

# SLIMAN J. BENSMAIA

September 2018

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## CONTACT INFORMATION

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Lab website: <http://bensmaialab.org>

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## EDUCATION

B.A. Cognitive Science, May 1995, University of Virginia

M.S. Cognitive Psychology, May 1999, University of North Carolina at Chapel Hill

Ph.D. Cognitive Psychology with a minor in neurobiology, May 2003, University of North Carolina at Chapel Hill – Advisor: Mark Hollins

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## RESEARCH EXPERIENCE

07/2015 – present Associate Professor, Department of Organismal Biology and Anatomy, University of Chicago.  
09/2009 – 07/2015 Assistant Professor, Department of Organismal Biology and Anatomy, University of Chicago.  
03/2006 – 09/2009 Associate Research Scientist, Krieger Mind/Brain Institute, Johns Hopkins University.  
09/2003 – 03/2006 Postdoctoral Fellow, Krieger Mind/Brain Institute, Johns Hopkins University – Advisor: Kenneth Johnson.

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## AWARDS

2002 Baughman Award for Innovative Dissertation Projects, Department of Psychology, University of North Carolina at Chapel Hill.  
2011 Early Career Award, National Science Foundation.  
2013 Early Career Award, IEEE Technical Committee on Haptics.  
2014 Distinguished Alumnus Award, University of North Carolina Department of Psychology.  
2015 Distinguished Investigator Award, University of Chicago Biological Sciences Division.

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**TEACHING**

2017	Survey of Systems Neuroscience, course director.
2014, 2017	Medical Robotics, Northwestern University, guest lecturer.
2012 – present	Methods in Computational Neuroscience, course director. Core course in Computational Neuroscience, 15-20 undergraduate and graduate students.
2009 – present	Integrative Organismal Biology, guest lecturer.
2009 – present	Topics in Integrative Organismal Biology, guest lecturer.
2009 – 2016	Systems Neuroscience (undergraduate), guest lecturer.
2009 – present	Systems Neuroscience (graduate), guest lecturer.
2009 – 2011	Computational Neuroscience 2, course director (co-taught with D. Freedman, L. Osborne, J. Maclean, M. Sherman). Core course in Computational Neuroscience, 15-20 undergraduate and graduate students.
2007	Primate Physiology, course director (co-taught with S. Hendry).
2001 – 2003	Sensation and Perception, teaching fellow.
2000	Sensation and Perception, teaching assistant (taught by M. Hollins).

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**ACADEMIC COMMITTEES AND SERVICE**

2016-present	Admissions Committee, Computational Neuroscience, chair
2011, 2015	Admissions Committee, Neurobiology and Computational Neuroscience
2014	Organizing committee, University of Chicago day
2013-present	Darwinian Cluster Retreat Committee, chair
2012-present	Committee on Teaching Assistantships
2012	Preliminary Examination Committee, Committee on Neurobiology
2011	Organismal Biology and Anatomy Neuroscience Search Committee
2010-present	Executive Committee, Computational Neuroscience
2010	Neurobiology and Computational Neuroscience Admissions Committee
2010, 2011	Tactile Research Group meeting, co-organizer

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**SOCIETY MEMBERSHIPS**

Society for Neuroscience, American Physiological Society, Tactile Research Group, Technical Committee on Haptics, Institute for Electrical and Electronics Engineers

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**EDITORIAL BOARDS**

Attention, Perception and Psychophysics (consulting editor)  
Encyclopedia of Computational Neuroscience (associate editor)  
Frontiers in Computational Neuroscience (associate editor)

Nature Scientific Reports (editorial board member)  
PLoS ONE (academic editor)

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#### AD HOC REVIEWER

Department of Defense; National Institutes of Health; National Science Foundation; Israeli Science Foundation; Netherlands Organization for Scientific Research; Biotechnology and Biological Sciences Research Council; COSYNE; Nature; Science; Science – Translational Medicine; Proceedings of the National Academy of Science; Neuron; Nature Neuroscience; Trends in Cognitive Sciences; Trends in Neuroscience; eLife; Journal of Neuroscience; Journal of Neurophysiology; Journal of Neural Engineering; Journal of Neuroscience Methods; Experimental Brain Research; Somatosensory and Motor Research; PLoS ONE; PLoS Computational Biology; IEEE Transactions on Biomedical Engineering; IEEE Transactions on Haptics; IEEE Transactions on Robotics; IEEE Transactions on Neural Systems and Rehabilitation Engineering; IEEE Virtual Reality; BMC Neuroscience; Brain Research; Perception; Neuroscience Letters; Consciousness and Cognition; Perception.

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#### PUBLICATIONS

1. Okorokova, E.V., He, Q., & Bensmaia, S.J. (in press). Biomimetic encoding model for restoring touch in bionic hands through a nerve interface, *Journal of Neural Engineering*.
2. Graczyk, E.L., Delhaye, B.P., Scheifer, M.A., Bensmaia, S.J., & Tyler, D.J. (in press). Sensory adaptation to electrical stimulation of the somatosensory nerves, *Journal of Neural Engineering*.
3. Delhaye, B.P., Long, K.H., & Bensmaia, S.J. (in press). The neural basis of touch and proprioception in primate cortex, *Comprehensive Physiology*.
4. Boundy-Singer, Z.M., Saal, H.P., & Bensmaia, S.J. (2017). Speed invariance of tactile texture perception, *Journal of Neurophysiology*.
5. Saal, H.P., Suresh, A.K., Solorzano, L.E., Weber, A.I., & Bensmaia, S.J. (2017). The effect of contact force on the responses of tactile nerve fibers to scanned textures, *Neuroscience*.
6. Lieber, J.D., Xia, X., Weber, A.I., and Bensmaia, S.J. (2017). The neural code for tactile roughness in the somatosensory nerves, *Journal of Neurophysiology*.
7. Suresh, A.K., Winberry, J., Versteeg, C., Chowdhury, R.H., Tomlinson, T., Rosenow, J.M., Miller, L.E., and Bensmaia, S.J. (2017). Methodological considerations for a chronic neural interface with the cuneate nucleus of macaques, *Journal of Neurophysiology*.
8. Saal, H.P., Delhaye, B.P., Rayhaun, B.C., & Bensmaia, S.J. (2017). Simulating tactile signals from the whole hand with millisecond precision, *Proceedings of the National Academy of Sciences*.
9. Goodman, J.M. & Bensmaia, S.J. (2017). A variation code accounts for the perceived roughness of coarsely textured surfaces, *Scientific Reports*.

