CURRICULUM VITAE

June 28, 2021

Harel Z. Shouval, Ph.D.

PRESENT TITLE: Professor
Department of Neurobiology and Anatomy
McGovern Medical School at The University of
Texas Health Science Center at Houston (UTHealth)
6431 Fannin Street, MSB 7.264
Houston, TX 77030

CITIZENSHIP: USA, Israel

MILITARY SERVICE:

1979-1982	Israeli Army

UNDERGRADUATE EDUCATION:

1983-1987	Tel Aviv University, B.Sc. in Physics (magna cum laude)

GRADUATE EDUCATION:

1987-1990	Weizmann Institute of Science, M.Sc. in Physics, Advisor: Eytan Domany
1990-1994	Brown University, Ph.D. in Physics, Advisor: Leon N Cooper

POSTGRADUATE TRAINING:

1994-1997	Postdoctoral Fellow, The Institute for Brain and Neural Systems (IBNS) Brown University

ACADEMIC APPOINTMENTS:

1997-2003	Assistant Professor (Research), Institute For Brain and Neural Systems, Brown University
2003-present	Adjunct Assistant Professor, Biomedical Engineering Department, The University of Texas, Austin
2003-2009	Assistant Professor, Department of Neurobiology and Anatomy, The University of Texas Medical School at Houston (now known as McGovern Medical School at UTHealth)
2009-2017	Associate Professor, Department of Neurobiology and Anatomy, The University of Texas Medical School at Houston (now known as McGovern Medical School at UTHealth)
2017-	Professor, Department of Neurobiology and Anatomy, The McGovern Medical School at UTHealth

PROFESSIONAL ORGANIZATIONS:

1994-present Society for Neuroscience

2005-present Organization for Computational Neuroscience (OCNS)

HONORS AND AWARDS:

1987 B.Sc. in Physics, magna cum laude

2001 August-September, Institute of Theoretical Physics (ITP), UCSB, Participation in program: *Dynamics of Neural Networks: from Biophysics to Behavior*

EDITORIAL POSITIONS

2021 - Associate Editor, Frontiers in Computational Neuroscience

SERVICE ON NATIONAL GRANT REVIEW PANELS:

Review panel for the joint NSF NIH program on Collaborative Research in Computational Neuroscience (CRCNS), 2006

Ad hoc review of NSF grants

Ad hoc review of grants, for the Medical Research Council (United Kingdom)

Ad hoc study sections NIH, two in 2011

Review panel for the joint NSF NIH program on Collaborative Research in Computational Neuroscience (CRCNS), 2015

NIH study section, Special Emphasis Panel, ZRG1 CB-W(50), 2016

CRCNS (joint NSF/NIH) study section, 2018

NIH, BRAIN initiative, ZEB1 OSR-F (A1) R

CRCNS (joint NSF/NIH) study section, 2019

SERVICE ON CONFERENCE PROGRAM COMMITTEE:

2008-2011 Computational Neuroscience Conference – member of program committee

SERVICE IN REVIEWING PAPERS FOR JOURNALS:

Review of manuscripts for the following journals: *Biological Cybernetics, Biophysical Journal, eLife, Frontiers, Hippocampus, Learning and Memory, Nature, Nature Neuroscience, Neuron, Physical Review E., Physical Review Letters, PLOS Biology, PLOS Computational Biology, PLOS ONE, PNAS, The Journal of Computational Neuroscience, The Journal of Neuroscience, The Journal of Neurophysiology, Trends in Neuroscience, Scientific Reports*

SERVICE FOR THE UNIVERSITY OF TEXAS MEDICAL SCHOOL AT HOUSTON:

2004-2010 Interviews of applicants for the medical school (10-17 applicants per year)

2009-2015 Member of Faculty Senate

SERVICE IN DEPARTMENT OF NEUROBIOLOGY AND ANATOMY

2011-2015 Member, Neuroscience Seminar Committee

2014-2016 Member, Faculty Search Committee

2015-2017 Chair, Neuroscience Seminar Committee

2020- NBA, Peer review committee

SERVICE TO THE GRADUATE SCHOOL:

