH 1-F31-MH073363	Serotonin Transporter Genotype and Mood Regulation	9/1/2006	8/31/2007	\$29,163	\$0	\$29,163
PI: Murray Grossman,	AG15116	Conceptual Processing in Alzheimer's disease	5/1/2007	4/30/2008	\$229,934	\$105,350	\$335,284
PI: Murray Grossman,	NS035867	Cognitive deficits in Parkinson's disease and aging	5/1/2006	4/30/2007	\$231,919	\$135,673	\$367,592
PI: Murray Grossman,	NS44266	Neural basis for generalized quantifiers	5/1/2006	4/30/2007	\$496,983	\$274,279	\$771,262
PI: Murray Grossman,	DC010924	Lexical retrieval verbal short-term memory and learning	12/1/2006	11/30/2007	\$90,311	\$51,478	\$141,789
PI: Murray Grossman,	AG017586	Frontotemporal dementias: genotypes and phenotypes	3/1/2007	2/28/2008	\$207,724	\$118,402	\$326,126
PI: Amishi Jha Ph.D.	NIH R21 AT002761	Neural Effects of Mindfulness Training on Attention	9/1/2006	8/31/2007	\$125,000	\$71,354	\$196,354
PI: Amishi Jha Ph.D.	Mind and Life Institute	Neural Effects of Mindfulness Meditation training on working memory	5/1/2006	4/30/2007	\$10,000	\$0	\$10,000
PI: Amishi Jha Ph.D. -co PI w/ Michael baime	Indiana State University	Mindfulness Meditation:Regulating Eating and Obesity	9/29/2005	6/30/2007	\$100,147	\$57,084	\$157,231
PI: Amishi Jha Ph.D.	Kessler Fund Trust	Neurocognitive Effects if mindfulness based attention training	4/1/2007	3/31/2008	\$10,000	\$0	\$10,000

Appendix II: Current Grants

PI / Role on Project	Grant	Title	Start Date	End Date	Directs	Indirects	Total
PI: Michael J. Kahana, Ph.D. CARRYOVER from 5-RO1-MH55687-11	NIH 5-RO1-MH055687-12	Associative Processes in Episodic Memory	2/1/2007	1/31/2008	\$174,000	\$93,654	\$267,654
					\$25,963	\$14,799	\$40,762
					<u>\$199,963</u>	<u>\$108,453</u>	<u>\$308,416</u>
PI: Michael J. Kahana, Ph.D. One year no-cost extension 12/1/06-11/30/07	NIH 5-RO1-MH061975-06	Intracranial Recordings Reveal Task Dependent Theta	12/1/2005	11/30/2007	\$219,713	\$92,657	\$312,370
PI: Michael J. Kahana, Ph.D. Penn is subcontract to Boston University Originating sponsor is NSF	CG 187434NGA-03	Strategic and Implementation Plan for Celest: Center for Excellence for Learning	10/1/2006	9/30/2007	\$90,564	\$51,698	\$142,262
PI: Michael J. Kahana, Ph.D. Penn is subcontract to Princeton University Originating sponsor is NIH	MH062196 AMEND # 1	Project 3: Retrieval Dynamics in Item and Source Memory	9/1/2006	8/31/2007	\$98,502	\$56,146	\$154,648
PI: Michael J. Kahana, Ph.D.	Mind and Life institute	Mathematical Modeling of Acute Effects of Meditation on Cognition	2/1/2007	7/30/2008	\$10,000	\$0	\$10,000
PI: Daniel Y. Kimberg, Ph.D.	NIH R01-DA014418	A Flexible Architecture for Neuroimaging Data	5/1/2005	4/30/2007	\$225,000	\$131,625	\$356,625
			No Cost Extension				
PI: Daniel Y. Kimberg, Ph.D.	NIH 1-R01-MH073529-01	Database System for Patient-Based Neuroscience Research	6/1/2006	5/31/2007	\$195,300	\$111,321	\$306,621
PI: Ingrid Olson, Ph.D.	NIH 5-R01-MH071615	Brain and Behavior of Visual Expectations	1/1/2007	12/31/2007	\$151,709	\$88,750	\$240,459
PI: Sharon L. Thompson-Schill, Ph.D.	NIH 1-R01-MH067008	Linguistic and Nonlinguistic Functions of Frontal Cortex	12/1/2006	11/30/2007	\$219,713	\$97,158	\$316,871
PI: Sharon L. Thompson-Schill, Ph.D.	NIH 1-RO1-MH070850	Visual Knowledge of Objects	8/5/2006	7/31/2007	\$224,168	\$120,942	\$345,110
PI: Sharon L. Thompson-Schill, Ph.D.	1 F32HD051364	The Organization of Semantic Memory	3/1/2007	2/28/2008	\$45,976		\$45,976
Eiling Yee NRSA Fellowship							
T O T A L:					\$6,547,673	\$3,256,156	\$9,803,829