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A. Education

Bachelor of Liberal Arts, St. John's College, Santa Fe, NM, 1983
PhD in Biophysics, University of California, Berkeley, CA, 1995 (Advisor: Walter J. Freeman)
Postdoctoral Scholar in Biology and Computational Neuroscience, California Inst. of Technology (Caltech), Pasadena, CA 1995-2000 (Advisor: Gilles Laurent)

B. Positions and Honors

1981 Annual Mathematics Prize, St. John's College
1982 Bromwell Ault Memorial Scholarship for Academic Excellence, St. John's College
1982-85 Graduate Student Researcher, GenBank, Los Alamos Natl. Laboratory, NM
1985 University of California Graduate Fellowship
1985-86 Graduate Student Researcher, University of California, Berkeley
1986 University of California Graduate Fellowship (declined)
1986-88 Programmer/Analyst, Applied Risk Management, Oakland, CA
1988 Scientific Reviewer, GenBank, Intelligenetics, Mountain View, CA
1988-90 Sr. Programmer/Analyst, Applied Risk Management, Oakland, CA
1991-95 Graduate Student Researcher, University of California, Berkeley
1991-93 USPHS Training Grant in Integrative Biology
1993 NSF Travel Grant to NATO Advanced Study Institute
1995-98 Postdoctoral Fellow in Biology, Caltech
1995-98 Sloan Foundation Postdoctoral Fellowship in Theoretical Neurobiology
1998-2000 Senior Postdoctoral Fellow in Biology, Caltech
1998-2000 Burroughs-Wellcome Computational Molecular Biology Fellowship
2000-08 Assistant Professor, Department of Psychology and The College, The University of Chicago
2000- Member of graduate Committees on Computational Neuroscience and Neurobiology
2008-2015 Associate Professor, Department of Psychology and The College, The University of Chicago
2008-2014 Director, Institute for Mind & Biology, The University of Chicago
2013 St. John's College Alumni Association Award of Merit
2014-2016 Chair, Integrative Neuroscience graduate program, Dept. of Psychology, UChicago
2015- Member, Grossman Inst. for Neuroscience, Quantitative Biology and Human Behavior, UChicago
2015- Professor, Department of Psychology and The College, The University of Chicago
2017-2020 Member, Board of Visitors and Governors, St. John's College, Annapolis & Santa Fe

C. Peer-reviewed publications (trainees underlined)

1. **Kay, L.**, Shimoide, K., and Freeman, W.J. (1995) Comparison of EEG time series from rat olfactory system with model composed of nonlinear coupled oscillators. *Int J Bif & Chaos*, 5(3): 849-858.
2. **Kay, L.M.**, Lancaster, L.R., and Freeman, W.J. (1996) Reafference and attractors in the olfactory system during odor recognition. *International Journal of Neural Systems*, 7(4): 489-495.
3. **Kay, L.M.** and Freeman, W.J. (1998) Bidirectional processing in the olfactory-limbic axis during olfactory behavior. *Behavioral Neuroscience*, 112(3): 541-553.
4. **Kay, L.M.** and Laurent, G. (1999) Odor- and context-dependent modulation of mitral cell firing in behaving rats. *Nature Neuroscience*, 2(11): 1003-1009.

5. Nusser, Z., **Kay, L.M.**, Laurent, G., Homanics, G.E., Mody, I. (2001) Disruption of GABA_A receptor-mediated inhibition of GABAergic interneurons leads to increased synchrony of the olfactory bulb network. *J. Neurophysiology* 86(6): 2823-2833.
6. **Kay, L.M.** (2001) Chaotic itinerancy: insufficient perceptual evidence. Commentary on I. Tsuda, "Towards an interpretation of dynamic neural activity in terms of chaotic dynamical systems," *Behavioral and Brain Sciences*, 24(5) 793-847.
7. **Kay, L.M.** (2003) A challenge to chaotic itinerancy from brain dynamics. *Chaos* 13(3): 1057-1066. [This paper selected for publication in the Virtual Journal of Biological Physics Research, Sept. 1, 2003, 6(5)]
8. **Kay, L.M.** (2003) Two species of gamma oscillations in the olfactory bulb: dependence on behavioral state and synaptic interactions. *Journal of Integrative Neuroscience* 2(1): 31-44.
9. **Kay, L.M.**, Lowry, C.A., Jacobs, H.A. (2003) Receptor contributions to configural and elemental odor mixture perception. *Behavioral Neuroscience* 117(5): 1108-1114.
10. **Kay, L.M.** (2004) Two minds about odors. *Proc Natl Acad Sci U S A* 101(51): 17569-17570.
11. **Kay, L.M.**, Crk, T. and Thorngate, J. (2005) A redefinition of odor mixture quality. *Behavioral Neuroscience* 119(3): 726-733.
12. **Kay, L.M.** (2005) Theta oscillations and sensorimotor performance. *Proc Natl Acad Sci U S A* 102(10): 3863-3868.
13. **Kay, L.M.**, Krysiak, M., Barlas, L., Edgerton, G.B. (2006) Grading odor similarities in a Go/No-Go task, *Physiology and Behavior*, 88(4-5):339-346.
14. **Kay, L.M.** and Stopfer, M. (2006) Information processing in the olfactory systems of insects and vertebrates. *Seminars in Cell and Developmental Biology*, 17(4):433-42.
15. **Kay, L.M.**, Beshel, J., Martin, C. (2006) When good enough is best. *Neuron*, 51(3):277-8.
16. **Kay, L.M.** and Sherman, S.M. (2006) Argument for an olfactory thalamus. *Trends in Neurosciences*, 30(2):47-53. [This paper selected as recommended reading by Faculty of 1000]
17. Ables, E. M., **Kay, L. M.**, Mateo, J. M. (2007) Rats assess degree of relatedness from human odors. *Physiology and Behavior*, 90: 726-732.
18. Lowry, C.A. and **Kay, L.M.** (2007) Chemical factors determine olfactory system beta oscillations in waking rats. *Journal of Neurophysiology*, 98(1): 394-404
19. Prendergast, B.J., Kampf-Lassin, A., Yee, J.R., Galang, J., McMaster, N., and **Kay, L.M.** (2007) Winter day lengths enhance T lymphocyte phenotypes, inhibit cytokine responses, and attenuate behavioral symptoms of infection in laboratory rats. *Brain, Behavior and Immunity*, 21(8): 1096-1108.
20. Beshel, J., Kopell, N. and **Kay, L.M.** (2007) Olfactory bulb gamma oscillations are enhanced with task demands. *Journal of Neuroscience*, 27(31): 8358-8365.
21. Martin, C., Beshel, J. and **Kay, L.M.** (2007) An olfacto-hippocampal network is dynamically involved in odor discrimination learning. *Journal of Neurophysiology*, 98(4): 2196-2205.
22. Prendergast, B.J. and **Kay, L.M.** (2008) Affective and adrenocorticotrophic responses to photoperiod in Wistar rats, *Journal of Neuroendocrinology*, 20(2): 261-267.
23. Grossman, K.J., Mallik, A.K., Ross, J., **Kay, L.M.**, Issa, N.P. (2008) Glomerular activation patterns and the perception of odor mixtures, *European Journal of Neuroscience*, 27(10): 2676-2685.
24. Rojas-Líbano, D. and **Kay, L.M.** (2008) Olfactory system gamma oscillations: the physiological dissection of a cognitive neural system. *Cognitive Neurodynamics*, 2(3): 179-194.
25. Prendergast, B. J., Pyter, L. M., Galang, J., & **Kay, L. M.** (2008). Reproductive responses to photoperiod persist in olfactory bulbectomized Siberian hamsters (*Phodopus sungorus*). *Behavioural Brain Research*, 198(1):159-164.
26. Frederick, D. E., Barlas, L., Ievins, A., & **Kay, L.M.** (2009). A critical test of the overlap hypothesis for odor mixture perception. *Behavioral Neuroscience*, 123(2): 430-437.
27. **Kay, L.M.**, Beshel, J., Brea, J., Martin, C., Rojas-Líbano, D. & Kopell, N. (2009) Olfactory oscillations: the what, how and what for, *Trends in Neurosciences*, 32(4): 207-214.
28. Prendergast, B. J., Galang, J., **Kay, L.M.**, Pyter, L. M. (2009). Influence of the olfactory bulbs on blood leukocytes and behavioral responses to infection in Siberian hamsters. *Brain Res*, 1268: 48-57.