ADMISSION COMMITTEE: Neuroscience Program representative on the GSBS Admissions Committee from 2012-2014

EXAMINING COMMITTEE: Member of standing examining committee, 2013-2015 (Participation in the exam of 17 Neuroscience Program students)

ADVISORY COMMITTEES: Chair, two committees, member thirteen committees

GRADUATE PROGRAM INITIATIVE: PI on grant: "UT-System Graduate Initiative". The grant entitled "*Graduate Program Initiative in Theoretical and Computational Neuroscience"* was granted for $500,000 a five year period and has supported stipends for graduate students in theoretical and computational neuroscience, as well as funding for undergraduates performing research in the departmental laboratories during the summer months. Support for undergraduates has helped recruiting high-quality students to the department.

NEUROSCIENCE GRADUATE PROGRAM DIRECTOR: Term, 9/1/2016-8/31/2019

SPONSORSHIP OF CANDIDATES FOR POSTGRADUATE DEGREES:

Georgios Kalantzis	2004-2009	
Jeff Gavornik	2004-2009	(Student at UT Austin, ECE)
Animesh Agarwal	2009-2011	(Student at UT Austin, BME)
Jonathan Flynn	2010-2017	
Ian Cone	2018-	(Rice student, Applied Physics)

TEACHING RESPONSIBILITIES:

1. Introduction to Theoretical/Computational Neuroscience. This course was taught in 2004-2006 both at Austin and Houston as part of a joint appointment at the Biomedical Engineering Department in UT Austin.
2. The Synaptic Basis of Learning and Memory: a Computational Approach. This course was taught both in Austin and in Houston from 2006-2009 as

part of a joint appointment in the BME department in Austin.

3. Cellular Biophysics, taught one third of the course (lectures dedicated to synaptic plasticity), 2008-2009.
4. Theoretical Neuroscience: Cells, Circuits and Systems. GS14 1153, 2010 present. Cross-listed at Rice University and Baylor College of Medicine (see Neur 415 below).
5. Theoretical Neuroscience: Learning, Perception and Cognition. GS14 0163, 2010-2018. Cross-listed at Rice and Baylor College of Medicine.
6. Cellular Neurophysiology: GS 140143. Three lectures, 2010-present
7. Systems Neuroscience: GS 140024. Seven lectures, 2010-present
8. Theoretical Neuroscience (Rice University) NEUR 415/615, ELEC 488, 15 Lectures 2017-
9. Introduction to Computational Neuroscience (Rice University). NEUR 382/482, 21 Lectures, 2017-

SERVICE TO THE ACADEMIC COMMUNITY

GCC-TCN: Chair of steering committee of the Gulf Coast Consortium in Theoretical and Computational Neuroscience (GCC-TCN). Founding member of the (GCC-TCN). Currently McGovern Medical School's representative on the steering committee of the GCC-TCN. The GCC-TCN concentrates on graduate education in theoretical and computational neuroscience across the four Houston schools: Rice University, Baylor College of Medicine, The University of Houston and the McGovorn Medical School. See: **http://gulfcoastconsortia.org** for further information. The GCC-TCN held one graduate training grant and one NSF grant for undergraduate trainees, has a weekly journal club, and a yearly conference.

SPONSORSHIP OF POSTDOCTORAL FELLOWS:

Yu Xintian	2005-2006
Yidao Cai	2005-2007
Naveed Aslam	2006-2011
Sajiya Jalil	2012-2015
Marco Huertas	2012-2018

GRANTS AND FELLOWSHIPS

Current Grant Support

NIH/NIBIB (PI)

1. 1. Learning spatio-temporal statistics from the environment in recurrent networks
2. 2. 1R01EB022891-01

3. 3. Period of support: 10/01/2016-04/30/2021 (no cost extension)
4. 4. Total budget: $1,183,500

ONR (Co-PI)

1. Learning spatio-temporal statistics from the environment in recurrent networks
2. Grant number: N00014-16-R-BA01
3. Period of support: 4/1/2016-6/30/2020 (no cost extension approved)
4. Total budget (for subcontract): $225,000

Completed Grant Support:

NIH/NIDA R01 (PI)

