CURRICULUM VITAE

SARAH M. N. WOOLLEY

Department of Psychology
Center for Integrative Animal Behavior
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Academic Positions

2016 -	Professor, Department of Psychology and Zuckerman Institute, Columbia University, New York, NY
2014 -	Elected member, Kavli Institute for Brain Science, Columbia University, New York, NY
2013 - 2016	Chairperson, Department of Psychology, Columbia University, New York, NY
2011 - 2016	Associate Professor, Department of Psychology, Columbia University, New York, NY
2006 - 2011	Assistant Professor, Department of Psychology, Columbia University, New York, NY
2006	Visiting Professor, School of Medicine, University of Auckland, Auckland, New Zealand

Education

2001 - 2005	Postdoctoral Fellow, Neuroscience and Psychology, University of California, Berkeley, CA Advisor: Dr. Frederic E. Theunissen
1999 - 2001	Postdoctoral Fellow, Psychology University of Washington, Seattle, WA Advisor: Dr. John H. Casseday
1992 - 1999	Ph.D., Neurobiology and Behavior, School of Medicine, V. M. Bloedel Hearing Research Center University of Washington, Seattle, WA Advisor: Dr. Edwin W Rubel
1987 - 1991	B.A., Honors, Biology and Psychology, University of Colorado, Boulder, CO Advisor: Dr. Anne C. Bekoff

Grants/Fellowships/Awards

Current

2010 – 2021	NIH/NIDCD R01 (PI) *Neural coding and perception of learned vocalizations*
2015 – 2016	Kavli Institute for Brain Science (PI) *Organizing principles of speech and birdsong (Nima Mesgarani co-PI)*
2014 – 2017	National Science Foundation Graduate Fellowship (Faculty Mentor), *Laura DeSouza* Ford Foundation Graduate Fellowship (Faculty Mentor), *Laura DeSouza*
2014 – 2016	Croucher Foundation Graduate Fellowship (Faculty Mentor), *Nina So* 2016 nominee HHMI International Predoctoral Fellowship (Faculty Mentor), *Nina So*

Completed

2011 – 2014	HHMI International Predoctoral Fellowship (Faculty Mentor), *Structure and dynamics of functional interactions in neuronal populations and implications for optimal sensory coding (Ana Calabrese PI)*

2010 – 2013	NIDCD National Research Service Award (Faculty Mentor), *Discrimination of communication sounds in auditory scenes (David Schneider PI)*
2009 - 2013	National Science Foundation Research Grant (PI), *Co-evolution of auditory coding and vocal Behavior*
2007 - 2011	Searle Scholars Award
2009 - 2010	National Organization for Hearing Research (PI)
2006 - 2008	Gatsby Initiative in Brain Circuitry (co-PI with Liam Paninski)
2006	New Zealand International Science and Technology Award
2001	Individual National Research Service Award (NIDCD)
2000	University of Washington Royalty Research Award
1994	NIH Graduate Neuroscience Training Grant position
1991	Howard Hughes Medical Institute Fellowship
1990	Howard Hughes Medical Institute Fellowship

Professional Service

Ad hoc journal reviewer for: Nature, Neuron, Nature Neuroscience, Journal of Neuroscience, Proceedings of the National Academy of Sciences, Animal Behaviour, Current Biology, Hormones and Behavior, Journal of Neurophysiology, PLoS Biology, JASA, Developmental Neurobiology, European Journal of Neuroscience, Journal of Computational Neuroscience, Journal of Comparative Psychology, Journal of Comparative Physiology-A, PLoS ONE, Hearing Research, Biology Letters, Proceedings of the Royal Society Biology, Behavioral Neuroscience, Frontiers in Systems Neuroscience, Frontiers in Neuroendocrinology, Columbia Undergraduate Science Journal

Ad hoc grant reviewer for: National Institutes of Health Sensorimotor Integration (SMI) Scientific Study Group, National Institutes of Health AREA, National Science Foundation IOS Neural Systems & Behavioral Systems, National Science Foundation OISE IRFP, Human Frontiers Science Program, CUNY Faculty Research, Swiss National Science Foundation

Conference evaluator for: Gordon Research Conferences

Textbook reviewer for: Animal Behavior: An Evolutionary Perspective (Alcock), Principles of Animal Behavior (Dugatkin)