29. Brea, J., **Kay, L.M.** and Kopell, N. (2009) Biophysical model for gamma rhythms in the olfactory bulb via subthreshold oscillations. *Proc Natl Acad Sci U S A*, 106(51): 21954-21959.
30. **Kay, L.M.** (2010) Beyond sensory coding: the cognitive context of olfactory neurodynamics, Proceedings of the International Conference in Cognitive Neurodynamics (ICCN'09), Springer.
31. Gourévitch, B., **Kay, L.M.** and **Martin, C.** (2010) Directional coupling from the olfactory bulb to the hippocampus during a go/no-go odor discrimination task. *Journal of Neurophysiology*, 103(5): 2633-2641.
32. **Kay, L.M.** and **Beshel, J.** (2010) A beta oscillation network supports a gamma oscillation mode in the rat olfactory system during a 2-alternative choice odor discrimination task. *Journal of Neurophysiology*, 104(2):829-839.
33. **Kay, L.M.** and **Lazzara, P.** (2010) How global are olfactory bulb oscillations? *Journal of Neurophysiology*, 104(3): 1768-1773.
34. **Frederick, D.E., Rojas-Líbano, D., Scott, M., and Kay, L.M.** (2011) Rat behavior in go/no-go and two-alternative choice odor discrimination: differences and similarities. *Behavioral Neuroscience*, 125(4): 588-603.
35. **Kay, L.M.** (2011) Olfactory cortex: Random scents make sense. *Current Biology*, 21(22): R928-9.
36. Drobyshevsky, A., Yu, L., Yang, Y., Khalid, S., Lui, K., Jiang, R., Ji, H., Derrick, M., **Kay, L.M.**, Silverman, R.B., Tan, S. (2012) Antenatal insults modify newborn olfactory function by nitric oxide produced from neuronal nitric oxide synthase. *Experimental Neurology*, 237(2):427-34.
37. **Rojas-Líbano, D. and Kay, L.M.** (2012) Interplay between odorant sorptiveness and sniffing behavior in olfactory learning and perception. *Journal of Neuroscience*, 32(44):15577-89. [Cover Photo]
38. Opal, M.D., Klenotich, S.C., Morais, M., Bessa, J., Winkle, J., Doukas, D., **Kay, L.J.**, Sousa, N., and Dulawa, S.M. (2014) Serotonin 2C receptor antagonists induce fast-onset antidepressant effects. *Molecular Psychiatry*, 19(10): 1106-1114. [Note: incorrect author initials Kay, L.J. should be Kay, L.M.]
39. **Rojas-Líbano, D., Frederick, D.E., Egaña, J.I. and Kay, L.M.** (2014) The olfactory bulb theta rhythm follows all frequencies of diaphragmatic respiration in the freely behaving rat. *Frontiers in Behavioral Neuroscience*, 8:214. doi: 10.3389/fnbeh.2014.00214
40. **Kay, L.M.** (2014) Circuit oscillations in odor perception and memory. *Progress in Brain Research: Odor Memory and Perception*. 208: 223-251.
41. **Kay, L.M.** (2015) Olfactory system oscillations across phyla. *Current Opinion in Neurobiology*. 31: 141-147.
42. Prendergast, B.J., Cable, E.A., Stevenson, T.J., Onishi, K.G., Zucker, I., and **Kay, L.M.** (2015) Circadian disruption alters the effects of lipopolysaccharide treatment on circadian and ultradian locomotor activity and body temperature rhythms of female Siberian hamsters. *Journal of Biological Rhythms*, 30(6): 543-556.
43. Corcoran, K.A., Frick, B.J., Radulovic, J., **Kay, L.M.** (2016) Analysis of coherent activity between retrosplenial cortex, hippocampus, thalamus, and anterior cingulate cortex during retrieval of recent and remote context fear memory. *Neurobiology of Learning and Memory*, 127: 93-101.
44. **Osinski, B. and Kay, L.M.** (2016) Granule cell excitability mediates gamma and beta oscillations in a model of the dendrodendritic microcircuit. *Journal of Neurophysiology*, 116(2): 522-539.
45. **Frederick, D.E., Vujovic, M., Brown, A., Mehta, N., and Kay, L.M.** (2016) Gamma and beta oscillations define a sequence of neurocognitive modes present in odor processing, *Journal of Neuroscience*, 36(29): 7750-7767.
46. Katz, D.B. and **Kay, L.M.** (2016) Editorial overview: Systems neuroscience 2016. *Current Opinion in Neurobiology*, 40: iv-vi.
47. **Frederick, D.E., Tacopina, S.A., Vujovic, M., Brown, A., Mehta, N., and Kay, L.M.** (2017) Task-dependent behavioral dynamics make the case for temporal integration in multiple strategies during odor processing. *Journal of Neuroscience*, 37(16):4416–4426.
48. **Osinski, B., Kim, A., Xiao, W., Mehta, N.M., and Kay, L.M.** (2017) Pharmacological manipulation of olfactory bulb granule cell excitability modulates beta oscillations: Testing a model. bioRxiv Dec. 15, 2017. doi: <https://doi.org/10.1101/234625>