1. Collaborative research: PKMzeta-dependent protein synthesis can account for the maintenance of synaptic plasticity: A theoretical model tested experimentally
2. Grant number: 1 R01 DA034970
3. Period of support: 7/1/2012-6/30/2018 (no cost extension)
4. Total budget: $922,822

NIH/NIMH R01 (subcontract)

1. Learning temporal representations In cortex: Their behavioral correlates and mechanism
2. Grant number: 1 R01 MH093665 (subcontract to Dr. Shuler/ JHMS)
3. Period of support: Three years (+ no cost extension)
4. Total budget: $611,000

UT System - Graduate Program Initiative (PI)

1. Graduate program initiative in theoretical and computational neuroscience
2. Period of support: 2/1/2009-5/1/2014
3. Total direct costs: $500,000
4. This grant primarily covered graduate training and undergraduate recruitment.

CRCNS/NSF/Information and Intelligent Systems (PI)

1. Collaborative Research: The Cellular Basis of Receptive Field Plasticity in Visual Cortex: An Integrative Experimental and Theoretical Approach
2. Grant number: 0515285
3. Period of support: September 1, 2005 to August 31, 2008
4. Total direct costs: $388,000

NIH/NINDS Program Project Grant (Lead Investigator Project 3)

1. Neural Models of Plasticity: Molecules to Networks

2. Grant number:
3. Period of support: July 15 2005, to July 15, 2010
4. Total direct costs: $861,139

PUBLICATIONS:

A. Refereed Original Articles in Journals

1. Shouval, H.Z, Shariv, I., Grossman T., Friesem A.A., and Domany E. An all-optical Hopfield network: theory and experiment. *International Journal of Neural Systems*. 1:355-360, 1990.
2. Liu, Y., and Shouval, H.Z., Localized principal components of natural images - an analytic solution. *Network: Computation in Neural Systems*. 5:317-325, 1994.
3. Shouval, H.Z., Intrator, N., Law C.C., and Cooper L.N., Effect of binocular cortical misalignment on ocular dominance and orientation selectivity. *Neural Computation*. 8:1021-1040, 1996.
4. Shouval, H.Z., and Cooper, L.N. Organization of receptive fields in networks with Hebbian learning: the connection between synaptic and phenomenological models. *Biological Cybernetics*. 74:439-447, 1996.
5. Shouval, H.Z., and Liu, Y. Principal component neurons in a realistic visual environment. *Network: Computation in Neural Systems*. 7:501-515, 1996.
6. Shouval, H.Z., Intrator, N., and Cooper L.N. BCM network develops orientation selectivity and ocular dominance in natural scene environment. *Vision Res*. 37:3339-3342, 1997.
7. Blais, B.S., Intrator, N., Shouval, H.Z., and Cooper, L.N. Receptive field formation in natural scene environments: comparison of single-cell Learning rules. *Neural Computation*. 10:1797-1813, 1998.
8. Huynh, Q.Q, Cooper, L.N., Intrator, N., and Shouval, H.Z. Classification of underwater mammals using feature extraction based on time-frequency analysis and BCM theory. *Signal Processing, IEEE transactions*. 46:1202-1207, 1998.
9. Artun, O.B, Shouval, H.Z, and Cooper, L.N. The effect of dynamic synapses on spatiotemporal receptive fields in visual cortex. *Proc. Natl. Acad. Sci. USA*. 95:11999-12003, 1999.
10. Blais, B.S., Shouval, H.Z., and Cooper, L.N. The role of presynaptic activity in monocular deprivation: Comparison of homosynaptic and heterosynaptic mechanisms. *Proc. Natl. Acad. Sci. USA*. 96:1083-1087, 1999.

11. Castellani, G.C, Intrator, N., Shouval, H.Z, and Cooper, L.N. Solutions of the BCM earning rule in a network of lateral interacting nonlinear neurons. *Network: Computation in Neural Systems*. 10:111-121, 1999.

12. Rittenhouse, C.D., Shouval, H.Z, Paradiso, M.A., and Bear, M.F. Monocular deprivation induces homosynaptic long-term depression in visual cortex. *Nature*. 397:347-350, 1999.