2017 - 2021	Scientific Review Group, Sensorimotor Integration Study Section, NIH
2016 -	Editor and author, updates to "Principles of Neural Science", textbook (Kandel, Schwartz, Jessell, Siegelbaum, Hudspeth)
2015 - 2016	Program Committee, 2016 International Congress on Neuroethology
	Trainee Professional Development Awards selection committee, Society for Neuroscience
2014	Scientific Review Group temporary member, Sensorimotor Integration Study Section, NIH
	Session organizer, satellite symposium of the Society for Neuroscience 2014 Annual Meeting, "Birdsong IV"
	Workshop provocateur and white paper contributor, National Science Foundation, "New Frontiers for the Integrative Study of Animal Behavior"
2014 - 2015	Co-editor, Developmental Neurobiology special issue "Neural Mechanisms of Behavioral Maturation"
	Chair, Developing Neuroethology Award committee, International Society for Neuroethology
	Nemko Prize for Cellular or Molecular Neuroscience committee, Society for Neuroscience
2013	Scientific Review Group member, NIH AREA Research Project Grants
	Co-organizer and session leader, satellite symposium of the Society for Neuroscience 2013 Annual Meeting, "Birdsong III: Mechanisms of Communication"

2012 - 2016	Elected Council member, International Society for Neuroethology
2012	Discussant, Auditory System Gordon Research Conference
2011	Session chair, HHMI Janelia Farm, "Producing and perceiving complex acoustic signals"
2010	Session moderator, Annual Eastern Auditory Retreat "neural processing"
2009	Workshop organizer, Computational and Systems Neuroscience Annual Meeting
	Symposium organizer, American Ornithologist Union Annual Meeting
	Symposium organizer, National Academy of Sciences/Kavli Frontiers of Science
	Chair, Society for Neuroscience (SfN) Songbird Social
2008	Symposium participant, National Academy of Sciences/Kavli Frontiers of Science
2007	Reviewing Editor for Columbia Undergraduate Science Journal
2006	Workshop participant, National Science Foundation/Santa Fe Institute Neuroscience

Professional Memberships

1994 -	Society for Neuroscience
1998 -	International Society for Neuroethology
2002 -	Association for Research in Otolaryngology
2007 -	American Psychological Association
	Association for Psychological Science
	New York Academy of Sciences
2010 -	American Physiological Society

Publications

1. Calabrese, A, **Woolley, SMN** (2015) Coding principles of the canonical cortical microcircuit in the avian brain. *PNAS*, 112: 3517-3522.
2. **Woolley, SMN**, Sanes, DH (2015) Introduction to the special issue on neural mechanisms of behavioral maturation. Dev Neurobio, 75: 1049-1050.
3. Hall, IC, **Woolley, SMN,** Kwong-Brown, U, Kelley, DB (2015) Sex differences and endocrine regulation of auditory-evoked, neural responses in African clawed frogs (*Xenopus*). *J Comp Physiol A*, 202: 17-34.
4. Schneider, DM, **Woolley, SMN** (2013) Sparse and background-invariant coding of vocalizations in auditory scenes. *Neuron*, 79: 141-152.
5. **Woolley, SMN** and Portfors, CV (2013) Conserved mechanisms of vocalization coding in mammalian and songbird auditory midbrain. *Hearing Res*, 305: 45-56.
6. **Woolley, SMN** (2013) The Songbird Auditory System. In: Animal Models of Speech and Language Disorders. S. Helekar ed. New York, Springer Press.
7. **Woolley, SMN** (2013) Mechanisms of perceiving communication sounds in scenes. *POMA*, 19: 1-5.
8. Hauber, ME, **Woolley, SMN**, Cassey, P, Theunissen, FE (2013) Experience dependence of neural responses to different classes of male songs in the primary auditory forebrain of female songbirds. *Beh Brain Res*, 243: 184-190.
9. **Woolley, SMN** (2012) Early experience shapes vocal neural coding and perception in songbirds. *Dev Psychobiol*, 54: 612-631.
10. Sanes, DH, **Woolley, SMN** (2011) A behavioral framework to guide research on central auditory development and plasticity. *Neuron*, 72: 912-929.
11. Schneider, DM, **Woolley, SMN** (2011) Extra-classical tuning predicts stimulus-dependent receptive fields in auditory neurons. *J Neurosci*, 31: 11867-11878.

