July 14, 2009

Michael J. Kahana, Ph.D.

Address

Department of Psychology
University of Pennsylvania
Suite 302C, 3401Walnut Street
Philadelphia, PA 19104
Lab: (215) 746-3500, Office: (215) 746-3501, Fax: (215)-746-6848
e-mail: kahana@sas.upenn.edu
website: http://memory.psych.upenn.edu

Personal

Born: May 7, 1969, St. Louis, MO
Citizenship: USA Married to Jessica A. Wachter, Ph.D.
Children:
Nathan Abraham, April 26, 2006
Joseph Morris, February 29, 2008

Professional

- 2004 — present, Professor, Department of Psychology, University of Pennsylvania
- 2000 — 2004, Associate Professor, Department of Psychology and Center for Complex Systems, Brandeis University.
- 1994 — 2000, Assistant Professor, Department of Psychology and National Center for Complex Systems, Brandeis University

Education

- 1989 B. A., Case Western Reserve University.
- 1993 Ph.D., University of Toronto (Psychology); (Ph.D. Thesis: *Interactions between item, associative, and serial order information*, B. B. Murdock, chair).
- 1993–1994 Postdoctoral Fellow, Harvard University (Psychology). Individual National Research Service Award (N.I.H. Grant NS09559, Sponsor: W. K. Estes)

Honors, Awards, Professional Activities

- Director of graduate studies, Psychology Graduate Group, University of Pennsylvania
- Chair of the 2010 meeting of the *Society of Experimental Psychologists*
- Fellow, *Society of Experimental Psychologists*, 2008 –
- Member, BBBP-4 (Cognition and Perception) study section, *Centers for Scientific Review, National Institutes of Health*, 2003–2007
- Associate Editor: *Cognitive Psychology*, 2005 –

- Associate Editor: *Memory & Cognition*, 2001 – 2005
- Consulting Editor: *Journal of Experimental Psychology: General*, 2008 –
- Consulting Editor: *Psychonomic Bulletin & Review*, 2005 – 2007.
- Consulting Editor: *Memory & Cognition*, 1997 – 2001.
- Consulting Editor: *Journal of Experimental Psychology: Learning, Memory and Cognition*, 1999 – 2001.
- Ad Hoc Reviewer: Brain, Cerebral Cortex, Cognitive Psychology, Hippocampus, IEEE transactions on neural networks, Intelligence, Journal of Gerontology: Psychological Sciences, Journal of Neuroscience, Journal of Neurophysiology, Journal of Memory and Language, Journal of Experimental Psychology: General, Neuron, Neuroscience, Neuropsychologia, Perception & Psychophysics, Pscyhophysiology, Psychological Review, Psychological Science, Psychology and Aging, Psychonomic Bulletin & Review, Quarterly Journal of Experimental Psychology, Science, Trends in Cognitive Science, Journal of Cognitive Neuroscience, Neuroimage, Nature Reviews Neuroscience
- Member, Advisory Panel. N.I.H. Silvio O. Conte Center for Neuroscience Research: Cognitive and Neural Mechanisms of Conflict and Control (Princeton University).
- Member, Advisory Panel. Doris Duke Charitable Foundation
- N.S.F. / N.I.H. panel "Collaborative Research in Computational Neuroscience", 2002
- Bernstein Fellow, Brandeis University, 1998-1999
- N.I.M.H. First Award, 1996
- Featured Alumnus: Centennial Celebration of the University of Toronto Graduate Program in Psychology, 1997
- Plenary address at the 40th Annual Meeting of the Society for Mathematical Psychology, Irvine, CA, 2007
- Organizer of 39th Annual Meeting of the Society for Mathematical Psychology, 2006
- Founder and Organizer of the 1st, 2nd, 3rd, and 5th Annual Meetings of the Context and Episodic Memory Symposium.
- Plenary address at the Computational Cognitive Neuroscience Conference, Houston, 2006
- Invited symposium at the Society for Neuroscience, Washington, D.C., 2005
- Invited address at the American Psychological Society, Chicago, 2004
- **Invited Colloquia:** Albert Einstein College of Medicine, Albert Ludwigs Universitat (Freiburg), Carnegie Mellon University, Boston University, Brown University, California Institute of Technology, Columbia University, Courant Institute, Dartmouth College, Harvard University, Indiana University, Johns Hopkins University, Max Planck Institute-Berlin, New York University, Northwestern University, Ohio State University, Princeton University, Salk Institute, Shriver Center, Syracuse University, Thomas Jefferson University, Tufts University, Donders Institute, Nijmejen, Netherlands, Stanford University, University of Delaware, University of Massechusetts at Amherst, University of Toronto (2), U.C. Irvine, U.C. San Diego, U.C.L.A. School of Medicine, U.C.L.A Psychology, U.C. Davis, Williams College, Yale University
- **Professional Society Memberships:** Psychonomic Society, Society for Neuroscience, Memory Disorders Research Society, Society for Cognitive Neuroscience, Society for Mathematical Psychology