10. Bensmaia, S.J. & Horch, K.W. (2017). Somatic sensation, in *Neuroprosthetics: Theory and Practice*.
11. Makin, T.R. & Bensmaia, S.J. (2017). Stability of sensory topographies in adult somatosensory cortex, *Trends in Cognitive Sciences*, 21, 195-204.
12. Kim, S.S., Callier, T., and Bensmaia, S.J. (2017). A computational model that predicts behavioral sensitivity to intracortical microstimulation, *Journal of Neural Engineering*, 14.
13. Delhaye, B.P., Saal, H.P., & Bensmaia, S.J. (2016). Key considerations in designing a somatosensory neuroprosthesis, *Journal of Physiology – Paris*.
14. Flesher, S.N., Collinger, J.L., Foldes, S.T., Weiss, J.M., Downey, J.E., Tyler-Kabara, E.C., Bensmaia, S.J., Schwartz, A.B., Boninger, M.L., & Gaunt, R.A. (2016). Intracortical microstimulation of human somatosensory cortex, *Science Translational Medicine*, 8, 361ra141.
15. Graczyk, E.L., Schiefer, M.A., Saal, H.P., Delhaye, B.P., Bensmaia, S.J., & Tyler, D.J. (2016). The neural basis of perceived intensity in natural and artificial touch, *Science Translational Medicine*, 8, 362ra142.
16. Suresh, A.K., Saal, H.P., & Bensmaia, S.J. (2016). Edge orientation signals in tactile afferents of macaques, *Journal of Neurophysiology*, 116, 2647-2655.
17. Bensmaia, S.J. & Goodman, J.M. (in press). Touch, in John Wixted (ed) *The Stevens Handbook of Experimental Psychology and Cognitive Neuroscience*, John Wiley & Sons, New York, NY.
18. Saal, H.P., Wang, X., & Bensmaia, S.J. (2016). Importance of spike timing in touch: an analogy with hearing? *Current Opinion in Neurobiology*, 40, 142-149.
19. Delhaye, B.P., Schluter, E.W., & Bensmaia, S.J. (2016). Robo-Psychophysics: extracting behaviorally relevant features from the output of sensors on a prosthetic finger, *IEEE Transactions on Haptics*, 9, 499-507.
20. Yau, J.M., Kim, S.S., Thakur, P.S., & Bensmaia, S.J. (2016). Feeling form: the neural basis of haptic shape perception, *Journal of Neurophysiology*, 115, 631-42.
21. Saal, H.P., Harvey, M.A., & Bensmaia, S.J. (2015). Rate and timing of cortical responses driven by separate sensory channels, *eLife*, 10450.
22. Callier, T., Saal, H.P., Tabot, G.A., Kim, S., & Bensmaia, S.J. (2015). Feeling through a bionic hand, *Journal of the Homeland Defense and Intelligence Analysis Center*, 1, 19-22.
23. Cho, Y., Craig, J.C., Hsiao, S.S., & Bensmaia, S.J. (2015). Vision is superior to touch even with equivalent peripheral input, *Journal of Neurophysiology*, 115, 92-99.
24. Kim, S., Callier, T., Tabot, G.A., Tenore, F.V., & Bensmaia, S.J. (2015). Behavioral assessment of sensitivity to intracortical microstimulation of primate somatosensory cortex, *Proceedings of the National Academy of Science*, 112, 15202-7.
25. Rajan, A.T., Boback, J.L., Dammann, J.F., Tenore, F.V., Wester, B.A., Otto, K.J., Gaunt, R.A., & Bensmaia, S.J. (2015). The effects of intracortical microstimulation on neural tissue and fine motor behavior, *Journal of Neural Engineering*, 12, 066018.
26. Pack, C.C. & Bensmaia, S.J. (2015). Seeing and feeling motion: canonical computations in vision and touch, *Public Library of Science Biology*, 13, e1007721.

27. Callier, T., Schluter, E.W., Tabot, G.A., Miller, L.E., Tenore, F.V., & Bensmaia, S.J. (2015). Long-term stability of sensitivity to intracortical microstimulation of somatosensory cortex, *Journal of Neural Engineering*, 12, 056010.
28. Saal, H.P. & Bensmaia, S.J. (2015). Biomimetic approaches to bionic touch through a peripheral nerve interface, *Neuropsychologia*, 79, 344-353.
29. Bensmaia, S.J. (2015). Biological and bionic hands: natural neural coding and artificial perception, *Philosophical Transactions of the Royal Society B*, 370, 20140209.
30. Bensmaia, S.J. & DiCarlo, J.J. (2015). Steven Hsiao: In Memoriam, *Neuron*, 85, 458-461.
31. Callier, T., Saal, H.P., Davis-Berg, E.C., & Bensmaia, S.J. (2015). Kinematics of unconstrained tactile texture exploration, *Journal of Neurophysiology*, 113, 3013-3020.
32. Kim, S., Callier, T., Tabot, G.A., Tenore, F.V., & Bensmaia, S.J. (2015). Sensitivity to microstimulation of somatosensory cortex distributed over multiple electrodes, *Frontiers in Systems Neuroscience*, 9, 47.
33. Pei, Y.C. & Bensmaia, S.J. (2014). The neural basis of tactile motion perception, *Journal of Neurophysiology*, 112, 3023-3032.
34. Tabot, G.A., Kim, S.S., & Bensmaia, S.J. (2015). Restoring tactile and proprioceptive sensation through a brain interface, *Neurobiology of Disease*, 83, 191-198.
35. Saal, H.P. & Bensmaia, S.J. (2014). Touch is a team effort: Interplay of submodalities in cutaneous sensibility, *Trends in Neuroscience*, 37, 689-697.
36. Bensmaia, S.J. & Miller, L.E. (2014). Restoring sensorimotor function through intracortical interfaces: progress and looming challenges, *Nature Reviews Neuroscience*, 15, 313-325.
37. Manfredi, L.R., Saal, H.P., Brown, K.J., Zielinski, M.C., Dammann, J.F., Polashock, V.S., & Bensmaia, S.J. (2014). Natural scenes in tactile texture, *Journal of Neurophysiology*, 111, 1792-802.
38. Chen, K.H., Dammann, J.F., Boback, J.L., Tenore, F.V., Otto, K.J., Gaunt, R.A., & Bensmaia, S.J. (2014). The effect of chronic intracortical microstimulation on the electrode-tissue interface, *Journal of Neural Engineering*, 11.
39. Pei, Y.C., Lee, T.C., Chang, T.Y., Ruffatto, D., Spenko, M., Bensmaia, S.J. (2014). A multi-digit tactile motion stimulator, *Journal of Neuroscience Methods*.
40. Bensmaia, S.J. (2014). Somatosensory prosthesis, in R. Jung & D. Jaeger (eds) *The Encyclopedia of Computational Neuroscience*, Springer Publishing Company, New York, NY.
41. Bensmaia, S.J. & Tillery, S.H. (2014). Tactile feedback from the hand, in R. Balasubramian, V.J. Santos, & Y. Matsuoka (eds) *The Human Hand: A Source of Inspiration for Robotic Hands*, Springer Publishing Company, New York, NY.
42. Zaidi, Q., Victor, J., McDermott, J., Geffen, M., Bensmaia, S., & Cleland, T. (2013) Perceptual Spaces: Mathematical structures to neural mechanisms, *Journal of Neuroscience*.
43. Tabot, G.A., Dammann III, J.F., Berg, J.A., Tenore, F.V., Boback, J.L., Vogelstein, R.J., & Bensmaia, S.J. (2013). Restoring the sense of touch with a prosthetic hand through a brain interface, *Proceedings of the National Academy of Science*, 110, 18279-84.

44. Weber, A.I., Saal, H.P., Lieber, J.D., Cheng, J.-W., Manfredi, L.R., Dammann III, J.F., & Bensmaia, S.J. (2013). Spatial and temporal codes mediate the tactile perception of natural textures, *Proceedings of the National Academy of Science*, 110, 17107-12.
45. Berg, J.A., Dammann, J.F., Tenore, F.V., Tabot, G.A., Boback, J.L., Manfredi, L.R., Peterson, M.L., Katyal, K.D., Johannes, M.S., Makhlin, A., Wilcox, R., Franklin, R.H., Vogelstein, R.J., Hatsopoulos, N.G., & Bensmaia, S.J. (2013). Behavioral demonstration of a somatosensory neuroprosthesis, *IEEE Transactions in Neural Systems and Rehabilitation Engineering*, 21, 500-507.
46. Harvey, M.A., Saal, H.P., Dammann, J.F., & Bensmaia, S.J. (2013). Multiplexing stimulus information through rate and temporal codes in primate somatosensory cortex, *PLoS Biology*, 11, e1001558.
47. Dong, Y., Mihalas, S., Kim, S.S., Yoshioka, T., Bensmaia, S.J., & Niebur, E. (2013). A simple model of mechanotransduction in primate glabrous skin, *Journal of Neurophysiology*, 109, 1350-9.
48. Cheng, J., Weber, A., & Bensmaia, S.J. (2013). Comparing the effects of isoflurane and pentobarbital on the responses of cutaneous mechanoreceptive afferents, *BMC Anesthesiology*, 13, 10.
49. Mackevicius, E.L., Best, M.D., Saal, H.P. & Bensmaia, S.J. (2012). Millisecond precision spike timing shapes tactile perception, *Journal of Neuroscience*, 32, 15309-17.
50. Armiger, R.S., Tenore, F.V., Katyal, K.D., Johannes, M.A., Makhlin, A., Natter, M.L., Colgate, J.E., Bensmaia, S.J., & Vogelstein, R.J. (2013). Enabling closed-loop control of the modular prosthetic limb through haptic feedback, *Johns Hopkins Applied Physics Laboratory Digest*, 31, 345-353.
51. Manfredi, L.R., Baker, A.T., Elias, D.O., Dammann, J.F., Zielinski, M.C., Polashock, V.S., & Bensmaia, S.J. (2012). The effect of surface wave propagation on neural responses to vibration in primate glabrous skin, *PLoS ONE*, 7: e31203.
52. Bensmaia, S.J. & Manfredi, L.M. (2012). The sense of touch, in V.S. Ramachandran's (ed) *Encyclopedia of Human Behavior*, Elsevier, Amsterdam.
53. Kim S.S., Mihalas S., Russel A., Dong, Y. & Bensmaia, S.J. (2011). Does afferent heterogeneity matter in conveying tactile feedback through peripheral nerve stimulation? *IEEE Transactions in neural systems and rehabilitation engineering*, 19, 514-520.
54. Pei, Y.C., Hsiao, S.S., Craig, J.C. & Bensmaia, S.J. (2011). Neural mechanisms of tactile motion integration in somatosensory cortex, *Neuron*, 69, 536-547.
55. Yau, J.M., Weber, A.I., & Bensmaia, S.J. (2010). Separate mechanisms for audio-tactile pitch and loudness interactions, *Frontiers in Perception Science*, 1.
56. Bensmaia, S.J. & Yau, J.M. (2011). The organization and function of the somatosensory cortex, in M. Hertenstein & S. Weiss (eds) *Handbook of Touch*, Springer Publishing Company, New York, New York.
57. Kim, S.S., Sripati, A.P., & Bensmaia, S.J. (2010). Predicting individual spikes evoked by tactile stimulation of the hand, *Journal of Neurophysiology*, 104, 1484-1496.
58. Pei, Y.C., Hsiao, S.S., Craig, J.C. & Bensmaia S.J. (2010). Shape invariant coding of motion direction in somatosensory cortex, *PLoS Biology*, 8, e1000305.