D. Other articles, Book chapters, Reference Works & Thesis

1. Barczyns, C., Bloom, L. and **Kay, L.** (1993) Applying genetic algorithms to improve EEG classification and explore GA parametrization, in *Lectures in Complex Systems*, Eds. L. Nadel & D. Stein, Santa Fe Institute Studies in the Sciences of Complexity, Lect. Vol. V, Addison-Wesley.
2. **Kay, L.M.** (1995) *Dynamic Interaction of Olfactory and Limbic Systems during Olfactory Perception*. Ph.D. Dissertation, University of California, Berkeley.
3. **Kay, L.**, Freeman, W.J. , and Lancaster, L. (1996) Limbic markers during olfactory perception, in *Advances in Processing and Pattern Analysis of Biological Signals*, Eds. I. Gath and G. Inbar. Plenum: New York, pp 71-84.
4. **Kay, L.M.** (2008) Olfactory Information, in *Encyclopedia of Neuroscience*, Binder, M.D.; Hirokawa, N.; Windhorst, U.; Hirsch, M.C. (Eds.) Springer Reference, New York.
5. **Kay, L.M.** (2008) Dynamical architecture of the mammalian olfactory system, in *Dynamic Brain LNCS 5286* (pp. 67-90), M. Marinaro, S. Scarpetta & Y. Yamaguchi (Eds.). Berlin Heidelberg: Springer-Verlag.
6. **Kay, L.M.** (2012) Timing at multiple scales in olfactory perception, in *Advances in Cognitive Neurodynamics (III)*, Y. Yamaguchi (Ed.), Springer Science, New York.
7. **Kay, L.M.** (2013) Local Field Potentials in Olfaction, in *Encyclopedia of Computational Neuroscience*, D. Jaeger and R. Jung (Eds.) Springer Reference, New York.
8. **Kay, L.M.** (2014) Circuit Oscillations in Odor Perception and Memory, in *Progress in Brain Research: Odor Memory and Perception*, vol. 208 E. Barkai and D.A. Wilson (Eds.), Elsevier, Oxford, UK.
9. **Kay, L.M.**, Rojas-Líbano, D. and Frederick, D.E. (2014) Active behaviors in odor sampling constrain the task for cortical processing, in *Advances in Cognitive Neurodynamics (IV)*, H. Liljenström (Ed.), Springer Science+Business Media, Dordrecht, Netherlands.
10. **Kay, L.M.** and Kozma, R. (2017) Walter J. Freeman: A tribute. *Neuron*. 94(4): 705-707.
11. **Kay, L.M.** (2017) How brains create the world: The dynamical legacy of Walter J Freeman in olfactory system physiology. *Chaos and Complexity Letters*, in press.

E. Editorial

Systems Neuroscience, Focus Issue in Current Opinion in Neurobiology, Eds. Leslie M. Kay and Donald B. Katz, Vol 40, October 2016.

F. Abstracts (2001 -)

- Lowry, C.A., Jacobs, H.A. and **Kay, L.M.** (2001) Effect of previous olfactory learning on odor class generalization in mice and rats. Society for Neuroscience Abstracts, 2001.
- Kay, L.M.**, Lowry, C.A. and Jacobs, H.A. (2002) Behavioral analysis of olfactory receptor biophysics. Program No. 661.2. Abstracts Viewer/Itinerary Planner. Washington DC: Society for Neuroscience 2002.
- Kay, L.M.** (2002) Context and chemistry in primary olfactory processing. Computation and Neural Systems (CNS*02) Abstracts.
- Lowry, C.A., Jacobs, H.A. and **Kay, L.M.** (2002) Does chemical similarity predict odor similarity? Computation and Neural Systems (CNS*02) Abstracts.
- Lowry, C.A. and **Kay, L.M.** (2003) Oscillatory dynamics of olfactory and hippocampal structures in response to aversive and attractive odors. Program No. 913.9. Washington DC: Society for Neuroscience 2003.
- Kay, L.M.** (2003) Olfactory-hippocampal theta band coherence is correlated with performance in an olfactory-motor task. Program No. 913.8. Washington DC: Society for Neuroscience 2003.
- Lowry, C.A. and **Kay, L.M.** (2004) Oscillatory dynamics of olfactory structures in response to predator and non-predator odors. *Org. for Computational Neurosciences annual meeting (CNS*04)*, Baltimore, MD.
- Kay, L.M.** (2004) Performance and olfactory-hippocampal theta band coherence. *Org. for Computational Neurosciences (CNS*04)*, Baltimore, MD.
- Lowry, C.A. and **Kay, L.M.** (2004) Predator and non-predator odors: similarities in spectral and behavioral patterns. 26th Annual Meeting of the Association for Chemoreception Sciences Abstracts.
- Beshel, J. and **Kay, L.M.** (2005) Modulation of gamma oscillations in the rat olfactory bulb during performance consolidation. *Org. for Computational Neurosciences (CNS*05)*, Madison, WI, July 2005.
- Kay, L. M.**, Bloom, G., Crk, T. and Thorngate, J. (2005). A re-examination of odor mixture quality and its assessment. *Association for Chemoreception Sciences Annual Meeting*, Sarasota, FL.