Current Grant Support

- Dana Foundation Grant entitled *Intracranial EEG for Theta Rhythm Contingency During Cognitive Tasks.* Dec, 2007 – Nov, 2010.
- NIH Grant 3RO1 MH55687 *Associative Processes in Episodic Memory.* M. J. Kahana, P.I. February 1, 2007 – Jan 30, 2011.
- NIH Grant 2RO1 MH61975 *Electrophysiology of Spatial Cognition..* M. J. Kahana, P.I. 2008 – 2012.
- P50 MH062196. Subproject on Conte Center Grant *Retrieval Dynamics in Item and Source Memory.*
- NSF grant SBE 0354378 Subproject 14 on Science of Learning Center Grant *CELEST: A Center for Learning in Education, Science, and Technology.* S. Grossberg P.I.
- Computational Neuroscience Training Grant, M. J. Kahana P.I.
- NIH Grant 2R01 MH68404 *Short Term Visual Episodic Recognition Memory*, R. Sekuler, P.I., M. J. Kahana, Co-P.I.. June 6 2009 - June 5, 2011.

Completed Grant Support

- NIH Grant R01 MH68404 *Short Term Visual Episodic Recognition Memory*, R. Sekuler, P.I., M. J. Kahana, Co-P.I.. April 1 2004 - March 31, 2009.
- Swartz Foundation Grant 2004/10-04 *Electrophysiology of Human Memory Formation.* M. J. Kahana P.I. Nov 28, 2003 – Nov 27, 2004.
- NIH Grant 2RO1 MH55687 *Associative Processes in Episodic Memory.* M. J. Kahana, P.I. April 1, 2002 – Jan 30, 2007.
- NIH Grant R29 MH55687 *Mathematical Models of Human Memory.* M. J. Kahana, P.I., April 1, 1997 – March 30, 2002.
- NIH Grant RO1 MH61975 *Using intracranial recordings to study task-dependent theta..* M. J. Kahana, P.I. Dec 12, 2001 – Dec 11, 2006.
- AFOSR Grant F49620-03-1-0376 *Model driven study of visual memory.* R. Sekuler, P.I., M. J. Kahana, Co-P.I.. July 1, 2003 – December 31, 2003.
- NIH Grant R01 AG15852 *Aging and the temporal dynamics of self-initiated recall* A. Wingfield, P.I., M. J. Kahana, Co-P.I. August 1, 1998 – July 30, 2003.

Postdoctoral Supervision

- Dan Kimball, J.D., Ph.D. (Postdoc, 2002 – 2003), Morris Associate Professor, Department of Psychology, *University of Oklahoma.*
- Sean Polyn, Ph.D. (Postdoc, 2005 – 2008), Assistant Professor, Psychology, *Vanderbilt University.*
- Kareem Zaghloul, M.D. Ph.D. (Postdoc, 2007 – 2008). Chief Resident, Department of Neurosurgery, University of Pennsylvania
- Christoph Weidemann, Ph.D. (Postdoc, 2006 –).Assistant Professor, Psychology, *University of Aberdeen*