13. Blais, B., Cooper, L.N., and Shouval, H.Z. Formation of direction selectivity in natural scene environments. *Neural Computation.* 12:1057-1066, 2000.

14. Lee, A.B., Blais, B.S., Shouval, H.Z, and Cooper, L.N. Statistics of lateral geniculate nucleus (LGN) activity determine the segregation of ON/OFF subfields for simple cells in visual cortex. *Proc. Natl. Acad. Sci. USA*. 97:12875-12879, 2000.

15. Shouval, H.Z, Goldberg, D.H, Jones, J.P., Beckerman, M., and Cooper, L.N. Structured long-range connections can provide a scaffold for orientation maps. *J. Neurosci.* 20:1119-1128, 2000.

16. Castellani, G.C., Quinlan, E.M., Cooper, L.N., and Shouval, H.Z. A biophysical model of bidirectional synaptic plasticity: dependence on AMPA and NMDA receptors. *Proc. Natl. Acad. Sci. USA*. 98:12772-12777, 2001.

17. Philpot, B.D., Sekhar, A.K., Shouval, H.Z and Bear, M.F. Visual experience and deprivation bidirectionally modify the composition and function of NMDA receptors in visual cortex. *Neuron*. 29:157-169, 2001.

18. Shouval, H.Z, Castellnai, G.C., Blais, B.S., Yeung, L.C., and Cooper, L.N. Converging evidence for a simplified biophysical model of synaptic plasticity. *Biological Cybernetics*. 87:383-391, 2002.

19. Shouval, H.Z, Bear, M.F., and Cooper, L.N. A unified model of NMDA receptor-dependent bidirectional synaptic plasticity. *Proc. Natl. Acad. Sci. USA*. 99:10831-10836, 2002.

20. Yeung, L.C., Blais, B.S., Cooper, L.N., and Shouval, H.Z. Calcium as the associative signal for a model of Hebbian plasticity: application to multi-input environments. *Neurocomputing.* 52-4:437-440, 2003.

21. Yeung, L.C., Castellani, G.C., and Shouval, H.Z. Analysis of intraspinal calcium dynamics and its implications for plasticity of spiking neurons. *Physical Review E*. 69.011907, 2004.

22. Shouval, H.Z., and Kalantzis, G. Stochastic properties of synaptic transmission affect the shape of spike time dependent plasticity curves. *J. Neurophysiol*. 93:1069-73, 2004.

23. Yeung, L.C., Blais, B.S., Shouval, H.Z., and Cooper, L.N. Homeostasis and pattern formation under an NMDAR-mediated, calcium-dependent synaptic plasticity model. *Proc. Natl. Acad. Sci. USA.* 101:14943-14948, 2004.

24. Castellani, G.C., Quinlan, E.M., Bersani, F., Cooper, L.N. and Shouval, H.Z. A Model of Bidirectional synaptic plasticity: from signaling network to channel conductance. *Learning and Memory.* 12:423-432, 2005.

25. Shouval, H.Z. Clusters of interacting receptors can stabilize synaptic efficacies. *Proc. Natl. Acad. Sci.* USA, 102:14440-14445, 2005.

26. Rittenhouse, C.D., Siegler, B.B., Volker, C.A., Shouval, H.Z., Paradiso, M.A., and Bear, M.F. The stimulus for rapid ocular dominance plasticity in visual cortex. *J. Neurophysiol.* 95:2947-2950, 2006.

27. Yu, X., Knierim, J.J., Lee, I., and Shouval, H.Z. Simulating place field dynamics using spike timing dependent plasticity. *Neural Computing.* 69:1253-1259, 2006.

28. Shah, N.T., Yeung, L.C., Cooper, L.N., Cai, Y., and Shouval, H.Z. A biophysical basis for the inter-spike interaction of spike-timing-dependent plasticity. *Biological Cybernetics.* 95:113-121, 2006.

29. Cai, Y., Gavornik, J.P., Cooper, L.N., Yeung, L.C., and Shouval, H.Z. Effect of stochastic synaptic and dendritic dynamics on synaptic plasticity in visual cortex and hippocampus. *J. Neurophysiol.* 97:375-386, 2007.