12. Gess, A, Schneider, DM, Vyas, A, **Woolley, SMN** (2011) Automated auditory recognition training and testing. *Anim Behav,* 82: 285-293.

13. Schumacher, JW, Schneider, DM, **Woolley, SMN** (2011) Anesthesia modulates excitability but not spectral tuning or neural discrimination in auditory midbrain neurons. *J Neurophys*, 106: 500-514.

14. **Woolley, SMN** and Moore, JM (2011) Coevolution of communication senders and receivers: vocal behavior and auditory processing in multiple songbird species. *Ann NY Academy of Sciences*, 1225: 155-165.

15. Ramirez, AD, Ahmadian, Y, Schumacher, JW, Schneider, DM, **Woolley, SMN**, Paninski, L (2011) Incorporating naturalistic correlation structure improves spectrogram reconstruction from neuronal activity in the songbird auditory midbrain. *J Neurosci* 31: 3828-3842.

16. Lewi, J, Schneider, DM, **Woolley, SMN**, Paninski, L (2011) Automating the design of informative sequences of sensory stimuli. *J Comp Neurosci* 30: 181-200.

17. Calabrese, A, Schumacher, JW, Schneider, DM, Paninski, L and **Woolley, SMN** (2011) A generalized linear model for estimating spectrotemporal receptive fields from responses to natural sounds. *PLoS ONE*, http://dx.plos.org/10.1371/journal.pone.0016104.

18. Schneider, DM, **Woolley, SMN** (2010) Discrimination of communication vocalizations by single neurons and groups of neurons in the auditory midbrain. *J Neurophys* 103: 3248-3265.

19. Ranjard, L, Anderson, MG, Rayner, MJ, Payne, RJ, McLean, I, Briskie, JV, Ross, HA, Brunton, D, **Woolley, SMN**, Hauber, ME (2010) Bioacoustic distances between begging calls of brood parasites and their host species: a comparison of bioacoustic techniques. *Behav Ecol and Sociobiol* 64: 1915-1926.

20. Hauber, ME, Campbell, DLM, **Woolley, SMN** (2010) Functional role and female perception of male song in the zebra finch. *Emu* 110: 209-218.

21. **Woolley, SMN**, Hauber, ME, Theunissen, FE (2010) Developmental experience alters information coding in auditory midbrain and forebrain neurons. *Dev Neurobio* 70: 235-252.

22. **Woolley, SMN**, Gill, PR, Fremouw, TE, and Theunissen, FE (2009) Functional groups in the avian auditory system. *J Neurosci* 29: 2780-93.

23. Theunissen, FE, Amin, N, Shaevitz, S, **Woolley, SMN**, Fremouw, T and Hauber, ME (2008) Song selectivity and the songbird brain. In: Neuroscience of Birdsong. P Zeigler and P Marler eds. New York, Cambridge University Press.

24. **Woolley, SMN** (2008) Auditory feedback and singing in adult birds. In: Neuroscience of Birdsong. HP Zeigler and P Marler eds. New York, Cambridge University Press.

25. Gill, PR, **Woolley, SMN**, Fremouw, TE, and Theunissen FE (2008) What's that sound? Auditory area CLM encodes stimulus surprise, not intensity or intensity changes. *J Neurophys* 99: 2809-2820.

26. Hauber, ME, Cassey, P, **Woolley, SMN** and Theunissen, FE (2007) Neurophysiological response selectivity for conspecific songs over synthetic sounds in the auditory forebrain of non-singing female songbirds. *J Comp Physiol- A* 193: 765-774.

27. Hauber, ME, **Woolley, SMN**, and Theunissen, FE (2007) Learning, memory and mate choice: Early experience and neuronal discrimination of songs by female Zebra Finches. *J Ornithol* 48: 231-239.

28. Gill, PR Zhang, J, **Woolley, SMN**, Fremouw and TE, Theunissen, FE (2006) Sound representation methods for spectro-temporal receptive field estimation. *J Comput Neurosci* 21:5-20.