- Lowry, C.A. and **Kay, L.M.** (2005) Context and chemistry as factors for innate odor responses. *Association for Chemoreception Sciences Annual Meeting*, Sarasota, FL.
- Beshel, J. and **Kay, L.M.** (2005) Changes in gamma oscillatory power in the rat olfactory bulb as a function of odor learning and task difficulty. *Society for Neuroscience Annual Meeting*, Washington D.C.
- Martin, C. and **Kay, L.M.** (2005) Sniffing-related linking of theta rhythms between the olfactory bulb and hippocampal subfields. *Society for Neuroscience Annual Meeting*, Washington D.C.
- Martin, C., Beshel, J. and **Kay, L.M.** (2006) Increase in beta-band coherence between the olfactory bulb and septal and temporal hippocampus during learning of an olfactory discrimination task. *Society for Neuroscience Annual Meeting*, Atlanta, GA.
- Beshel, J. and **Kay, L.M.** (2006) Variable coupling with piriform cortex modulates gamma power in the olfactory bulb during an odor discrimination task. *Society for Neuroscience Annual Meeting*, Atlanta, GA.
- Grossman, K.J., Ross, J., **Kay, L.M.**, Issa, N.P. (2006) Glomerular activation patterns and the perception of odor mixtures. *Society for Neuroscience Annual Meeting*, Atlanta, GA.
- Linster, C., Mandairon, N., Wyatt, E., **Kay, L.M.** (2007) Olfactory bulb odor response dynamics enhanced by odor enrichment. *Association for Chemoreception Sciences Annual Meeting*, Sarasota, FL.
(Selected for highlighting in AChemS press release; **talk** by Linster)
- Beshel, J. and **Kay, L.M.** (2007) Olfactory bulb gamma oscillations are dynamically altered to adjust to task demands. *Association for Chemoreception Sciences Annual Meeting*, Sarasota, FL.
(Selected for highlighting in AChemS press release; **talk** by Beshel)
- Brea, J., E. Sivan, J. Beshel, C. Martin, **L.M. Kay**, and N. Kopell. A biophysical model for beta and gamma oscillatory transitions in the rat olfactory system during odor discrimination learning. in *Society for Neuroscience Annual Meeting*. 2007. San Diego, CA.
- Beshel, J. and **L.M. Kay**. Afferent drive to the olfactory bulb changes as a function of odor discrimination task demands. in *Society for Neuroscience Annual Meeting*. 2007. San Diego, CA.
- Frederick, D.E., Ivins, A., Barlas, L., and **Kay, L.M.** Individual odor input patterns in rat olfactory bulb predict mixture perceptual qualities, *Association for Psychological Science Annual Convention*, 2008, Chicago, IL.
- Frederick, D.E. and **Kay, L.M.** Olfactory system beta and gamma oscillations correlate with discrimination of binary mixtures and their components in a Go/No-Go task. *Society for Neuroscience Annual Meeting*. 2008, Washington DC.
- Rojas-Libano, D. and **Kay, L.M.** Sniffing strategies and their influences on olfactory system oscillatory processing modes. *Society for Neuroscience Annual Meeting*. 2008, Washington DC.
- Scott, M., Lee, H., Tacopina, S. and **Kay, L.M.** Different olfactory networks are engaged in 2-alternative choice vs. go/no-go odor discrimination task. *Society for Neuroscience Annual Meeting*. 2009, Chicago.
- Kay, L.M.** and Beshel, J. Relationship between β and γ oscillatory modes during a 2-alternative choice odor discrimination task. *Society for Neuroscience Annual Meeting*. 2009, Chicago.
- Ames, K.C., Scott, M. and **Kay, L.M.** Dopamine receptors modify oscillatory circuits in the rat olfactory bulb. *Society for Neuroscience Annual Meeting*. 2009, Chicago.
- Brea, J.N., Beshel, J., Martin, C., **Kay, L.M.** and Kopell, N. Gamma power increase during rat olfactory learning: a modeling study. *Society for Neuroscience Annual Meeting*. 2009, Chicago.
- Frederick, D.E., Rojas-Libano, D., Scott, M., Lee, H., Tacopina, S. and **Kay, L.M.** Taking behavior seriously: characterizing go/no-go and two-alternative choice tasks in olfactory discrimination. *Society for Neuroscience Annual Meeting*. 2009, Chicago.
- Rojas-Libano, D., Lee, H., Frederick, D.E., and **Kay, L.M.** Olfactory system oscillations and odorant properties in a discrimination task. *Society for Neuroscience Annual Meeting*. 2009, Chicago.
- Frederick, D.E., Rojas-Libano, D., Scott, M., and **Kay, L.M.** Characterizing go/no-go and two-alternative choice olfactory discrimination tasks in rats. *Society for Neuroscience Annual Meeting*. 2010, San Diego.
- Rojas, D. and **Kay, L.M.** Performance of rats in a discrimination task involving odorants differing in sorptiveness. *Society for Neuroscience Annual Meeting*. 2010, San Diego.