Doctoral Supervision

- Marc W. Howard, Ph.D. (1995 – 2000). Associate Professor, Psychology, *Syracuse University*. Thesis Title: *Temporal Context in Free Recall*
- Jeremy B. Caplan, Ph.D. (1997 – 2002). Assistant Professor, Psychology, *University of Alberta*. Thesis Title: *Serial and navigational learning: behavior, theory and the roles of theta oscillations*.
- Daniel S. Rizzuto, Ph.D. (1997 – 2002). Project manager for the neural prosthetics group at the *California Institute of Technology*. Thesis Title: *The computational and electrophysiological foundation of item and associative memory*.
- Arne D. Ekstrom, Ph.D. (2001 – 2004). Assistant Professor, Psychology and Neuroscience, *University of California, Davis*. Thesis Title: *The Cellular Networks Underlying Human Spatial Navigation*.
- Kelly Addis, Ph.D. (2000 – 2004). Postdoctoral Fellow, Mathematical Psychology, Indiana University. Thesis Title: *Constraining models of serial learning*
- Grace Hwang, Ph.D. (2002 – 2005). Engineer. Mitre Corporation.
- Per Sederberg (2001 – 2006). Assistant Professor, Department of Psychology, *Ohio State University*.
- Marieke van Vugt (2003 – 2008). Postdoctoral Fellow, Psychology and Neuroscience, *Princeton University*.
- Joshua Jacobs (2004 – 2008). Postdoctoral Fellow, Neuroscience, *University of Pennsylvania*.
- Jeremy Manning (2006 –). Neuroscience Ph.D. student, University of Pennsylvania.
- Lynn Lohnas (2007 –). Neuroscience Ph.D. student, University of Pennsylvania.
- Mark Lippmann (2009 –). Bioengineering Ph.D. Student, University of Pennsylvania.

Monographs

- Kahana, M. J. (2009). Foundations of Human Memory. Oxford University Press. Forthcoming.

Working Papers

1. Weidemann, C.T., Solway, A., Kahana, M.J. & Fried. I. Single neurons in the human brain encode task context. Submitted.
2. Maris, E., van Vug, M. & Kahana, M.J. Multiple Neurophysiological Sources are Involved in Oscillatory Coupling between High-Frequency Amplitudes and Low-Frequency Phases. Submitted.
3. van Vugt, M.K., Schulze-Bonhage, A., Litt, B., Brandt, A. & Kahana, M.J. Hippocampal gamma oscillations increase with working memory load. Submitted.
4. Manning, J. Jacobs, J. Fried, I. & Kahana, M.J. Broadband shifts in LFP power spectra are correlated with single-neuron spiking in humans. Submitted to *Journal of Neuroscience*.
5. Jacobs, J., Kahana, M. J., Ekstrom, A. D., Mollison, M. V., & Fried, I. Representation of movement direction in the human entorhinal cortex. Under revision for *PLOS Biology*.
6. Kahana, M. J. and Miller, J. Recall termination in free recall. Under revision. Submitted.
7. Sederberg, P. B., Miller, J. F., Howard, M. W., and Kahana, M.J. Temporal contiguity

between recalls predicts episodic memory performance. Submitted.

8. van Vugt, M. K., Sekuler, R., Wilson, H. R., & Kahana, M. J. Distinct electrophysiological correlates of proactive and similarity-based interference in visual working memory. Under Revision for *Journal of Experimental Psychology: General*.
9. Solway, A., Kahana, M.J., Addis, K.M., and Murdock, B.B. A strength-based chaining model of serial learning. Working paper.
10. Associative Memory. Scholarpedia, in preparation.
11. Manning, J., Kahana, M. J., & Sekuler, R. An Ideal Navigator Model of Human Wayfinding: Learning One's Way Around a New Town. Under Revision.
12. Kahana, M. J., & Adler, M. Note on the power law of forgetting. Under revision.