59. Bensmaia, S.J. (2010) Tactile acuity, in B. Goldstein (ed) *The Encyclopedia of Perception*, pp 947-950, Sage publications, Inc., Thousand Oaks, CA.
60. Bensmaia, S.J. (2010) Vibratory perception, in B. Goldstein (ed) *The Encyclopedia of Perception*, pp 1029-1032, Sage publications, Inc., Thousand Oaks, CA.
61. Kim, S., Sripati, A.P., Vogelstein, R.J., Armiger, R.S., Russel, A.F., & Bensmaia, S.J. (2009). Conveying tactile feedback in sensorized hand neuroprostheses using a model of mechanotransduction, *IEEE Transactions in Biomedical Circuits and Systems*, 3, 398-404.
62. Pei, Y.C., Denchev P.V., Hsiao, S.S., Craig, J.C. & Bensmaia, S.J. (2009). Convergence of submodality specific input onto neurons in primary somatosensory cortex, *Journal of Neurophysiology*, 102, 1843-1853.
63. Yau, J.M., Hollins M., & Bensmaia, S.J. (2009). Textural timbre: the perception of surface microtexture depends in part on multimodal spectral cues, *Communicative and Integrative Biology*, 2, 1-3.
64. Yau, J.M., Olenczak, J.B., Dammann, J.F. & Bensmaia, S.J. (2009). Temporal frequency channels linked across audition and touch, *Current Biology*, 19, 561-566.
65. Pei, Y.C., Hsiao S.S., & Bensmaia, S.J. (2008). The tactile integration of local motion cues is analogous to its visual counterpart, *Proceedings of the National Academy of Science*, 105, 8130-8135.
66. Russell, A.F., Armiger, R.S., Vogelstein R.J., Bensmaia S.J., & Etienne-Cummings R. (2009). Real-time implementation of a biofidelic SA1 model for tactile feedback, *Proceedings of the IEEE Engineering in Medicine and Biology Society Conference*, 1, 185-188.
67. Craig, J.C., Rhodes, R.P., Gibson, G.O. & Bensmaia, S.J. (2008). Discriminating smooth from grooved surfaces: Effects of random variations in skin penetration, *Experimental Brain Research*, 188, 331-340.
68. Bensmaia, S.J., Denchev, P.V., Dammann, J.F., Craig, J.C., & Hsiao, S.S. (2008). The representation of stimulus orientation in the early stages of somatosensory processing, *Journal of Neuroscience*, 28, 776-786.
69. Bensmaia, S.J., Hsiao, S.S., Denchev, P.V., Killebrew, J.H., & Craig J.C. (2008). The tactile perception of stimulus orientation, *Somatosensory and Motor Research*, 25, 49-59.
70. Bensmaia, S.J., Kim, S.S., Sripati, A.P. & Vogelstein, R.J. (2008). Conveying tactile feedback using a model of mechanotransduction, *Proceedings of IEEE Biomedical Circuits and Systems Conference*, Baltimore, MD.
71. Bensmaia, S.J. (2008) Tactile intensity and population codes, *Behavioural Brain Research*, 190, 165-173 (invited review).
72. Hsiao, S.S. & Bensmaia, S.J. (2008) Coding of object shape and texture, in JH Kaas and E Gardner (eds) *Somatosensation*, Volume 6 of *AI Basbaum, A Kaneko, GM Shepherd, and G Westheimer, The Senses - A comprehensive reference*, pp 55 - 66, Academic Press / Elsevier, Oxford.
73. Muniak, M.A., Ray, S., Hsiao, S.S., Dammann, J.F., & Bensmaia, S.J. (2007). The neural coding of stimulus intensity: linking the population response of mechanoreceptive afferents with psychophysical behavior, *Journal of Neuroscience*, 27, 11687-11699.

74. Yoshioka, T., Bensmaia, S.J., Craig, J.C., & Hsiao, S.S. (2007). Texture perception through direct and indirect touch: An analysis of perceptual space for tactile textures in two modes of exploration, *Somatosensory and Motor Research*, 24, 53-70.
75. Killebrew, J.H., Bensmaia, S.J., Dammann, J.F., Denchev, P., Hsiao, S.S., Craig, J.C. & Johnson, K.O. (2007). A dense array stimulator to generate arbitrary spatio-temporal tactile stimuli, *Journal of Neuroscience Methods*, 161, 62-74.
76. Hollins, S.S. & Bensmaia, S.J. (2007). The coding of roughness, *Canadian Journal of Experimental Psychology*, 61, 184-195.
77. Bensmaia, S.J., Killebrew, J.H. & Craig, J.C. (2006). Influence of visual motion on tactile motion perception, *Journal of Neurophysiology*, 96, 1625-1637.
78. Sripathi, A.P., Bensmaia, S.J., & Johnson, K.O. (2006). A continuum mechanical model for mechanoreceptive afferent responses to indented spatial patterns, *Journal of Neurophysiology*, 95, 3852-3864.
79. Bensmaia, S.J., Craig, J.C., & Johnson, K.O. (2006). Temporal factors in tactile spatial acuity: Evidence for RA interference in fine spatial processing, *Journal of Neurophysiology*, 95, 1783-1791.
80. Bensmaia, S.J., Craig, J.C., Yoshioka, T., & Johnson, K.O. (2006). SA1 and RA responses to static and vibrating gratings, *Journal of Neurophysiology*, 95, 1771-1782.
81. Leung, Y.Y.M., Bensmaia, S.J., Hsiao, S.S. & Johnson, K.O. (2005). Time course of vibratory adaptation and recovery in cutaneous mechanoreceptive afferents, *Journal of Neurophysiology*, 94, 3037-3045.
82. Bensmaia, S.J., Leung, Y.Y.M., Hsiao, S.S. & Johnson, K.O. (2005). Vibratory adaptation of cutaneous mechanoreceptive afferents, *Journal of Neurophysiology*, 94, 3023-3036.
83. Bensmaia, S.J. & Hollins, M. (2005). Pacinian representation of fine surface texture, *Perception & Psychophysics*, 67, 842-854.
84. Bensmaia, S.J., Hollins, M., & Yau, J. (2005). Vibrotactile frequency and intensity information in the Pacinian system: a psychophysical model, *Perception & Psychophysics*, 67, 828-841.
85. Bensmaia, S.J. & Hollins, M. (2003). The vibrations of texture, *Somatosensory and Motor Research*, 20, 33-43.
86. Bensmaia, S. (2002). A transduction model of the Meissner corpuscle, *Mathematical Biosciences*, 176, 203-217.
87. Hollins, M., Bensmaia, S. J., & Roy, E. A. (2002). Vibrotaction and texture perception, *Behavioural Brain Research*, 135, 51-56.
88. Hollins, M., Bensmaia, S., & Washburn, S. (2001). Vibrotactile adaptation impairs discrimination of fine, but not coarse, textures, *Somatosensory and Motor Research*, 18, 253-262.
89. Hollins, M., Bensmaia, S., Karlof, K., & Young, F. (2000). Individual Differences in Perceptual Space for Tactile Textures: Evidence from Multidimensional Scaling, *Perception & Psychophysics*, 62, 1534-1544.
90. Bensmaia, S. & Hollins, M. (2000). Complex tactile waveform discrimination, *Journal of the Acoustical Society of America*, 108, 1236-1245.