- Tacopina, S., Lee, H., Pyter, L., Prendergast, B.J., Kay, L.M. Interaction between day length and anxiety measures in olfactory-bulbectomized Wistar rats. *Society for Neuroscience Annual Meeting*. 2011, Washington DC.
- Frederick, D.E. and Kay, L.M. Beta and gamma oscillations in the olfactory bulb: A current source density analysis in awake behaving rats. *Society for Neuroscience Annual Meeting*. 2011, Washington DC.
- Frederick, D.E., Tacopina, S.A., Vujovic, M., Fixsen, B., Brown, A., Amina, T., Mehta, N., and Kay, L.M. "Behavioral economics in rats: The role of task type" *Association of Psychological Sciences Annual Meeting*, Chicago, IL 2012.
- Frederick, D.E., Mehta, N.M. and Kay, L.M. (2012) Physiological differences support divergent strategies in olfactory go/no-go and 2-alternative choice tasks. *Society for Neuroscience Annual Meeting 2012, New Orleans*.
- Kay, L.M., Mehta, N.M. and Doruk, C (2013) The temporal structure of odor mixture perception in rats. *Association for Chemoreception Sciences Annual Meeting*, Huntington Beach, CA.
- Frederick, D.E., Mehta, N., Brown, A., Doruk, C and Kay, L.M. (2014) Olfactory Bulb Current Source Density Analysis in Awake Behaving Rats: Beta and Gamma Oscillations. *Association for Chemoreception Sciences Annual Meeting*, Bonita Springs, FL.
- Lorig, T.S., Warner, E.A., Cusack, S.E., Kay, L.M. and Mainland, J.D. (2014) Perceptual and Neural Effects of Timing for Binary Odor Mixtures. *Association for Chemoreception Sciences Annual Meeting*, Bonita Springs, FL.
- Osinski, B. and Kay, L.M. (2014) Modeling beta oscillations in the coupled cortico-bulbar network. *Society for Neuroscience Annual Meeting 2014, Washington D.C.*
- Osinski, B.L. and Kay, L.M. (2015) Granule cell excitability mediates gamma and beta oscillations in a model of the dendrodendritic microcircuit. . *Org. for Computational Neurosciences (CNS*15)*, Prague, Czech Republic.
- Frederick, D.E. and Kay, L.M. (2015) Gamma and beta oscillations in the rat olfactory bulb define a cognitive sequence in odor discrimination, poster 786.04. *Society for Neuroscience Annual Meeting*, Chicago.
- Osinski, B.L. and Kay, L.M. (2015) Granule cell excitability mediates gamma and beta oscillations in a model of the dendrodendritic microcircuit, poster 786.05. *Society for Neuroscience Annual Meeting*, Chicago.
- Corcoran, K.A., Frick, B.J., Kay, L.M. and Radulovic, J. (2015) Altered states: Amnestic treatments alter coherent activity between retrosplenial cortex and associated structures during memory retrieval. *Society for Neuroscience Annual Meeting*, Chicago.
- Peace, S.T. and Kay, L.M. (2017) Transient optical inactivation of piriform cortex inputs to the olfactory bulb affect perceptual behavioral strategies. *Association for Chemoreception Sciences Annual Meeting*, Bonita Springs, FL.
- Osinski, B.L. and Kay, L.M. (2017) Olfactory bulb beta oscillations and granule cell excitability: testing model predictions. *Association for Chemoreception Sciences Annual Meeting*, Bonita Springs, FL. (Finalist for the Don Tucker Award)

G. Conference / symposium organizer

- Cognitive Neurodynamics in Chemosensory Perception, APS 20th Annual Convention, Chicago, 2008
- Dynamical Systems and Data Analysis in Neuroscience: Bridging the gap, Mathematical Biosciences Institute workshop (co-organizer), The Ohio State University, Columbus, OH, 2016

H. Invited Lectures (since 2002)

- 7th Tamagawa International Dynamic Brain Forum (DBF 2002), Budapest, Hungary 2002
- Center for Biodynamics, Boston University 2002
- Neuroscience lecture series, Michigan State University, East Lansing, MI, 2002
- Gordon Research Conference: Biology, Chemistry and Evolution of Floral Scents, Ventura, CA 2002
- Olfaction Workshop, Mathematical Biosciences Institute, The Ohio State University, 2003
- Workshop on Olfaction and Emotion. AChemS annual meeting, Sarasota, FL, 2003
- Gordon Research Conference: Chemical Senses, New London, NH, 2003 (discussant)
- Natural Sciences Colloquium, Carthage College, Kenosha, WI, 2003
- Satellite Symposium for CNS*04: Computation in the Olfactory System, Baltimore, MD, 2004
- University of Texas, San Antonio, Neurobiology, 2005