30. Kubota, Y., Putky, J.A., Shouval, H.Z., and Waxham, M.N. IQ-motif proteins influence intracellular free Ca^{2+} in hippocampal neurons through their interactions with calmodulin. *J. Neurophysiol.* 99:264-276, 2007.

31. Yu X., Shouval, H.Z., and Knierim, J.J. A biophysical model of synaptic plasticity and metaplasticity can account for the dynamics of the backward shift of hippocampal place fields. *J. Neurophysiol.* 100:983-992, 2008.

32. Blais, B., Frenkel., M., Kuindersma, S., Muhammad, R., Shouval, H.Z., Cooper, L.N., and Bear M.F. Recovery from monocular deprivation using binocular deprivation: Experimental observations and theoretical analysis. *J. Neurophysiol.* 100:2217-2224, 2008.

33. Aslam, N., Kubota, Y., Wells D., and Shouval, H.Z., Translational switch for long-term maintenance of synaptic plasticity. *Molecular Systems Biology.* 5:284, 2009. PMID:19536207 PMCID:PMC2710869

34. Kalantzis, G., Kubota, Y., and Shouval, H.Z. Evaluating statistical methods used to estimate the number of postsynaptic receptors. *J. Neurosci. Methods.* 178:393-401, 2009.

35. Gavornik, J.P., Hussain Shuler, M.G., Loewenstein, Y., Bear, M.F., and Shouval, H.Z. Learning reward timing in cortex through reward dependent expression of synaptic plasticity. *Proc. Natl. Acad. Sci. USA.* 106:6826-6831, 2009.

36. Blais, B.S., Cooper, L.N., and Shouval, H.Z. Effect of correlated lateral geniculate nucleus firing rates on predictions for or monocular eye closure versus monocular retinal inactivation *Physical Review E*. 80:061915, 2009.

37. Kalantzis, G. and Shouval, H.Z Structural plasticity can produce metaplasticity. *PLoS ONE.* 4(11): e8062, 2009.

38. Shouval, H.Z, Wang, S.S., and Wittenberg, G.M. Spike timing dependent plasticity: a consequence of more fundamental learning, *Frontiers in Computational Neuroscience.* 4:19, 2010.

39. Gavornik, J.P., and Shouval, H.Z. A network of spiking neurons that can represent interval timing: mean field analysis. *Journal of Computational Neuroscience.* 30:501-513, 2011. PMID: 20830512

40. Shouval, H.Z and Gavornik, J.P. A single spiking neuron that can represent interval timing: analysis, plasticity and multi-stability. *Journal of Computational Neuroscience.* 30:489-499, 2011. PMID: 20827572

41. Rachmuth, G., Shouval, H.Z, Bear, M.F, Poon, C.S. A biophysically-based neuromorphic model of spike rate- and timing-dependent plasticity. *Proc. Natl. Acad. Sci. USA*. 108:E1266-1274, 2011, PMID: 22335938

42. Shouval, H.Z. What is the appropriate description level of synaptic plasticity. *Proc. Natl. Acad. Sci. USA*. 108:19103-19104, 2011. PMID: 22089234

43. Aslam, N., Shouval, H.Z. Regulation of cytoplasmic polyadenylation can generate a bistable switch. *BMC Syst. Biol*. 15;6:12, 2012. PMID: 22335938

44. Agarwal, A., Adams, R., Castellani, G.C., and Shouval, H.Z. On the precision of quasi steady state assumptions in stochastic dynamics. *J. Chem. Phys.* 137.4:044105, 2012. Erratum in: *J Chem. Phys.* 40(1):019902, 2014. PMID: 22852595

45. Shouval, H.Z, Agarwal, A., Gavornik, J.P. Scaling of perceptual errors can predict the shape of neural tuning curves. *Physical Review Letters* 110(16):168102, 2013. PMID: 23679640

46. Yao, Y., Shao, C., Jothianandan, D., Tcherepanov, A., Shouval, H.Z., Sacktor T.C. Matching biochemical and functional efficacies confirm ZIP as a potent competitive inhibitor of PKMζ in neurons.