91. Hollins, M., Bensmaia, S., & Risner, R. (1998). The duplex theory of tactile texture perception. In Grondin, S., & Lacouture, Y. (Eds.), *Fechner Day 98. Proceedings of the Fourteenth Annual Meeting of the International Society for Psychophysics* (pp. 115-120). Québec, Canada: The International Society for Psychophysics.

(Articles in italics were featured articles in their respective issues)

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#### **PATENTS**

System and method for simulating biofidelic signals (co-inventor) – US Patent Pending 13/541791 – A system for simulating biomimetic neuronal signals to be used to convey sensory feedback in neuroprostheses.

Tactile motion stimulator (co-inventor) – China Patent Approved, Taiwan Patent Pending – Stimulator that can deliver motion stimuli to multiple fingers simultaneously.

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#### **INVITED TALKS AND SYMPOSIA**

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| 08/2018 | Hand, Brain, and Technology Conference, Monte Verita, Switzerland.                            |
| 07/2018 | Unit of Neuroscience, Information, and Complexity, CNRS, Paris, France                        |
| 06/2018 | Labex Cortex, Universite de Lyon, Lyon, France.   |
| 05/2018 | International Brain Computer Interfaces Meeting, Asilomar, CA.                                |
| 05/2018 | Center for Integrative Neuroscience, Karl Eberhards Universität, Tübingen, Germany.           |
| 05/2018 | Midwest Monkey Manifolds for Movement Meeting, Shirley Ryan Ability Lab, Chicago, IL.         |
| 05/2018 | American Society of Mechanical Engineers, Naperville, IL.                                     |
| 04/2018 | Department of Neuroscience, Baylor College of Medicine, Houston, TX.                          |
| 04/2018 | Center for Functional Electrical Stimulation, Case Western Reserve University, Cleveland, OH. |
| 03/2018 | Netherlands Institute for Neuroscience, Amsterdam, Netherlands.                               |
| 03/2018 | Helmholtz lecture, Helmholtz Institute, Utrecht, Netherlands.                                 |
| 02/2018 | Winter School of Biomedical Engineering, American University in Beirut, Beirut, Lebanon.      |
| 02/2018 | DARPA HAPTIX principal investigator meeting, Charleston, SC (invited speaker).                |
| 02/2018 | University of California at San Diego, Department of Neuroscience, San Diego, CA              |
| 01/2018 | Georgia Institute of Technology, Department of Biomedical Engineering, Atlanta, GA.           |
| 01/2018 | University of Geneva, Neuroscience Center, Geneva, Switzerland.                               |
| 12/2017 | Department of Psychology, University of Sydney, Sydney, Australia.                            |
| 12/2017 | Australasian Neuroscience Society, Sydney, Australia.   |

11/2017 Frontiers in neuroscience and technology, Zhejiang University Interdisciplinary Institute of Neuroscience and Technology, Hangzhou, China.

10/2017 Brain-computer interfaces: Science and practice, Samara State Medical University, Samara, Russia.

08/2017 Pangborn sensory science symposium, Providence, RI.

08/2017 Summer school in translational neuroscience, Zermatt, Switzerland.

08/2017 Sci Foo, Googleplex, Mountain View, CA.

06/2017 Conference of the International Graphonomics Society (invited speaker), Gaeta, Italy.

06/2017 Startup Village (invited speaker), Moscow, Russia.

05/2017 The Future of Humans & Machines: Partnership, Fusion, or Fear? Johns Hopkins University Applied Physics Laboratory, Laurel, MD (invited speaker on panel entitled "Machines a Part of Us!").

05/2017 Center for Neuroscience, University of California at Davis, Davis, CA.

05/2017 Department of Bioengineering, Imperial College London, London, United Kingdom.

05/2017 Institute of Cognitive Neuroscience, University College London, London, United Kingdom.

05/2017 Neural Control of Movement, Dublin, Ireland.

03/2017 Restorative Therapies for Sensory Disorders, Göttingen, Germany (invited speaker).

02/2017 DARPA HAPTIX principal investigator meeting, Arlington, VA (invited speaker).

02/2017 Istanbul Neuroprosthetics Workshop, Istanbul, Turkey (keynote speaker).

02/2017 Neuroengineering seminar, University of Minnesota, Minneapolis, MN.

01/2017 Winter Workshop, Mechanism of Mind and Brain, Rusutsu, Hokkaido, Japan (invited speaker).

01/2017 Shitsukan group, Nippon Telegraph and Telephone, Atsugi, Kanagawa, Japan.

12/2016 Workshop on tactile coding and neuroprostheses, Pontedera, Italy.

11/2016 Society for Neuroscience, Nanosymposium: Neural coding in the somatosensory system, San Diego, CA [Abstracts of the Society for Neuroscience 45: 288.02].

11/2016 Barrels XXIX, Brain and Creativity Institute, University of Southern California, Los Angeles, CA.

11/2016 School of Biological and Health Systems Engineering, Arizona State University, Tempe, AZ.

10/2016 University of North Carolina/North Carolina State University Joint Department of Biomedical Engineering, Raleigh, NC.

10/2016 Bernstein Sparks Workshop, Delmenhorst, Germany (invited speaker).

10/2016 BCI: Science and practice, Samara Russia (invited speaker).

09/2016 Frontiers in Stem Cells and Regeneration, Woods Hole, MA (invited lecturer).

09/2016 Workshop on computational Touch, Paris, France (invited lecturer).

07/2016 Telluride neuromorphic engineering workshop, Telluride, CO (invited lecturer).

06/2016 AREADNE, Santorini, Greece (invited speaker).

06/2016 University of Pittsburgh Brain Institute, Pittsburgh, PA.

06/2016 Regenerative medicine for minority health and health disparities, University of Pittsburgh, Pittsburgh, PA.

04/2016 Society for Brain Mapping and Therapeutics, Miami, FL.

03/2016 Brain and Cognitive Sciences, Massachusetts Institute of Technology, Cambridge, MA.

01/2016 GDR multielectrode systems for neuroscience, Grenoble-Autrans, France (invited speaker).

11/2015 Tactile Research Group, Chicago, IL (invited speaker).

11/2015 Mammalian circuits underlying somatosensation, Janelia Farm Research Campus, Ashburn, VA (invited speaker).

10/2015 Perceptual representation of illumination, shape and Material (PRISM), Leuven, Belgium.

08/2015 Department of Neuroscience, University of Florida, Gainesville, FL.

07/2015 Computational Neuroscience meeting (workshop entitled "Rate vs. temporal coding schemes: mutually exclusive or cooperatively coexisting?"), Prague, Czech Republic.

06/2015 IEEE World Haptics Conference, Chicago, IL (plenary speaker).

05/2015 Chicago Science Festival, Chicago, IL.

04/2015 Department of Bioengineering, University of Washington, Seattle, WA.

04/2015 Department of Biological Structure, University of Washington, Seattle, WA.

04/2015 TEDx Columbia College Chicago, Chicago, IL.

04/2015 Brain Teasers: Cracking the mind's toughest riddles, University of Chicago, Chicago, IL.

03/2015 Department of Electrical and Computer Engineering, Johns Hopkins University, Baltimore, MD.

03/2015 Mind/Brain Institute, Johns Hopkins University, Baltimore, MD.

01/2015 Department of Psychology, University of California, Berkeley, CA.

01/2015 Institute of Neuroengineering, University of Washington, Seattle, WA.

11/2014 Society for Neuroscience, Washington DC [Abstracts of the Society for Neuroscience 44: 289.11]

11/2014 Killiam Seminar, McGill University, Montreal, Canada.

10/2014 Neuroscience seminar, University of California, Berkeley, CA.

10/2014 Steven S. Hsiao memorial seminar, Johns Hopkins University, Baltimore, MD.

10/2014 Neuroscience seminar, Columbia University, New York, NY.

10/2014 Horizons lecture, Kimberly Clark Corporation, Neenah, WI.

09/2014 International Conference on Intelligent Robots and Systems (workshop entitled "Active touch sensing in robots and animals"), Chicago, IL.