Washington & Lee University, Neurobiology, 2005
Monell Institute, Philadelphia, PA, 2005
Porter Neuroscience Center, NIH, December 2005
University of Maryland Medical School, Dept. of Neurobiology, Baltimore, May 2006
AREADNE 2006, Encoding and Decoding of Neural Ensembles, Santorini, Greece, June 2006
Northwestern University, Dept. of Biomedical Engineering, Evanston, IL, November 2006
Conference on Brain Network Dynamics, UC Berkeley, January 2007
UC Irvine, Dept. of Neurobiology and Behavior, February 2007
Cornell University, Dept. of Neurobiology and Behavior, March 2007
UIUC Physics, Understanding Complex Systems meeting, Plenary talk, May 2007
SIAM - Minisymposium on Rhythms in the Brain, Snowbird, Utah, May 2007
University of British Columbia, Synchronous Rhythms in the Brain meeting, June 2007
ICIAM - Dynamical Systems Approaches in Neuroscience, Zurich, Switzerland, July 2007
Friedrich Miescher Institute, Basel, Switzerland, July 2007
"Olfactory information processing, learning and cognition – from molecules to behaviors" Fondation des Treilles, Tourtour, France, August 2007
Neuroscience Retreat, The University of Chicago, New Buffalo, MI, Sept 2007
The Rushton Lectures, Florida State University, December 2007
IIASS International School on Neural Networks, E. R. Caianiello course on The Dynamic Brain, Erice, Italy, December 2007
Boston University, Neurobiology Lecture Series, February 2008
Riken Brain Science Institute, Wako City, Saitama, Japan, September 2008
"Workshop on Dynamical Circuits in the Brain," Keynote speaker, Hokkaido Univ., Sapporo, Japan, Sept 2008
Winter Conference on Brain Research, session on "Cognitive modulation of sensory processing," Copper Mountain, CO, January 2009
COSYNE Workshop "Olfactory coding: Many roles of neural plasticity in shaping odor codes," Snowbird, UT, March 2009
Brandeis University Neurobiology Retreat, Keynote Speaker, Woods Hole, April 2009
Presidential Symposium, Association for Chemosensory Sciences (AChemS), Annual Meeting, Sarasota, FL, April 2009
International Conference on Cognitive Neurodynamics (ICCN'09), MS-5 Tamagawa-RIKEN Dynamic Brain Forum, Hangzhou, China, November, 2009
Northwestern University, Alzheimer's Disease Seminar Series, December 2009
Neurocognitive Networks, Florida Atlantic University, Boca Raton, FL, January 2010
Chemical Senses Seminar, University of Florida, Gainesville, February 2010
Banff International Research Station for Mathematical Innovation and Discovery (BIRS), "Linking neural dynamics and coding: correlations, synchrony, and information," October 2010
SUNY Binghamton, Undergraduate workshop and Dean's lecture in Integrative Neuroscience, October 2010
CNS seminar series (chosen by the graduate students), November 2010
American University, Behavior, Cognition and Neuroscience Program, April 2011
Plenary Speaker, 3rd International Conference on Cognitive Neurodynamics, Hokkaido, Japan, June 2011
University of California San Diego Neuroscience Seminar Series, Feb. 2011
Max Planck Institute for Medical Research, Heidelberg, Germany, May 2012
Paris - Chicago Conference on Neural Representations of Reality and Illusion, The University of Chicago Center in Paris, May 2012
Keynote speaker in "Olfaction across species and systems" at the German Zoological Society Meeting, Konstanz, Germany, Sept. 2012
MURI Winter School, Dynamics of Multifunction Brain Networks, UC San Diego, January 2013
Dynamic Brain Forum, Sigtuna, Sweden, June 2013
University of Illinois, Chicago, Integrative Neuroscience, December 2013

NYU Olfa-Club, June 2014
 Nathan Kline Institute, Orangeburg, NY, June 2014
 UT Arlington, Department of Psychology, September 2014
 Great Conversations, UChicago Graham School/Civic Knowledge Project, November 2014
 St. John's College, Friday Evening Lecture, Annapolis, MD, November 2014
 Northwestern University, Neurobiology, Evanston IL, December 2014
 National Institute for Mathematical and Biological Synthesis (NIMBioS) Investigative Workshop on *Large-scale modeling of olfactory processing*, University of Tennessee, Knoxville, TN, March 2015
 NSF Ideas Lab on Cracking the Olfactory Code, Janelia Farms, Ashburn, VA, June 2015- participant
 Deconstructing the Sense of Smell, Kavli Inst. for Theoretical Physics, UC Santa Barbara, July 2015
 St. John's College, Friday Evening Lecture, Santa Fe, NM, November 2015
 University of Tennessee Health Sciences Center, Memphis, TN, November 2015
 Walter J Freeman Festschrift at The Science of Consciousness, Tucson AZ, April 2016
 Loyola University, Neuroscience Seminar, Chicago IL, September 2016
 Haifa University, Neuroscience Seminar, Haifa, Israel, March 2017
 University of Florida, Center for Smell and Taste, October 2017

I. Submitted talks

Biological Neural Networks Session, World Congress on Neural Networks (WCNN'94)
 Computation and Neural Systems (CNS*95), Monterey, CA, July 1995
 Workshop on the Role and Control of Random Events in Biological Systems, Sigtuna, Sweden, 1995
 Consciousness and Intentionality, World Congress on Neural Networks, San Diego, 1996
 Computational Neuroscience 2002 (CNS*2002), Chicago, IL, 2002 (Featured talk)
 APS 16th Annual Convention, Chicago, 28 May, 2004 (Hot Topic talk)
 Cognitive Neurodynamics in Chemosensory Perception, APS 20th Annual Convention, Chicago, 2008
 Symposium on Feedback and Modulation in Chemical Senses, Association for Chemosensory Sciences (AChemS), Annual Meeting, Bonita Springs, FL (April 2015)

J. Research Support

Current and Pending

NIDCD R01 *CRCNS: Dynamical mechanisms of oscillation transitions in the olfactory system* (PI; \$1.9 million;
 CoInvestigator- Thomas Cleland, Cornell) 7/14 - 6/19
 DARPA: Context-dependent reconfiguration of an intelligent neural system 2/18 - 1/22
 (PI; \$2.3 million; subawards: Christiane Linster-Cornell and Risto Miikkulainen-UT Austin)

Completed

Big Ideas Generator (B.I.G.) Seed Grant, University of Chicago. *Redefining sensory information in perceiving brains* (\$45,790) 4/15 - 6/16
 NIDCD R01 (PI) *CRCNS-Multiple olfactory gamma oscillations: roles in sensation and attention*, (R01DC007995; Total \$1,329,289) 8/05 - 7/11
 VP for Research Seed Grant, U of Chicago, *Smelling time: olfactory, visual and auditory interactions in humans* (PI: \$8,191) 7/12 - 6/13
 Predoctoral NRSA to Jennifer Beshel (graduate student award) 9/06 - 3/08
 Center for Integrative Neuroscience and Neuroengineering Research Seed Grant (PI) 7/06 - 6/07
Testing odor coding hypotheses using microstimulation of the rat olfactory bulb
 CoPI: Phil Troyk, Illinois Inst of Technology (\$22,000)
 Social Sciences Division and Vice President for Research (PI) 7/06 - 6/07
Analysis of local and global synchrony in human EEG (\$13,500)
 Brain Research Foundation; *Quantitative analysis of odor mixture perception* (\$25,000) 7/05 - 6/06
 Brain Research Foundation; *Olfactory-hippocampal dynamics in natural behavior* (\$25,000) 7/03 - 6/04
 Brain Research Foundation; *Behavioral analysis of olfactory neuroanatomy* (\$50,000) 7/01 - 6/03