29. **Woolley, SMN,** Gill, P, and Theunissen, FE (2006) Stimulus-dependent auditory tuning results in synchronized population coding of vocalizations in the songbird midbrain. *J Neurosci* 26:2499-2512.

30. **Woolley, SMN**, Fremouw, TE, Hsu, A, and Theunissen, FE (2005) Tuning for spectro-temporal modulations as a mechanism for auditory discrimination of natural sounds. *Nat Neurosci* 8: 1371-1379.

31. **Woolley, SMN** and Casseday, JH (2005) Processing of modulated sounds in the zebra finch auditory midbrain: responses to noise, frequency sweeps and sinusoidal amplitude modulations. *J Neurophysiol* 94: 1143-1157.

32. **Woolley, SMN** (2004) Auditory Experience and Adult Song Plasticity. In: Behavioral Neurobiology of Birdsong. PH Zeigler and P Marler eds. *Ann NY Academy of Sciences* 1016: 208-221.

33. Theunissen, FE, **Woolley, SMN,** Hsu, A, and Fremouw, T (2004) Methods for analysis of auditory processing in the brain. In: Behavioral Neurobiology of Birdsong. PH Zeigler and P Marler eds. *Ann NY Academy of Sciences* 1016: 187-207.

34. Theunissen, FE, Amin, N, Shaevitz, S, **Woolley, SMN**, Fremouw, T and Hauber, ME (2004) Song Selectivity in the Song System and in the Auditory Forebrain. In: Behavioral Neurobiology of Birdsong. HP Zeigler and P Marler eds. *Ann NY Academy of Sciences* 1016: 222-245.

35. Hsu, A, **Woolley, SMN**, Fremouw, TE and Theunissen, FE (2004) Modulation and phase spectrum of natural sounds enhance neural discrimination performed by single auditory neurons. *J Neurosci* 24: 9201 -9211.

36. **Woolley, SMN** and Casseday, JH (2004) Response properties of single neurons in the zebra finch auditory midbrain: response patterns, frequency coding, intensity coding and spike latencies. *J Neurophysiol* 91: 136-151.

37. Brenowitz, EA and **Woolley, SMN** (2004) The avian song control system: a model for understanding changes in neural structure and function. In: Springer Handbook of Auditory Research, Plasticity of the Auditory System. TN Parks, EW Rubel, AN Popper and RR Fay eds. Springer, New York.

38. Rubel, EW, **Woolley, SMN,** Goode, CT and Fuchs, AF (2003) Hair cell regeneration reveals central nervous system plasticity in the avian brain. *Sem Hearing*: 24(2).

39. **Woolley, SMN** and Rubel, EW (2002) Vocal memory and learning in adult Bengalese finches with regenerated hair cells. *J Neurosci* 22: 7774-7787.

40. **Woolley, SMN**, Wissman, AM, and Rubel, EW (2001) Auditory thresholds and hair cell regeneration following aminoglycoside ototoxicity in Bengalese finches. *Hear Res* 153: 181-195.

41. Stone, JS, Choi, Y-S, **Woolley, SMN**, Yamashita, H and Rubel, EW (1999) Progenitor cell cycling during hair cell regeneration in the vestibular and auditory epithelia of the chick. *J Neurocytol* 28: 863-876.

42. **Woolley, SMN** and Rubel, EW (1999) High frequency auditory feedback is not required for adult song maintenance in Bengalese finches. *J Neurosci* 19: 358-371.

43. **Woolley, SMN** and Rubel, EW (1997) Bengalese finches *Lonchura Striata domestica* depend upon auditory feedback for the maintenance of adult song. *J Neurosci* 17: 6380-6390.