09/2014 Hand, Brain, and Technology, Monte Verita, Ascona, Switzerland.

09/2014 Bernstein conference (workshop entitled “Sensory coding and the natural environment”), University of Göttingen, Göttingen, Germany.

07/2014 Future of Shitsukan Research, University of Tokyo, Tokyo, Japan (invited speaker).

06/2014 GlaxoSmithKline bioelectronics R&D network meeting, Dallas, TX.

06/2014 Regenerative medicine for minority health and health disparities, Morehouse School of Medicine, Atlanta, GA

05/2014 International Congress on Mechatronic Engineering, Monterrey, Mexico (plenary speaker).

04/2014 Institute of Neuroscience, Université Catholique de Louvain, Brussels, Belgium (lecture).

04/2014 Institute of Neuroscience, Université Catholique de Louvain, Brussels, Belgium (seminar).

04/2014 Neural Control of Movement (panel entitled “Causing a sensation: development of a somatosensory afferent interface for BMI users”), Amsterdam, Netherlands.

04/2014 Department of physiology, University of Gothenburg, Gothenburg, Sweden.

04/2014 Department of integrative medical biology, University of Umea, Umea, Sweden.

03/2014 COSYNE, Salt Lake City, UT (delivered by H. Saal).

02/2014 Haptics symposium, Houston, TX (plenary speaker).

02/2014 Haptics symposium (workshop on brain-computer interfaces and haptics), Houston, TX.

02/2014 Neuroscience seminar, Michigan State University, East Lansing, MI.

02/2014 DARPA sensorimotor prosthetics workshop, Scottsdale, AZ.

01/2014 Society for Integrative and Comparative Biology, Austin, TX (delivered by E. Davis-Berg).

11/2013 Society for Neuroscience, San Diego, CA [Abstracts of the Society for Neuroscience 43: 593.04].

10/2013 Interdepartmental neuroscience research symposium, SUNY Upstate Medical University, Syracuse, NY.

10/2013 PepsiCo workshop on oral processing, Stamford, CT.

09/2013 Conference on mammalian touch sensation, Janelia Farm Research Campus, VA.

08/2013 Applied neuroscience seminar, Johns Hopkins Applied Physics Laboratory, Laurel, MD.

08/2013 Zanvyl Krieger Mind/Brain Institute, Johns Hopkins University, Baltimore, MD.

07/2013 Organization for Computational Neurosciences Conference (workshop entitled “early touch: from neural coding to haptic space geometry”), Paris, France.

07/2013 Engineering in Medical Biology Conference, Osaka, Japan.

06/2013 Chicago Skeptics Society, Chicago, IL.

06/2013 International Brain Computer Interfaces Meeting, Asilomar, CA.  
04/2013 Brain Awareness Day, University of Chicago, Chicago, IL.  
04/2013 Department of biomedical engineering, Purdue University, West Lafayette, IN.  
02/2013 Department of science and mathematics, Columbia College, Chicago, IL.  
02/2013 Neuroscience and robotics laboratory, Northwestern University, Evanston, IL.  
10/2012 Society for Neuroscience, New Orleans, LA [Abstracts of the Society for Neuroscience 42: 15.02] (delivered by G. Tabot).  
06/2012 AREADNE, Santorini, Greece (invited speaker).  
06/2012 Brain Awareness Day, University of Chicago, Chicago, IL.  
04/2012 Neural Control of Movement, Venice, Italy.  
11/2011 Society for Neuroscience, Washington DC [Abstracts of the Society for Neuroscience 41: 750.01] (delivered by A. Weber).  
11/2011 DARPA NEST meeting, Washington, DC.  
11/2011 Tactile Research Group, Seattle, WA.  
06/2011 International Graphonomics Society Conference, Cancun, Mexico.  
05/2011. Acoustical Society of America, Seattle, WA (delivered by J. Yau).  
04/2011 Sloan/Shwartz seminar of the California Institute of Technology, Pasadena, CA.  
04/2011 Department of physiology, Northwestern University, Chicago, IL.  
11/2010 Tactile Research Group, St. Louis, MO.  
10/2010 Department of neuroscience of Indiana University, Bloomington, IN.  
07/2010 Organization for Computational Neurosciences Conference (workshop entitled "Neurodesign: Using computational modeling for the design of neurotechnology"), San Antonio, TX.  
02/2010 Department of Biomedical Engineering of the Illinois Institute of Technology, Chicago, IL.  
09/2009 IEEE Engineering in Medicine and Biology Society, Minneapolis, Minnesota (delivered by A. Russel).  
05/2009 Committee for computational neuroscience, University of Chicago, Chicago, IL.  
11/2008 IEEE Biomedical Circuits and Systems Conference, Baltimore, MD.  
04/2005 COSYNE, Salt Lake City, UT (delivered by A. Sripati).  
11/2000 Psychonomic Society, New Orleans, LA. [Abstracts of the Psychonomic Society, 5, 17] (delivered by M. Hollins).  
11/2000 Tactile Research Group meeting, New Orleans, LA.  
03/2000 Biological psychology program, University of North Carolina at Chapel Hill, Chapel Hill, N.C.  
11/1999 School of dentistry, University of North Carolina at Chapel Hill, Chapel Hill, NC.  
11/1999 Tactile Research Group meeting, Los Angeles, CA.

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**POSTER PRESENTATIONS**

1. Liu, M.F., Winberry, J.E., Simpson, T.W., Delhay, B.P., Oby, E.R., Degenhart, A.D., Urbin, M.A., Batista, A.P., Gaunt, R.A., Fisher, L.E., Bensmaia, S.J., Weber, D.J. (November, 2017). Dorsal root ganglion neuronal population responses to tactile stimuli in rhesus monkey hand [Abstracts of the Society for Neuroscience 47: 224.11].
2. Lee, S., Goodman, J.M., Bensmaia, S.J., Hatsopoulos, N.G. (November, 2017). Cortico-cortical functional connectivity between the primary motor and somatosensory cortical areas during grasp [Abstracts of the Society for Neuroscience 47: 497.01].
3. Pohlmeier, E.A., Fifer, M.S., Bensmaia, S.J., Rich, M., Pino, J., Flesher, S.N., Weiss, J.M., Collinger, J.L., Gaunt, R.A., Beaty, J., McLoughlin, M., Tenore, F. (November, 2017). Navigating a virtual environment using intracortical microstimulation of human somatosensory cortex [Abstracts of the Society for Neuroscience 47: 498.13].
4. Kumaravelu, K., Tomlinson, T., Callier, T., Bensmaia, S.J., Miller, L.E., Grill, W.M. (November, 2017). Model-based design of optimal spatiotemporal patterns of intracortical microstimulation for prosthetic sensation [Abstracts of the Society for Neuroscience 47: 499.03].
5. Callier, T. & Bensmaia, S.J. (November, 2016). Neural representation of contact pressure in primary somatosensory cortex [Abstracts of the Society for Neuroscience 46: 151.07].
6. Suresh, A.K., Delhay, B.P., Saal, H.P., & Bensmaia, S.J. (November, 2016). Coding of edge orientation in afferent responses of macaques [Abstracts of the Society for Neuroscience 46: 151.08].
7. Pirschel, F., Winberry, J.E., & Bensmaia, S.J. (November, 2016). Dynamics of motion signals in the primary somatosensory cortex [Abstracts of the Society for Neuroscience 46: 151.09].
8. Lieber, J.D., Saal, H.P., Boundy-Singer, Z.M., A. I. Weber, Winberry, J.E., & Bensmaia, S.J. (November, 2016). The transformation of texture representations from somatosensory periphery to cortex [Abstracts of the Society for Neuroscience 46: 151.10].
9. Delhay, B.P., Weber, A.I., & Bensmaia, S.J. (November, 2016). Decoding motion speed from the responses of tactile afferents [Abstracts of the Society for Neuroscience 46: 151.12].
10. Goodman, J.M., Tabot, G.A., Suresh, A.K., Hatsopoulos, N.G., & Bensmaia, S.J. (November, 2016). High-dimensional representation of hand movements in sensory and motor cortices [Abstracts of the Society for Neuroscience 46: 151.11].
11. Graczyk, E.L., Schiefer, M.A., Saal, H.P., Delhay, B.P., Bensmaia, S.J., & Tyler, D.J. (November, 2016). Fascicular organization affects tactile sensation evoked from peripheral nerve cuff stimulation [Abstracts of the Society for Neuroscience 46: 248.05].
12. Flesher, S.N., Collinger, J.L., Foldes, S.T., Weiss, J.M., Downey, J.E., Tyler-Kabara, E.C., Bensmaia, S.J., Schwartz, A.B., Boninger, M.L., & Gaunt, R.A. (November, 2016).