Articles

1. Jacobs, J. and Kahana, M. J. Neural representations of individual stimuli in humans revealed by gamma-band ECoG activity. *Journal of Neuroscience*, in press.
2. Galster, M., Kahana, M. J., Wilson, H. R., & Sekuler, R. (2009). Identity modulates short-term memory for facial emotion. *Cognitive, Affective, and Behavioral Neuroscience*, in press.
3. Kahana, M. J., Mollison, M. V., & Addis, K. M. (2009). Positional cues in serial learning: The spin-list technique. *Memory & Cognition*, in press.
4. Howard, M. W., Sederberg, P. B., & Kahana, M. J. (2009). Reply to Farrell and Lewandowsky: Recency-contiguity interactions predicted by the temporal context model. *Psychonomic Bulletin & Review*, in press.
5. Huang, J., Kahana, M. J., & Sekuler, R. (2009). A task-irrelevant stimulus attribute affects perception and short-term memory. *Memory & Cognition*, in press.
6. Weidemann, C. T., Mollison, M. V., & Kahana, M. J. (2009). Electrophysiological correlates of high-level perception during spatial navigation. *Psychonomic Bulletin & Review*, in press.
7. van Vugt, M. K., Schulze-Bonhage, A., Sekuler, R., Litt, B., Brandt, A., Baltuch, G. & Kahana, M. J. (2009). Intracranial electroencephalography reveals two distinct similarity effects during item recognition. *Brain Research*, in press.
8. Kahana, M. J. Associative Symmetry. To appear in *Encyclopedia of the Mind.*, Hal Pashler, Ed.
9. Kahana, M. J. Recall Dynamics. To appear in *Encyclopedia of the Mind.*, Hal Pashler, Ed.
10. Polyn, S. M., Norman, K. A., & Kahana, M. J. (2009). Task context and organization in free recall. *Neuropsychologia*, 47, 2158-2163.
11. Korolev, I. O., Jacobs, J. Caplan, J. B., Ekstrom, A. D., Litt, B. Fried, I, Schulze-Bonhage, A., Madsen, J. R., & Kahana, M.J. (2009). Right Lateralization of Human Brain Oscillations during Navigational Movement and Search. *Journal of Cognitive Neuroscience*, in press.
12. Seligman, M.E.P. and Kahana, M. J. (2009). Unpacking intuition: A conjecture. *Perspectives on Psychological Science*, 4(4), 399-402.
13. Zaghloul, K. A., Blanco, J. A., Weidemann, C. T., McGill, K., Jaggi, J. L. Baltuch, G.

H., & Kahana, M. J. (2009). Human Substantia Nigra Encodes Unexpected Financial Rewards. *Science*, 323, 1496-1499.

14. Polyn, S. M., Norman, K. A. and Kahana, M. J. (2009) A context maintenance and retrieval model of organizational processes in free recall. *Psychological Review*, 116, 129-156.
15. Visscher, K. M., Kahana, M. J., & Sekuler, R. (2009). Trial-to-trial carry-over in auditory short-term memory. *Journal of Experimental Psychology: Learning, Memory & Cognition*, *4*, 893-912.
16. Agam, Y., Hyun, J.-S., Danker, J., Zhou, F., Kahana, M. J., & Sekuler, R. (2009). Early neural signatures of visual short-term memory. *Neuroimage*, *2*, 531-536.
17. Kahana, M. J., Sederberg, P. B., & Howard, M.W. (2008) Putting short-term memory into context: Reply to Usher and colleagues (2008). (Postscript: Howard, M. W., Kahana, M. J., & Sederberg, P. B. Distinctions between temporal context and short-term store.) *Psychological Review*, 115, 1119-1126.
18. Sederberg, P. B., Howard, M. W., & Kahana, M. J. (2008). A context-based theory of recency and contiguity in free recall. *Psychological Review*, 115, 893-912.
19. Pantelis, P. C., van Vugt, M. K., Sekuler, R., Wilson, H. R., & Kahana, M. J. (2008). Why are some people's names easier to learn than others? The effects of similarity on memory for face-name associations. *Memory & Cognition*, 36, 1182-1195.
20. Danker, J. Hwang-Grodzins, G., Gauthier, L. Geller, A. Kahana, M.J., & Sekuler, R. (2008). Characterizing the ERP old-new effect in a short-term memory task *Psychophysiology*, 45, 784-793.
21. Serruya, M. D., & Kahana, M. J. (2008). Techniques and Devices to Restore Cognition. *Behavioural Brain Research*, 192, 149-165.
22. Golomb J. D., Peelle J. E., Addis, K. M., Kahana, M. J., & Wingfield A. (2008). Effects of Adult Aging on Utilization of Temporal and Semantic Associations during Free and Serial Recall. *Memory & Cognition*, 36, 947-956.
23. Yotsumoto, Y., McLaughlin, C., Kahana, M. J., & Sekuler, R. (2008). Recognition and position information in working memory for visual textures. *Memory & Cognition*, 36, 282-294.
24. Kahana, M. J., Howard, M. W., & Polyn, S. M. (2008). Associative Processes in Episodic Memory. H.L. Roedger (Ed.) *Learning and Memory - A Comprehensive Reference*. Elsevier.
25. Davis, O., Geller, A.S., Rizzuto, D., & Kahana, M. J. (2008). Temporal associative processes revealed by intrusions in paired-associate recall. *Psychonomic Bulletin & Review*, 15, 64-69.
26. Polyn, S. M. & Kahana, M. J. (2008) Memory search and the neural representation of context. *Trends in Cognitive Science*, 12, 24-30.
27. Sekuler, R. & Kahana, M. J. (2008). A stimulus-oriented approach to memory. *Current Directions in Psychological Science*, 16, 305-310.
28. Geller, A. S. Schleifer, I. Sederberg, P. B., Jacobs, J., & Kahana, M.J. (2007). PyEPL: A Cross-Platform Experiment Programming Library *Behavior Research Methods*, 39 (4).
29. Sederberg, P. B., Schulze-Bonhage, A., Madsen, J. R., Bromfield, E.B., Litt, B., Brandt, A., & Kahana, M.J. (2007). Theta and gamma oscillations distinguish true from false memories. *Psychological Science*, 18, 927-932.