Popular Press Coverage/Public Outreach

Channel 13 (September 21, 2014) "Treasures of New York." Public Broadcasting Service
Adam Piore (March, 2013) "The Psychologist and the Song Writer" The Record
Annemarie Fertoli (February 22, 2013) "Birds, Music and the Brain" WNYC News, Morning Edition, National Public Radio

Café Science (February 13, 2013) "Singing and the Brain" with Jill Sobule, Craft, NYC
Studio 360 (September 20, 2012) "An Evening of Ignorance" The WNYC Greene Space
Charlotte Koldbye (July 8, 2011) "Det forbudte eksperiment (The forbidden experiment)", Weekendavisen, Denmark
Beth Kwon (February, 2011) "What Songbirds Can Teach Us about the Brain" The Record
Robert Siegel (June 29, 2007) "Scientist Studies Brain Process of Songbirds" All Things Considered, National Public Radio
Café Science (June 11, 2007) "Singing in the Brain" Picnic Café, Columbia Science Connection
Maria Emiliab (April 6, 2006) "Songbirds" Imagen Informativa con Pedro Ferriz de Con
Marit Haahr (January 28, 2003) "Hearing", The Infinite Mind, National Public Radio
Warren King (July 1, 2001) "Tiny finches may hold the key in UW research aimed at helping restore noise-damaged hearing", Seattle Sunday Times

Invited Talks (last 5 years)

International and national meetings

2016 Presidential Special Lecture, Society for Neuroscience Annual Meeting, San Diego, CA
forthcoming
2016 International Congress on Neuroethology, auditory processing, sound production and motor control satellite, Montevideo, Uruguay
American College of Laboratory Animal Medicine, Annual Conference, St. Pete, FL
2016 Society for Integrative and Comparative Biology, Annual Conference, Portland, OR
2015 9th Annual Canadian Neuroscience Conference, Vancouver, BC
Symposium on Learning about the Vocal World, Emory University, Atlanta, GA
2014 Plenary speaker, International Congress on Neuroethology, Sapporo, Japan
Gordon Research Conference, The Auditory System, Lewiston, ME
2013 Association for Research in Otolaryngology Annual Meeting, Baltimore, MD
International Congress on Acoustics, Montreal, Quebec, CA
2012 Society for Neuroscience Annual Meeting, New Orleans, LA
Natural Environments, Tasks and Intelligence Conference, Austin, TX
Computational and Systems Neuroscience Annual meeting, Salt Lake City, UT
CUNY Animal Behavior Institute annual meeting, New York, NY
2011 Society for Neuroscience Annual Meeting, Washington DC
Symposium on the Neuroscience of Music, Italian Academy, Columbia University, New York, NY
Janelia Farm, HHMI "Model systems in producing and perceiving vocalizations"

University seminars and small meetings

2016 University of Chicago, Neurosciences Graduate Programs Retreat, New Buffalo, MI
Colorado State University, Neurosciences, Fort Collins, CO
Spotify, New York, NY
Boston University, Hearing Research Center, Boston, MA
Johns Hopkins University, Neurobiology, Baltimore, MD
Duke University, Neurobiology, Durham, NC
2015 National Institute for Deafness and Other Communication Disorders, Bethesda, MD
University of California at Berkeley, Neuroscience, Berkeley, CA
University of Southern California, Neuroscience, Los Angeles, CA
Princeton University, Psychology and Neuroscience, Princeton, NJ
Yale University, Psychology, New Haven, CT
Comparative Neural Circuits meeting, Jackson Hole, WY

2014	New York Genome Center, New York, NY
	Columbia University Teacher's College, New York, NY
2013	Winthrop University Hospital, Mineola, NY
	Queens College, CUNY
2012	University of California San Diego
	Woods Hole Marine Biological Laboratories, Neural Systems and Behavior
	University of Pennsylvania
	Boston University
	Columbia University senior administrative officers meeting
	Columbia University Medical Center Child and Adolescent Psychiatry Grand Rounds
2011	Harvard University Medical School
	Johns Hopkins University
	New York University, Center for Neural Science
	Northeastern Ohio Medical Colleges

Courses (last 5 years)

Communicating Science, graduate seminar, Psychology/Neurobiology and Behavior
Animal Behavior, undergraduate lecture course, Psychology
Research Seminar in Auditory Neuroscience, graduate seminar, Psychology/Neurobiology and Behavior
Survey of Neuroscience, graduate course, Neurobiology and Behavior
Proseminar, Neural Basis of Behavior, graduate seminar, Psychology
Auditory Perception, undergraduate seminar, Psychology
Neuroethology, graduate seminar, Psychology/Neurobiology and Behavior
Psychology Honors Program, Director and Instructor