Intracortical microstimulation of human somatosensory cortex elicits cutaneous percepts [Abstracts of the Society for Neuroscience 46: 248.15].

13. Bensmaia, S.J., Callier, T., Saal, H.P., & Delhaye, B.P. (November, 2016). The dynamics of neural signals about contact pressure - implications for bionic hands [Abstracts of the Society for Neuroscience 46: 288.01].
14. Gaunt, R.A., Flesher, S.N., Collinger, J.L., Foldes, S.T., Downey, J.E., Tyler-Kabara, E.C., Bensmaia, S.J., Schwartz, A.B., & Boninger, M.L. (November, 2016). Intracortical microstimulation in human somatosensory cortex [Abstracts of the Society for Neuroscience 46: 288.06].
15. Saal, H.P., Lieber, J.D., Boundy-Singer, Z.M., Weber, A.I., & Bensmaia, S.J. (November, 2016). Tactile texture invariance and its peripheral neural basis [Abstracts of the Society for Neuroscience 46: 842.01].
16. Lieber, J.D., Saal, H.P., Boundy-Singer, Z.M., Weber, A.I., & Bensmaia, S.J. (November, 2016). The coding of natural textures in primate somatosensory cortex [Abstracts of the Society for Neuroscience 46: 842.04].
17. Flesher, S., Weiss, J., Downey, J., Waters, S., Tyler-Kabara, E., Bensmaia, S., Schwartz, A., Boninger, M., Collinger, J., & Gaunt, R.A. (June, 2016) Neurophysiological, psychophysical and electrochemical assessment of intracortical microstimulation stability in human somatosensory cortex. Neural Interfaces Conference, Baltimore, MD.
18. Graczyk, E., Schiefer, M.A., Delhaye, B.P., Saal, H.P., Bensmaia, S.J., & Tyler, D.J. (June, 2016). The role of sensory adaptation in artificial tactile intensity. Neural Interfaces Conference, Baltimore, MD.
19. Flesher, S., Downey, J., Collinger, J., Foldes, S., Weiss, J., Tyler-Kabara, E., Bensmaia, S., Schwartz, A., Boninger, M., & Gaunt, R.A. (June, 2016). Intracortical microstimulation as a feedback source for brain-computer interface users. Sixth International Brain-Computer Interface Meeting, Asilomar, CA.
20. Callier, T., Saal, H.P., Schluter, E.W., Tenore, F.V., & Bensmaia, S.J. (October, 2015). Does precise pulse timing affect the perception of intracortical microstimulation? Society for Neuroscience, Chicago, IL [Abstracts of the Society for Neuroscience 45: 611.16].
21. Saal, H.P., Lieber, J.D., Boundy-Singer, Z.M., Weber, A.I., & Bensmaia, S.J. (October, 2015). Inferring the neural representations underlying perceptual invariance in touch. Society for Neuroscience, Chicago, IL [Abstracts of the Society for Neuroscience 45: 706.17].
22. Tabot, G.A., Goodman, J.M., Rajan, A.S., Suresh, A.K., Hatsopoulos, N.G., & Bensmaia, S.J. (October, 2015). Neurons in primary somatosensory cortex encode complex hand postures and movements. Society for Neuroscience, Chicago, IL [Abstracts of the Society for Neuroscience 45: 706.18].
23. Lieber, J.D., Saal, H.P., & Bensmaia, S.J. (October, 2015). The coding of natural textures in primate somatosensory cortex. Society for Neuroscience, Chicago, IL [Abstracts of the Society for Neuroscience 45: 706.19].
24. Delhaye, B.P., Saal, H.P., Rayhaun, B.C., & Bensmaia, S.J. (October, 2015). A model that simulates the response of the somatosensory nerves to arbitrary spatio-temporal

- deformations of the skin of the hand. Society for Neuroscience, Chicago, IL [Abstracts of the Society for Neuroscience 45: 706.20].
25. Delhaye, B.P., Schuster, E.W., Johannes, M.S., Katyal, K.D., Tenore, F.V., & Bensmaia, S.J. (October, 2015). What can bionic fingers tell us about objects? Extracting behaviorally relevant features from finger sensors output. Society for Neuroscience, Chicago, IL [Abstracts of the Society for Neuroscience 45: 706.21].
  26. Goodman, J.M., Tabot, G.A., Rajan, A.S., Suresh, A.K., Hatsopoulos, N.G., & Bensmaia, S.J. (October, 2015). Do proprioceptive neurons in somatosensory cortex encode muscle length? Society for Neuroscience, Chicago, IL [Abstracts of the Society for Neuroscience 45: 706.22].
  27. Neimat, J.S., Noel, J.P., Saal, H.P., Dammann, J.F., Bensmaia, S.J., & Harvey, M.A. (October, 2015). Tactile responses of single neurons in the ventral caudal nucleus of awake humans. Society for Neuroscience, Chicago, IL [Abstracts of the Society for Neuroscience 45: 706.23].
  28. Suresh, A.K., Tomlinson, T., Winberry, J., Rosenow, J.M., Miller, L.E., & Bensmaia, S.J. (October 2015). Tactile coding in the cuneate nucleus of macaques. Society for Neuroscience, Chicago, IL [Abstracts of the Society for Neuroscience 45: 706.24].
  29. Johannes, M.S., Katyal, K.D., Armiger, R.S., Helder, J.B., Para, M.P., Beaty, J.D., Ravitz, A.D., Mcloughlin, M.P., Lasowsky, O., Schluter, E., Bensmaia, S.J. & Tenore, F.V. (November, 2014). Sensing capabilities of the modular prosthetic limb. Society for Neuroscience, Washington DC [Abstracts of the Society for Neuroscience 44: 636.20].
  30. Goodman, J.M., Lieber, J.D., Saal, H.P. & Bensmaia, S.J. (November, 2014). Spatial variation of simulated slowly adapting type 1 afferent responses to embossed dot patterns predicts perceived roughness. Society for Neuroscience, Washington DC [Abstracts of the Society for Neuroscience 44: 441.16].
  31. Saal, H.P., Harvey, M.A. & Bensmaia, S.J. (November, 2014). Integration of cutaneous modalities in primate somatosensory cortex. Society for Neuroscience, Washington DC [Abstracts of the Society for Neuroscience 44: 339.07].
  32. Tabot, G.A., Rajan, A.T., Hatsopoulos, N.G., & Bensmaia, S.J. (November, 2014). Using maximally informative dimensions to zero in on the receptive field properties of proprioceptive neurons in primary somatosensory cortex. Society for Neuroscience, Washington DC [Abstracts of the Society for Neuroscience 44: 339.06].
  33. Kim, S.S., Callier, T., Tabot, G.A., Tenore, F.V., & Bensmaia, S.J. (November, 2014). Discrimination of electrical stimulation to primary somatosensory cortex. Society for Neuroscience, Washington DC [Abstracts of the Society for Neuroscience 44: 253.10].
  34. Suresh, A.K., Tabot, G.A., Rajan, A.T., Hatsopoulos, N.G. & Bensmaia, S.J. (November, 2014). Analysis of joint-angle kinematics of grasping in Rhesus macaque. Society for Neuroscience, Washington DC [Abstracts of the Society for Neuroscience 44: 160.04].
  35. Tabot, G.A., Rajan, A.S., Hatsopoulos, N.G. & Bensmaia, S.J. (November, 2013). The representation of hand conformation and movements in primary somatosensory cortex. Society for Neuroscience, San Diego, CA [Abstracts of the Society for Neuroscience 43: 644.13].