30. Kimball, D. R., Smith, T. A., & Kahana, M.J. (2007). The fSAM model of false recall. *Psychological Review*, 114, 954-993.

31. Howard, M. W., Venkatadass, V., Norman, K. A., & Kahana, M. J. (2007). Associative Processes in Immediate Recency *Memory & Cognition*, 35, 1698-1709.

32. Ekstrom, A., Viskontas, I. Kahana, M.J., Jacobs, J., Upchurch, K. Bookheimer, S., & Fried, I. (2007). Contrasting roles of neural firing rate and local field potentials in human memory. *Hippocampus*, 17, 606-617.

33. Kahana, M.J., Zhou, F., Geller, A., & Sekuler, R. (2007). Lure-similarity affects visual episodic recognition: Detailed tests of a noisy exemplar model. *Memory & Cognition*, 35, 1222-1232.

34. Yotsumoto, Y, Kahana, M. J. Wilson, H. R., & Sekuler, R. (2007). Recognition memory for realistic synthetic faces. *Memory & Cognition*, 35, 1233-1244.

35. Newman, E. L., Caplan, J. B., Kirschen, M. P., Korolev, I.O. Sekuler, R., & Kahana, M. J. (2007). Learning your way around town: Virtual taxi drivers reveal the secrets of navigational learning. *Cognition*, 104, 231-253.

36. van Vugt, M. K., Sederberg, P. B., & Kahana, M. J. (2007). Comparison of spectral analysis methods for characterizing brain oscillations. *J. Neuroscience Methods*, 162, 49-63.

37. Sederberg, P. B., Schulze-Bonhage, A., Madsen, J. R., Bromfield, E. B., McCarthy, D. C., Brandt, A., Tully, M. S., & Kahana,M. J. (2007). Hippocampal and neocortical gamma oscillations predict memory formation in humans. *Cerebral Cortex*, 17, 1190-1196.

38. Howard, M. W., Addis, K. M., Jing, B., & Kahana, M. J. (2007). Semantic structure and episodic memory. In McNamara, D., Landauer, T., Dennis, S. and Kintsch, W. Editors, *LSA: A road to meaning*, Earlbaum, Mahwah, N.J., pp. 121-141.

39. Visscher, K. A., Kaplan, E. Kahana, M. J., & Sekuler, R. (2007). Auditory Short-Term Memory Behaves Like Visual Short-Term Memory. *PLOS Biology*, 5, 662-672.

40. Monaco, J., Abbott, L., & Kahana, M.J. (2007). Lexico-Semantic Structure and the Word-Frequency Effect. *Learning and Memory*, 14, 204-213.

41. Jacobs, J., Kahana, M. J., Ekstrom, A. D., & Fried, I. (2007). Brain oscillations synchronize single-neuron activity in humans, *J. Neuroscience*, 27, 3839-3844.

42. Sekuler, R., McLaughlin, C., Kahana, M. J., Wingfield, A., & Yotsumoto, Y. (2006). Short-term visual recognition and temporal order memory are both well-preserved in aging. *Psychology & Aging*, 21, 632-637.

43. Howard, M. W., Kahana, M. J., & Wingfield, A. (2006). Aging and contextual binding: modeling recency and lag-recency effects with the Temporal Context Model. *Psychonomic Bulletin & Review*, 13, 439-445.