K. Service**1) Editorial**

Consulting editor for Behavioral Neuroscience (2008-)

Editorial Board for Cognitive Neurodynamics, Springer, Netherlands (2006-)

Guest Editor for PLOS Computational Biology (2012, 2015)

Ad hoc reviewer for Behavioral and Brain Sciences (BBS), Behavioural Processes, BMC Neuroscience, Brain Research, Case Reports in Medicine, Cerebral Cortex, Chemical Senses, Cognition, Current Biology, Developmental Psychology, eLife, Experimental Brain Research, Frontiers in Behavioral Neuroscience, Frontiers in Consciousness Research, Frontiers in Neural Circuits, Journal of Chemical Ecology, J Computational Neuroscience, Journal of Consciousness Studies, J Exp Biol, J Neurophysiology, J Neuroscience, J Neuroscience Methods, J Physiology, Hippocampus, Learning & Memory, Nature, Nature Communications, Nature Neuroscience, Neuron, Neuroscience, Neuroscience & Biobehavioral Reviews, Neuroscience Letters, Physiology & Behavior, PLOS One, PLOS Computational Biology, PNAS, Psychophysiology, Science, NSF, Israel Science Foundation

2) National and International

St. John's College Board of Visitors and Governors (2017-2020)

Advisor for St. John's College graduates (Santa Fe and Annapolis) interested in neuroscience (ongoing)

Undergraduate internship sponsor for St. John's College Ariel and Hodson fellowship programs (ongoing)

NSF-Santa Fe Institute advisory meeting on "Brain Science at the Interface of Biological, Physical and

Mathematical Sciences, Computer Science, and Engineering: Analysis of New Opportunities," 2007

National Science Foundation Advisory Panels on Computational Neuroscience and IOS (2004, 2006, 2015, 2016)

Board member of the Organization for Computational Neuroscience (2006-09)

Site Review, NICHD, Laboratory of Comparative Ethology (LCE/PDN), 2009, 2011

Program committee for the International Joint Conference in Neural Networks (IJCNN 2011)

Program committee for the Organization for Computational Neuroscience annual meeting (2004-06)

Program committee for the International Conference on Cognitive Neurodynamics (ICCN 07,09,11,13,15)

Reviewer for ICONIP 2007, 14th International Conference on Neural Information Processing

3) University**Current:**

Department of Psychology, Student Affairs Committee (2007-09, 2013-)

Department of Psychology, Steering Committee (2017-)

Committee on Computational Neuroscience Executive Committee (2006-)

Committee on Neurobiology Executive Committee (2006-09, 2017-)

Chair, Committee on Appointment Inequities (Faculty) (2015-)

Chair, Committee on Appointment Inequities (Other Academic Appointments) (2015-)

Faculty Advisory Council, Court Theatre (2017-)

Past:

Director, Institute for Mind and Biology (2008-14)

Chair, Integrative Neuroscience (2014-15)

Working Group on Equity and Diversity, Social Sciences Division (2016-17)

Advisor for Court Theatre production of The Hard Problem, Tom Stoppard (2017)

Chair, Psychology Lecturer Search Committee (2015)

Chair, Integrative Neuroscience faculty search committee (2008-09, 2010-11)

Department of Psychology Faculty Search Committee (2013-14)

Committee on Faculty Retirement and Oversight (July 2013-2016)

Department of Psychology, Steering Committee (2009-2011), Curriculum Committee Chair (2009-11)

Women in Science Project, supported by Assoc. Provost's office and Gender Studies (2009-14)

Neuroscience Institute Steering Committee (2008-09, 2010-11)

Council of the Faculty Senate (2008-11)

Panel member, “Motherhood and Success in Science & Engineering”, May 2009
 Neurobiology faculty search committee (2007-08)
 Biopsychology faculty search committee (2002-03, 2003-04, 2005-06)
 Univ. of Chicago Neuroscience Task Force (2005-06)

4) **Program/Lab**

Current PhD students:

Andrew Sheriff, Psychology, 3rd year; Yu Ji, Psychology, 3rd year; Rui He, Psychology, 2nd year

Former Graduate students:

Boleslaw Osinski, PhD, Biophysics, February 2018; Dissertation: *Understanding the generation mechanism of olfactory bulb beta oscillations through computational modeling, pharmacology, and electrophysiology of granule cells.*

Donald Frederick, PhD, Psychology, July 2014; Dissertation: *Olfactory system dynamics: the role of tasks and oscillations* (Postdoctoral Fellow at Institute for Quantitative Social Science (IQSS), Harvard University, Cambridge, MA)

Daniel Rojas-Líbano, PhD, Neurobiology, June 2011; Dissertation: *On the interplay between odorant properties and sniffing in the rat* (Assistant Professor, Laboratory of Cognitive and Social Neuroscience, Dept. of Psychology, Universidad Diego Portales, Santiago, Chile)

Jennifer Beshel, PhD, Psychology, February 2008; Dissertation: *Modulation of Olfactory System Oscillatory Dynamics by Task Demands* (Senior Research Scientist, Cold Spring Harbor Laboratory, NY)

Catherine Lowry, PhD, Neurobiology, November 2005; Dissertation: *Context and chemistry as factors for innate odor responses* (Assistant Professor of Psychology, Longwood University, VA)

Past rotation students: Emily Wyatt (Psychology), Zachary Haga (Psychology), Gabrielle Bloom Edgerton (Neurobiology), Jacob Reimer (Neurobiology), Chris Kim (Computational Neuroscience), Selina Baeza-Loya (Neurobiology), Claire McKinnon (Neurobiology)