36. Saal, H.P., Lieber, J.D., Manfredi, L.R., Weber, A.I., Dammann, J.F. & Bensmaia, S.J. (November, 2013). The influence of fingerprint skin on texture perception. Society for Neuroscience, San Diego, CA [Abstracts of the Society for Neuroscience 43: 644.17].
37. Lieber, J.D., Weber, A.I., Saal, H.P., & Bensmaia, S.J. (November, 2013). The peripheral neural code of tactile roughness for natural textures. Society for Neuroscience, San Diego, CA [Abstracts of the Society for Neuroscience 43: 644.22].
38. Rajan, A.S., Tabot, G.A., Bensmaia, S.J., & Hatsopoulos, N.G. (November, 2013). The dynamics of functional connectivity in motor and somatosensory cortices during prehension. Society for Neuroscience, San Diego, CA [Abstracts of the Society for Neuroscience 43: 750.12].
39. Tabot, G.A., Boback, J.L., Dammann, J.F., Tenore, F.V., & Bensmaia, S.J. (November, 2013). Restoring touch using a brain interface: Dependence of artificial percepts on stimulation parameters. Society for Neuroscience, San Diego, CA [Abstracts of the Society for Neuroscience 43: 835.07].
40. Tabot, G.A., Rajan, A.S., Hatsopoulos, N.G., and Bensmaia, S.J. (April, 2013). Proprioceptive representations of the hand in primary somatosensory cortex. Society for the Neural Control of Movement, San Juan, PR.
41. M.A. Harvey, H.P. Saal, J.F. Damman, III, & S.J. Bensmaia (October, 2012). Co-existence of temporal and rate codes in primary somatosensory cortex. Society for Neuroscience, New Orleans, LA [Abstracts of the Society for Neuroscience 42: 677.25].
42. T. Lee, Y.-S. Yeh, T.Y. Chang, D. Ruffatto, M. Spenko, S.J. Bensmaia, & Y.C. Pei (October 2012). A novel multi-digit tactile motion stimulator: Design and application. Society for Neuroscience, New Orleans, LA [Abstracts of the Society for Neuroscience 42: 677.23].
43. L.R. Manfredi, J.F. Damman, III, M.C. Zielinski, V. Polashock, A.T. Baker & S.J. Bensmaia (November, 2011). The statistics of natural scenes in tactile perception. Society for Neuroscience, Washington DC [Abstracts of the Society for Neuroscience 41: 704.13].
44. M.A. Harvey, A.I. Weber, M.D. Best & S.J. Bensmaia (2011, November). Spectro-temporal receptive field properties of neurons in primate somatosensory cortex. Society for Neuroscience, Washington DC [Abstracts of the Society for Neuroscience 41: 385.05].
45. J.A. Berg, J.F. Dammann, III, L.R. Manfredi, F.V. Tenore, U. Kandaswamy, R.J. Vogelstein, G. Tabot, N.G. Hatsopoulos & S.J. Bensmaia (2011, November). Providing sensory feedback through intracortical microstimulation for upper limb neuroprostheses. Society for Neuroscience, Washington DC [Abstracts of the Society for Neuroscience 41: 84.18].
46. M.R. Fettiplace, B.M. Darbandi, Z. Lai, P. Pouliquen, S.J. Bensmaia, R.S. Armiger, R.J. Vogelstein, & S.S. Hsiao (2010, November). Cortical microstimulation strategies for tactile feedback in the somatosensory cortex. Society for Neuroscience, San Diego, CA [Abstracts of the Society for Neuroscience 40: 295.8].
47. Y.-C. Pei, S.S. Hsiao, J.C. Craig, & S.J. Bensmaia (2010, November). The tactile perception of motion direction relies primarily on signals emanating from SA1 afferents. Society for Neuroscience, San Diego, CA [Abstracts of the Society for Neuroscience 40: 782.3].

48. M.A. Harvey, J.F. Dammann, J.A. Berg, & S.J. Bensmaia (2010, November). The processing of spectrally complex vibrations in somatosensory cortex. Society for Neuroscience, San Diego, CA [Abstracts of the Society for Neuroscience 40: 782.22].
49. S. Kim, A.P. Sripati, R.J. Vogelstein, R.S. Armiger, A.F. Russel, & S.J. Bensmaia (2009, October). Conveying tactile feedback in sensorized upper-limb neuroprostheses. Society for Neuroscience, Chicago, IL [Abstracts of the Society for Neuroscience 39: 895.2].
50. J.M. Yau, D.J. Kim, M. Jo, & S.J. Bensmaia (2009, October). Cross-modal interactions in pitch and loudness. Society for Neuroscience, Chicago, IL [Abstracts of the Society for Neuroscience 39: 260.22].
51. Y.-C. Pei, S.S. Hsiao, J.C. Craig, & S.J. Bensmaia (2009, October). Neural mechanisms of tactile motion integration in primary somatosensory cortex. Society for Neuroscience, Chicago, IL [Abstracts of the Society for Neuroscience 39: 182.7].
52. Y. Cho, S.S. Hsiao, J.C. Craig, Y.-C. Pei, I.M. Solis, & S.J. Bensmaia (2009, October). Comparison of complex shape perception in vision and touch. Society for Neuroscience, Chicago, IL [Abstracts of the Society for Neuroscience 39: 175.4].
53. Kim S, Sripati A, & Bensmaia, S.J. (2008, February). Predicting the timing of spikes evoked in mechanoreceptive afferents by dynamic stimuli. Computational and Systems Neuroscience (COSYNE) conference, Salt Lake City, UT.
54. Bensmaia S.J, Denchev P.V., Pei, Y.C., Craig J.C. & Hsiao S.S. (2007, November). Neural coding of motion in the somatosensory cortex of macaque. Society for Neuroscience, San Diego, CA [Abstracts of the Society for Neuroscience 37: 620.10].
55. Denchev P, Bensmaia S.J, Yoshioka T & Hsiao S.S. (2006, November). Feature representation at the periphery and in the primary somatosensory cortex of macaque: Orientation and direction invariance. Society for Neuroscience, Atlanta, GA [Abstracts of the Society for Neuroscience 36: 446.17].
56. Muniak M, Hsiao S.S., Yoshioka T & Bensmaia S.J (2006, November). The peripheral representation of vibrotactile intensity: Correlating psychophysics with neurophysiology. Society for Neuroscience, Atlanta, GA [Abstracts of the Society for Neuroscience 36: 143.7].
57. Bensmaia S.J. & Sripati A.P.. (2006, March). Spike timing in mechanoreceptive afferent fibers can be predicted using integrate-and-fire mechanisms. Computational and Systems Neuroscience (COSYNE) conference, Salt Lake City, UT.
58. Yoshioka T., Bensmaia S.J., Craig J.C., Hsiao S.S., Ray S., Watson, A.C., Carey L.E. & Johnson K.O. (2005, November). Tactile texture perception using probe or bare finger. Society for Neuroscience, Washington, DC [Abstracts of the Society for Neuroscience 35: 626.8].
59. Bensmaia S.J., Sripati A.P. & Johnson K.O. (2005, November). A biophysical model of afferent responses to dynamic stimuli. Society for Neuroscience, Washington, DC [Abstracts of the Society for Neuroscience 31: 624.12].
60. Bensmaia S.J., Craig J.C., Yoshioka T., & Johnson, K.O. (2004, November). SA and RA contributions to the tactile perception of grating orientation. Society for Neuroscience, San Diego, CA. [Abstracts of the Society for Neuroscience 30: 59.7].

61. Bensmaia S.J., Hollins M. & Yau J. (2003, February). The Pacinian system and the discrimination of high-frequency complex tactile waveforms: A neural model. North Carolina Cognition Conference, Durham, NC.
62. Bensmaia S.J., Vaden K. & Halpin H. (2002, February). How and what does SINBAD learn: improving on an unsupervised error backpropagating network. North Carolina Cognition Conference, Chapel Hill, NC.
63. Bensmaia S.J., Hollins M. & Johnson, M.L. (2002, February). The vibrations of texture. North Carolina Cognition Conference, Chapel Hill, N.C.
64. Bensmaia S.J., Hollins M., & Johnson, M. (2000, February). Role of vibrotactile waveform in the perception of fine textures: methodological considerations. North Carolina Cognition Conference, Winston-Salem, NC.
65. Bensmaia S.J. (2000, February). The Meissner corpuscle: A receptor model. North Carolina Cognition Conference, Winston-Salem, NC.
66. Bensmaia S.J. & Hollins M. (1999, February). Complex tactile waveform discrimination. North Carolina Cognition Conference, Raleigh, NC.