Neuropharmacology. 64:37-44, 2013. PMID: 22846225, PMCID: PMC3445653

47. Shouval, H.Z., Hussain Shuler, M.G., Agarwal, A., Gavornik, J.P. What does scalar timing tell us about neural dynamics? *Frontiers in Human Neuroscience.* 8:438, 2014. PMID:24994976, PMCID: PMC4063330

48. Namboodiri, N.M.K, Huertas, M., Monk, K.J., Shouval, H.Z., Hussain Shuler, MG. Visually-cued action timing in the primary visual cortex. *Neuron*. 86:319-330, 2015. PMID: 25819611, PMCID: PMC4393368

49. Jalil, S.J., Sacktor, T.C., Shouval, H.Z. Atypical PKCs in memory maintenance: the roles of feedback and redundancy. *Learning and Memory.* 22:344-353, 2015. PMID: 26077687, PMCID: PMC4478332

50. Huertas, M., Hussain Shuler, M.G., and Shouval, H.Z. A simple network architecture accounts for diverse reward time responses in primary visual cortex. *J. Neurosci.* 35.37:12659-12672. 2015. PMID: 26593091, PMCID: PMC4660261

51. He, K., Huertas, M., Hong, S.Z., Tie, X., Hell, J.W., Shouval, H.Z., & Kirkwood, A. Distinct eligibility traces for LTP and LTD in cortical synapses. *Neuron.* 88.3:528-538, 2015. PMID: 26593091, PMCID: PMC4660261

52. Veliz-Cuba, A., Shouval, H.Z., Josić, K., Kilpatrick, Z.P. Networks that learn the precise timing of event sequences. *Journal of Computational Neuroscie*nce. 39:235-254, 2015. PMID: 26334992

53. Tsokas, P., Hsieh, C., Yao, Y., Lesburgueres, E., Wallace, E.J., Tcherepanov, A., Jothianandan, D., Hartley, B.R., Pan, L., Rivard, B., Farese, R.V., Sajan, M.P., Bergold, P.J., Hernandez, A.I., Cottrell, J.E., Shouval, H.Z., Fenton, A.A., and Sacktor, T.C. Compensation for PKMζ in long-term potentiation and spatial long-term memory in mutant mice. *eLife.* 5:e14846, 2016. PMID: 27187150, PMCID: PMC4869915

54. Hsieh, C., Tsokas, P., Serrano, P., Hernandez, I., Tian, D., Cottrell, J.E., Shouval, H.Z., Fenton, A.A,. and Sacktor, T.C. Persistent increased PKMζ in long-term and remote spatial memory. *Neurobiology of Learning and Memory*. in press, 2016. PMID: 27417578

55. Huertas, M.*A,* Schwettman, S.E, and Shouval H.Z. The role of multiple neuromodulators in reinforcement learning that is based on competition between eligibility traces. *Frontiers in Synaptic Neuroscience*. 8, 2016. PMID: 28018206, PMCID: PCM5156839

56. Flynn, J.R and Shouval, H.Z. On the origin of sensory errors: Contrast discrimination under temporal constraint. *Journal of Vision.* 17(6) 2017 PMID: 28672372

57. Conner CR, Kadipasaoglu CM, Shouval HZ, Hickok G, Tandon N. Network dynamics of Broca's area during word selection. PLoS One. 14(12):e0225756 2019 PMID: 31860640; PMCID: PMC6924671

58. Cone I, Shouval HZ. Learning precise spatiotemporal sequences via biophysically realistic learning rules in a modular, spiking network. *Elife*. 2021;10:e63751. PMID: 33734085 PMCID: PMC7972481

59. Cone I, Shouval HZ. Behavioral Time Scale Plasticity of Place Fields: Mathematical Analysis. *Front Comput Neurosci*. 2021;15:640235 PMID: 33732128 PMCID: PMC7959845