44. Sederberg, P. B., Gauthier, L. V., Terushkin, V., Miller, J. F., Barnathan, J. A., & Kahana, M. J. (2006). Oscillatory Correlates of the Primacy Effect in Episodic Memory. *Neuroimage*, 32, 1422-1431.

45. Jacobs, J., Hwang, G., Curran, T., & Kahana, M. J. (2006). EEG oscillations and recognition memory: Theta correlates of memory retrieval and decision making. *Neuroimage*, 32, 978-987.

46. Zaromb, F. M., Howard, M. W., Dolan, E. D., Sirotin, Y. B., Tully, M., Wingfield, A., & Kahana, M. J. (2006). Temporal associations and prior list intrusions in free recall. *Journal of Experimental Psychology: Learning, Memory & Cognition*, 32, 792-804.

47. Kahana, M. J. (2006). The cognitive correlates of human brain oscillations. *Journal of Neuroscience*, 26, 1669-1672

48. Rizzuto, D. S., Madsen, J. R., Bromfield, E., Schulze-Bonhage, A., & Kahana, M. J. (2006). Phase dynamics of neocortical oscillations during working memory. *Neuroimage*, 31, 1352-1358.

49. Raghavachari, S. Lisman, J. E., Tully, M. Madsen, J. R. Bromfield, E. B., & Kahana, M. J. (2006). Theta oscillations in human cortex during a working memory task: evidence for local generators. *Journal of Neurophysiology*, *95*, 1630-1638.

50. Hwang, G., Jacobs, J., Geller, A., Danker, J., Sekuler, R., & Kahana, M. J. (2005). EEG Correlates of Subvocal Rehearsal in Working Memory *Behavioral and Brain Functions*, 1-20.

51. Sirotin, Y. B., Kimball, D., & Kahana, M. J. (2005). Going beyond a single list: Semantic-episodic interactions in a large-scale model of episodic recall. *Psychonomic Bulletin & Review*, *12*, 787-805.

52. Kahana, M. J., Rizzuto, D. S., & Schneider, A. R. (2005). Theoretical correlations and measured correlations: Relating recognition and recall in four distributed memory models. *Journal of Experimental Psychology: Learning, Memory & Cognition*, *5*, 933-953.

53. Ekstrom, A. E., Caplan, J. B., Ho, E., Shattuck, K., Fried, I., & Kahana, M. J. (2005). Human Hippocampal Theta Activity During Virtual Navigation. *Hippocampus*, *15*, 881-889.

54. Schwartz, G., Howard, M. W., Jing, B., & Kahana, M. J. (2005). Shadows of the past: Temporal retrieval effects in recognition memory. *Psychological Science*, *16*, 898-904.

55. Klein, K., Addis, K. M., & Kahana, M. J. (2005). A comparative analysis of serial and free recall. *Memory & Cognition*, 33, 833-839.

56. Kahana, M. J. & Howard, M. W. (2005). Spacing and lag effects in free recall of pure lists. *Psychonomic Bulletin & Review*, 12, 159-164.

57. Kahana, M. J., Dolan, E., Sauder, C., & Wingfield, A. (2005). Intrusions in Episodic Recall: Age Differences in Editing of Overt Responses. *Journal of Gerontology*, 60, 92-97.

58. Sekuler, R., Kahana, M. J., McLaughlin, C., Golomb, J., & Wingfield, A. (2005). Preservation of episodic visual recognition memory in aging. *Experimental Aging Research*, 31, 1-13.

59. Addis, K. M. & Kahana, M. J. (2004). Decomposing serial learning: What is missing from the learning curve?. *Psychonomic Bulletin & Review*, 11, 118-124.

60. Zhou, F., Kahana, M. J., & Sekuler, R. (2004). Episodic memory for visual textures: A roving probe gathers some memory. *Psychological Science*, 15, 112-118.

61. Sederberg, P. B., Kahana, M. J., Donner, E., & Madsen, J. R. (2003). Theta and Gamma Oscillations During Encoding Predict Subsequent Recall. *Journal of Neuroscience*, 23, 10809-10814.

62. Cantero, J. L., Atienza, M., Stickgold, R., Kahana, M. J., Madsen, J. R., & Kocsis, B. (2003). REM sleep-dependent theta waves in the human hippocampus and neocortex. *Journal of Neuroscience*, 10897-10903.