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**ONGOING RESEARCH SUPPORT**

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|---|---|
| <p>UH3 NS 100541 (Fisher)<br/>         Spinal root stimulation for restoration of function in lower-limb amputees<br/>         Role: key personnel<br/>         The aim is to restore sensation for lower-limb amputees equipped with prosthetic legs.</p>                        | <p>09/2017-07-2022<br/>         NIH/NINDS</p> |
| <p>R01 NS 101325<br/>         Touch spanning spatial scales: the neural basis of texture perception in somatosensory cortex<br/>         Role: PI<br/>         The aim is to understand the neural basis of texture perception in primary and secondary somatosensory cortex.</p> | <p>06/2017-05/2022<br/>         NIH/NINDS</p> |
| <p>R01 NS 095251<br/>         Biomimetic somatosensory feedback through ICMS<br/>         Role: PI<br/>         The aim is to develop approaches to restore the sense of touch through intracortical microstimulation.</p>  | <p>06/2016-05/2021<br/>         NIH/NINDS</p> |
| <p>R01 NS 095162<br/>         Probing somatosensory representations in the cuneate nucleus<br/>         Role: PI<br/>         The aims is to investigate the processing of somatosensory signals in the cuneate nucleus of awake behaving primates.</p>                           | <p>09/2015-08/2020<br/>         NIH/NINDS</p> |
| <p>iSens (PI: Tyler)</p>  | <p>11/2014-11/2019</p>                        |

Role: Sub-PI  
The aim is to develop sensory neuroprostheses through a flat neural interface electrode implanted in the peripheral nerve.

DARPA (HAPTIX)

Embodied Neuroprostheses (PI: Clark)  
Role: Sub-PI  
The aim is to develop sensory neuroprostheses through a Utah Slant Electrode Array implanted in the peripheral nerve.

11/2014-11/2019

DARPA (HAPTIX)

IIS-1518614  
TextureShop: Tools for the composition and display of virtual textures  
Role: Co-I  
The aim is to develop approaches to generate virtual textures.

07/2015-06/2019

NSF

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#### COMPLETED RESEARCH SUPPORT

R01 NS 082865  
Hand proprioception and sensorimotor interplay  
Role: PI  
The aim is to discover the neural basis for proprioception and its role in motor control.

03/2013-09/2018

NIH/NINDS

IOS-1150209  
CAREER: Vibration and texture perception  
Role: PI  
The aim is to discover the neural basis for tactile texture perception.

02/2012-01/2017

NSF

Anthropomorphic Robotic Tactile Sensing system  
Role: PI  
The aim is to develop a robotic system that predicts how human subjects will perceive texture.

10/2014-6/2016

Kimberly-Clark

Generating virtual textures to understand tactile perception  
Role: PI  
The aim is to study tactile texture perception by generating and manipulating virtual textures.

02/2014-12-2016

FACCTS

N66001-10-C-4056  
Revolutionizing Prosthetics  
Role: PI  
The aim is to test methods to convey tactile feedback through stimulation of somatosensory cortex.

07/2010-06/2015

DARPA

c-049

04/2014-03/2015

Probing somatosensory representations in the brainstem of awake monkeys (Catalyst award) Role: PI Consortium The aim is to measure cutaneous responses of neurons in the cuneate nucleus of awake, behaving monkeys.	Chicago Biomedical
Peripheral Interface with the Nervous System (PI: Durand) Role: Sub-PI The aim is to develop sensory neuroprostheses through a flat neural interface electrode implanted in the peripheral nerve.	9/2014-3/2015 DARPA
R01 NS 018787 – Hsiao, Craig, Bensmaia (PIs) Cortical Processing of Tactual Spatial Information Role: PI The aim is to discover the neural basis for tactile form, texture and motion perception.	03/2008-03/2013 NIH/NINDS
The vibrations of texture Role: PI The aim is to characterize the biomechanics of skin-surface interactions and relate them to texture perception.	10/2012-10/2013 Kimberly Clark
N66001-06-C-8005 – Hsiao, Bensmaia (PIs) Revolutionizing Prosthetics 2009 Role: PI The aim is to test methods to convey tactile feedback through stimulation of somatosensory cortex.	04/2008-01/2010 DARPA

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**SUPERVISION OF STUDENTS AND POSTDOCTORAL RESEARCHERS**

2017-present Thierrri Callier, graduate student in Computational Neuroscience  
2017-present Maria Boyarinova, undergraduate research assistant  
2017-present Qinpu He, graduate student in Computational Neuroscience  
2017-present Elizaveta Okorokova, graduate student in Computational Neuroscience  
2016-present Katie Long, graduate student in Interdisciplinary Scientist Training Program  
2016-2017 Frederiece Pirschel, postdoctoral scholar  
2016-present Molly O'Donnell, undergraduate research assistant  
2016-2017 Gege "Julia" Ran, undergraduate research assistant  
2015 Rahul Kumar, International summer intern (IIT Delhi)  
2015-present Benoit Delhaye, postdoctoral scholar  
2014 Chinmay Purandare, International summer intern (IIT Bombay)  
2014 Divyansh Apurva, international summer intern (IIT Delhi)  
2014, 2015 Sebastien Novak, international summer intern (Université du Québec)  
2014-present Aneesha Suresh, graduate student in Computational Neuroscience

2014-present James Goodman, graduate student in Computational Neuroscience  
2014-2015 Sungshin Kim, postdoctoral scholar  
2013-present Lukun Zhang, undergraduate research assistant  
2013-present Zoe Boundy-Singer, undergraduate research assistant  
2013 Ezra Zigmond, high school summer intern  
2012-present Justin Lieber, graduate student in Computational Neuroscience  
2012-2015 Brandon Rayhaun, undergraduate research assistant  
2012-2013 Abdullah Muhammad, undergraduate research assistant  
2012-2013 Vimig Socrates, high school intern  
2012 Kyler Brown, rotation student in Computational Neuroscience  
2012 Jyothsna Suresh, rotation student in Computational Neuroscience  
2012 Boleslaw Osinski, rotation student in Biophysics  
2012 Felicia Rustandy, high school summer intern  
2011-present Gregg Tabot, graduate student in Computational Neuroscience  
2011-2013 Kevin Chen, undergraduate research assistant  
2011-2013 Erika Dunn-Weiss, undergraduate research assistant  
2011-2012 Umasankar Kandaswamy, postdoctoral scholar  
2010-2013 Michael Harvey, research associate  
2010-2013 Louise Manfredi, postdoctoral scholar  
2010-2012 Juwen Cheng, visiting scientist  
2010-2012 Emily Mackevicius, undergraduate research assistant  
2010-2012 Matthew Best, undergraduate research assistant  
2010-2012 Emily Lines, undergraduate research assistant  
2010-2012 Kenn Miller, undergraduate research assistant  
2010 Joseph Brehm, undergraduate summer intern  
2010 Lauren Nielsen, undergraduate summer intern  
2009-2012 Alison Weber, undergraduate research assistant  
2009-2012 Mark Zielinski, undergraduate research assistant  
2009-2011 Bahir Desta, undergraduate research assistant  
2009 Aaron Olsen, rotation student in Organismal Biology and Anatomy  
2009 Alexander Rajan, rotation student in Computational Neuroscience  
2008 Jesse Hamilton, undergraduate research assistant  
2007-2009 Joseph Kim, undergraduate research assistant (JHU)  
2006-2009 Melissa Solis, undergraduate research assistant (JHU)  
2006-2009 Yu-Cheng Pei, graduate student in Neuroscience (JHU)  
2006-2009 Jonathan Olenczak, undergraduate research assistant (JHU)  
2006 Michael Muniak, rotation graduate student (JHU)  
2001 Daniel Benjamin, undergraduate research assistant (UNC)  
2002-2003 Jeffrey Yau, undergraduate research assistant (UNC)

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**SERVICE ON PHD THESIS COMMITTEES**

Alex Lee, University of Chicago, Computational Neuroscience

Katherine Henderson, University of Chicago, Organismal Biology and Anatomy  
Brett Aiello, University of Chicago, Organismal Biology and Anatomy, 2018  
Raeed Chowdhury, Northwestern University, Biomedical Engineering  
Boleslaw Osinski, University of Chicago, Biophysics, 2018  
Alexander Rajan, University of Chicago, Computational Neuroscience, 2016  
Richard Williams IV, University of Chicago, Computational Neuroscience, 2014  
Noah Ledbetter, University of Utah, Biomedical Engineering (External reviewer), 2011  
Michael Lusignan, University of Chicago, Computational Neuroscience, 2012  
Christopher Jones, Illinois Institute of Technology, Biomedical Engineering, 2014  
Etienne Manderscheid, University of Chicago, Computational Neuroscience, 2014

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