Dissertation committees: Ewurama Shaw-Taylor (Biopsychology); Cecilia Sanders (MSTP: MD/PhD); Sylvan Shank (Psychology); Pascal Wallisch (Psychology); Andrew Clark (Psychology; reader); Tom Hummer (CNS); Michael Carroll (CNS); Jen Dwyer (CNS); Sean Bradley (Psychology); August Kampf-Lassen (Psychology); Tim Brawn (Psychology); Melissa Runfeldt (CNS); Erin Cable (Psychology); Serena Clos (Psychology); Joseph Arthurs (UIC); Brittany Cazakoff (CSHL)

Current PhD committees: Doreen Rhee (Neurobiology); Sophia Uddin (MD/PhD); Justin Losacco (University of Colorado, Denver)

Master's Students

Wenxi Xiao (Master of Arts Program in Computational Social Sciences, current)

Woodrow Gardiner (Master of Arts Program in the Social Sciences, 2017) - *The Role of the Orbitofrontal Cortex: An optogenetic study on the function of the orbitofrontal cortex in rule transfer*

Matthew Markowicz, (Master of Arts Program in the Social Sciences, 2010) - *How does it smell?*

Undergraduate Honors Theses:

Stephanie Tacopina (Psychology, 2010) - *Interactions between olfactory, affective and seasonal response systems*

Magdalena Krysiak (Psychology, 2006) – *Rodent Odor Psychophysics: How overshadowing of odorants in binary mixtures affects their future detectability*

David Paunesku (Psychology, 2005) – *The role of oscillatory synchrony in odor discrimination: how dopamine simultaneously affects neural synchrony and odor discrimination*

Erin Ables (Psychology, with Jill Mateo, 2005) – *Foundations for human kin recognition: The relationship between odor cues and degree of relatedness in humans*; awarded first prize at the First Annual Chicago Area Undergraduate Research Symposium at Northwestern University April, 2005

Undergraduates trained in the laboratory (UofC unless noted; **BOLD = Current**; SJC= St. John's College):

Alex Kim	Jacob Dink (SJC)	Jessica Ross (Middlebury)
Jacqueline Kloos	Shira Dinner	Meagen Scott (Grinnell)
Kendall Phillips	Bethany Fixsen	Matthew Shahoub
Sam Zheng	Hugh Gibbons	Lucy Shen
Katherine (Cora) Ames	Sarah Helfinstein	Riju Srimal
Tasneem Amina	Aiva levins	Carolyn Stephen (SJC)
Mary Elaine Barclay	Quincy John	John Strauch (SJC)
Lale Barlas	Christina Khou (Grinnell)	Jon Sussman
Evan Bernard	Magdalena Krysiak	Stephanie Tacopina
Elizabeth Brim	Philip Lazzara (SJC)	Bianca Tamez-Buccino
Austin Brown	Hannah Lee	Emily Tao (UCSD)
Dana Bryaska	Karl Neumann (McGill)	Jennifer Thorngate
Indira Cabrera (SJC)	Jessica Ng	Bryan Ulrich
Alexandra Carlson	Vivian Nguyen	Liam Warren (SJC)
Krishanu Chatterjee	Zeynep Okray	Cameron Westerback (SJC)
Sana Chaudry	Katherine Oosterbaan	Erin Wiles (SJC)
Tanja Crk	Sam Paskewitz (SJC)	Errett Williams
Kate D'Alo Place	David Paunesku	Jessica Zimmerberg-Helms (SJC)
Davi DaSilva	Rajeev Ram	

Postdoctoral Trainees:

Shane Peace, PhD, 2015- (current)

Claire Martin, PhD, 2005-07, Chargée de Recherche, Unité Biologie Fonctionnelle et Adaptative, Université Paris Diderot CNRS UMR 8251

5) Community

KAM Isaiah Israel Congregation, Chicago IL – Board Member 2010-16; Vice President, 2013-15; Treasurer 2015-16

L. Teaching

Mind, Undergraduate core course (SOSC 14100, 14300 2003-2008, 2013-15, 2017-)

Biological Psychology, Undergrad major course (PSYC 20300 annually, winter 2002-2011, 2013-15, 2017-)

Advanced Topics in Biological Psychology (PSYC 30300 2002-04, 2006, 2011; PSYC 40300 2013, 2015)

Animal Models in the Study of Cognition (PSYC 28910, spring 2015, 2017)

Psychological Statistics (PSYC 20100 autumn 2009)

Undergraduate Honors Seminar (PSYC 29800 autumn 2003-05)

Language and the Senses (Graduate seminar with Daniel Casasanto, PSYC 45650, winter 2017)

Multisensory Integration (Graduate seminar; PSYC 43850 spring 2014)

Neural Oscillations (Graduate seminar; PSYC 37155 spring 2006, 2009)

Olfaction and Cognition (Graduate seminar; PSYC 36900 spring 2005)

Trial Research (PSYC 42100 spring 2011)

Tutorial in Behavioral Neurophysiology (winter 2008)

Institute for Mind & Biology Proseminar (PSYC 37200 3 quarters each year 2003-04, 2006-07, 2010-11)

Dept. of Psychology Proseminar (PSYC 48000 autumn 2006)

M. Professional Organizations

American Association for the Advancement of Science (AAAS)

American Physiological Society (APS)

Association for Chemoreception Sciences (AChemS)

Society for Neuroscience (SFN)

N. Current Collaborators

Thomas Cleland, Dept. of Psychology, Cornell University

Christiane Linster, Dept. of Neurobiology and Behavior, Cornell University

Risto Miikkulainen, Computer Science and Neuroscience, Univ. of Texas at Austin

Brian Prendergast, Dept. of Psychology, The University of Chicago

O. Past Collaborators

Stephanie Dulawa, Nancy Kopell, Jelena Radulovic, Steven Shevell, Sid Tan