63. Howard, M. W., Rizzuto, D. S., Caplan, J. B., Madsen, J. R., Lisman, J., Aschenbrenner-Scheibe, R., Schulze-Bonhage, A., & Kahana, M.J. (2003). Gamma oscillations correlate with working memory load in humans. *Cerebral Cortex, 13*, 1369-1374.

64. Ekstrom, A. D., Kahana, M. J., Caplan, J. B., Fields, T. A., Isham, E. A., Newman, E. L., & Fried, I. (2003). Cellular networks underlying human spatial navigation. *Nature, 425*, 184-187. (see, also, *Nature Reviews Neuroscience*, 4, 933, and *Trends in Cognitive Science*, 7, 517-519, where this article was highlighted and reviewed).

65. Caplan, J. B., Madsen, J. R., Schulze-Bonhage, A., Aschenbrenner-Scheibe, R., Newman, E. L., & Kahana, M. J. (2003). Human theta oscillations related to sensorimotor integration and spatial learning. *Journal of Neuroscience*, *23*, 4726-4736.

66. Rizzuto, D. S., Madsen, J. R., Bromfield, E., Schulze-Bonhage, A., Seelig, D., Aschenbrenner-Scheibe, R., & Kahana, M. J. (2003). Reset of human neocortical oscillations during a working Memory task. *Proceedings of the National Academy of Sciences*, *100*, 7931-7936.

67. Kahana, E., Lovegreen, L., Kahana, B., & Kahana, M. (2003). Person, environment, and person-environment fit as influences on residential satisfaction of elders. *Environment & Behavior*, *35*, 434-453.

68. Wingfield, A. & Kahana, M. J. (2002). The dynamics of memory retrieval in older adults. *Canadian Journal of Experimental Psychology*, *56*, 187-199.

69. Kahana, M. J. (2002). Associative symmetry and memory theory. *Memory & Cognition*, *30*, 823-840.

70. Kahana, M. J. & Caplan, J. B. (2002). Associative Asymmetry in Probed Recall of Serial Lists. *Memory & Cognition*, *30*, 841-849.

71. Kahana, M. J. & Sekuler, R. (2002). Recognizing spatial patterns: A noisy exemplar approach. *Vision Research*, *42*, 2177-2192.

72. Howard, M. W. & Kahana, M. J. (2002). A distributed representation of temporal context. *Journal of Mathematical Psychology*, *46*, 269-299.

73. Kahana, M. J., Howard, M. H., Zaromb, F., & Wingfield, A. (2002). Age dissociates recency and lag-recency effects in free recall. *Journal of Experimental Psychologhy: Learning, Memory and Cognition*, *28*, 530-540.

74. Howard, M. W. & Kahana, M. J. (2002). When does semantic similarity help episodic retrieval? *Journal of Memory and Language*, *46*, 85-98.

75. Kahana, M. J., Seelig, D., & Madsen J. R. (2001). Theta Returns. *Current Opinion in Neurobiology*, *11*, 739-744.

76. Caplan, J. B., Madsen, J. R., Raghavachari, S., & Kahana, M. J. (2001). Distinct patterns of brain oscillations underlie two basic parameters of human maze learning. *Journal of Neurophysiology*, *86*, 368-380.

77. Rizzuto, D. S. & Kahana, M. J. (2001). An autoassociative model of paired-associate learning. *Neural Computation*, *13*, 2075-2092.

78. Raghavachari, S., Kahana, M. J., Rizzuto, D. S., Caplan, J. B., Kirschen, M., Bourgeois, B., & Lisman, J. (2001). Gating of human theta oscillations by a working memory task. *Journal of Neuroscience*, *21*, 3175-3183.

79. Lisman, J., Jensen, O., & Kahana, M. J. (2001). Towards a physiological explanation of the behavioral data on human memory: the role of theta-gamma oscillations and NMDAR-dependent LTP. In Holscher, C. (Ed.) *Neural Mechanisms of Memory Formation.* Cambridge University Press, N.Y., pp. 195-223.

80. Kirschen, M., Kahana, M. J., Sekuler, R., & Burack, B. (2000). Optic flow aids learning in virtual environments. *Perception*, *29*, 801-818.

81. Kahana, M. J. & Wingfield, A. W. (2000). A functional relation between learning and organization in free recall. *Psychonomic Bulletin & Review*, *7*, 516-521.

82. Kahana, M. J. & Jacobs, J. (2000). Inter-response times in serial recall: Effects of intra-serial repetition. *Journal of Experimental Psychology: Learning, Memory and Cognition, 26,* 1188-1197.

83. Rizzuto, D. S. & Kahana, M. J. (2000). Associative Symmetry vs. Independent Associations. *Neurocomputing, 32,* 973-978.

84. Caplan, J. B., Kahana, M. J., Sekuler, R., Kirschen, M., & Madsen, J. R. (2000). Task dependence of human theta: the case for multiple cognitive functions. *Neurocomputing, 32,* 659-665.

85. Kahana, M. J. (2000). Contingency Analyses of Human Memory. In E. Tulving and F.I.M. Craik (Eds.) *The Oxford Handbook of Memory.* Oxford University Press. pp. 59-72.

86. Howard, M. W. & Kahana, M. J. (1999). Contextual variability and serial position effects in free recall. *Journal of Experimental Psychology: Learning, Memory and Cognition, 25*, 923-941.

87. Kahana, M. J. & Loftus, G. (1999). Response time versus Accuracy in Human Memory. In R. Sternberg (Ed.) *The Nature of Cognition*, MIT Press, MA, pp. 323-384.

88. Kahana, M. J., Sekuler, R., Caplan, J. B., Kirschen, M., & Madsen, J. (1999). Intracranial recordings reveal task-dependent changes in theta oscillations during virtual maze navigation by human subjects. *Nature, 399,* 781-784. (See also, *Trends in Cognitive Science*, 3, 403-406, where this article was highlighted and reviewed by J. O'Keefe and N. Burgess)

89. Kahana, M. J., Caplan, J. B., Sekuler, R., & Madsen, J. (1999). Using intracranial recordings to study theta: Response to J. O'Keefe and N. Burgess (1999). *Trends in Cognitive Science, 3,* 406-407.

90. Wingfield, A., Lindfield, K., & Kahana, M. J. (1998). Adult age differences in the temporal characteristics of category free recall. *Psychology and Aging, 13,* 256-266.

91. Chance, F. S. & Kahana, M. J. (1997). Testing the role of associative interference and compound cues in sequence memory. In Bower, J. (Ed.) *Computational Neuroscience, Trends in research.* Plenum Press, NY. pp. 599-603.

92. Kahana, M. J. (1996). Associative retrieval processes in free-recall. *Memory & Cognition, 24,* 103-109.

93. Glatstein, I. Z., Hornstein, M. D., Kahana, M. J., Jackson, K. V., & Friedman, A.J. (1995). The predictive value of discriminatory human chorionic gonadotrophin levels in the diagnosis of implantation outcome in in vitro fertilization cycles. *Fertility and Sterility, 63,* 350-356.

94. Kahana, M. J. & Bennett, P. J. (1994). Classification and perceived similarity of compound gratings that differ in relative spatial phase. *Perception and Psychophysics, 55,* 642-656.

95. Kahana, M. J. & Greene, R. L. (1993). The effects of spacing on memory for homogeneous lists. *Journal of Experimental Psychology: Learning, Memory and Cognition, 19*, 159-162.

96. Murdock, B. B. & Kahana, M. J. (1993). List-strength and list-length effects: Reply to Shiffrin, Ratcliff, Murnane and Nobel (1993). *Journal of Experimental Psychology:*

Learning, Memory and Cognition, 19, 1450-1453.

97. Murdock, B. B. & Kahana, M. J. (1993). Analysis of the list strength effect. *Journal of Experimental Psychology: Learning, Memory and Cognition, 19,* 689-697.

98. Andrist, C. G., Kahana, M. J., Spry, K., Knevel, S., Luo, D., Persanyi, M., Evans, S., & Detterman, D. K. (1992). Individual Differences in the Biological Correlates of Intelligence: a selected overview. In (Douglas K. Detterman Ed.) *Current Topics in Human Intelligence, Volume 2: Is mind modular or unitary?* Ablex Publishers, N.J., pp. 1-59.

99. Kaufman, M. & Kahana, M. (1988). Cayley-tree Ising model with antiferromagnetic nearest-neighbor and ferromagnetic equivalent-neighbor interactions. *Physical Review B*, *37*, 7638-7642