B. Chapters

1. Shouval, H.Z. and Cooper, L.N. LTP, LTD and cortical receptive fields: what do they tell us about synaptic modification? In: *Current Issues in LTP and LTD*, eds., J. Davis and M. Baudry, MIT press: Boston, 1995.
2. Shouval, H.Z. and Perrone, M. Post-Hebb learning rules. In: *The Handbook of Brain Theory and Neural Networks*, ed., M. Arbib, MIT press: Boston. p.745-748, 1995.
3. Shouval, H.Z. Hebb synapses: Modeling of neuronal selectivity. In: *Encyclopedia of Cognitive Science*, ed., L. Nadal. McMillan publishers. 311-16, 2007.
4. Shouval, H.Z. Computational approaches to the understanding of cellular/molecular mechanisms of plasticity. In: *New Encyclopedia of Neuroscience*, ed., L. Squire, Elsevier, 2008.
5. Heidelberger, R. Shouval, H.Z, Zucker, R.S., and Byrne J.S. Synaptic plasticity. In: *From Molecules to Networks: An Introduction to Cellular and Molecular Neuroscience*, eds., Byrne, J.H., Heidelberger, R., and Waxham, M.N. Academic Press, 2014

C. Books

Cooper, L.N., Blais, B., Intrator, N., Shouval, H.Z. *Theory of Cortical Plasticity.* World Scientific, 2004.

D. Other Publications

Online Publications

1. Shouval, H.Z. Models of synaptic plasticity, *Scholarpedia*, 2:1605, 2007. http://www.scholarpedia.org/article/Models_of_synaptic_plasticity

2. Shouval, H.Z. Maintenance of synaptic plasticity, *Scholaredia,* 4:1606, 2009. http://www.scholarpedia.org/article/Maintenance_of_synaptic_plasticity

3. Conner, C.R., Kadipasaoglu, C.M, Shouval, H.Z., Hickok, G., Tandon, N. Network dynamics of Broca's area during word selection bioRxiv 478461; doi: https://doi.org/10.1101/478461

4. Huertas, M.A., Sacktor, T.C. and Shouval, H.Z. Conditions for synaptic specificity during the maintenance phase of synaptic plasticity bioRxiv 617928; doi: https://doi.org/10.1101/617928, 2019

5. I. Cone, H. Z. Shouval Learning precise spatiotemporal sequences via biophysically realistic circuits with modular structure bioRxiv 2020.04.17.046862

INVITED SPEAKER TO COLLOQUIA AND SYMPOSIA:

2004

- An integrated theoretical approach to synaptic plasticity: from biophysics to receptive fields, University of Texas in Austin, center for perceptual systems seminar series, Feb 16, 2004
- An integrated approach to synaptic plasticity: from biophysics to receptive fields, Monte Verita, Switzerland, Workshop on Spike Time Dependent Plasticity, March 2, 2004
- An integrated theoretical approach to synaptic plasticity: from biophysics to receptive fields. Rice University, Department of Computational and Applied Mathematics, April 5, 2004
- An integrated theoretical approach to synaptic plasticity: from biophysics to receptive fields, Haifa University, Israel, June 21, 2004
- Clusters of interacting receptors can stabilize synaptic efficacies. Weizmann Institute, June 22, 2004

2005

- An integrated approach to synaptic plasticity: Induction, maintenance and receptive field formation, UCSD/Merk symposium on Neural Plasticity, January 20, 2005
- An integrated approach to synaptic plasticity: Induction, maintenance and receptive field formation, Department of Anatomy and Neurobiology, Boston University, April 21, 2005

- An integrated approach to synaptic plasticity: Induction, maintenance and receptive field formation, Technische Universität Berlin, June 17, 2005

2006

- An integrated approach to synaptic plasticity: Induction, stochastic considerations and learning to represent Time, University of Houston, November, 2006

2007

- Learning reward timing using reinforced expression of synaptic plasticity, CRCNS PI conference, University of Maryland, June 2007
- Synaptic plasticity: from calcium transients to learning interval timing, Hebrew University, Jerusalem, January 2007

2008

- Translational switch for long term maintenance of synaptic plasticity, Santa Fe Institute – work group, May 2008
- Learning reward timing in cortex: A theoretical study, Johns Hopkins University, Mind Brain Institute, April 2008
- Learning reward timing in cortex: A theoretical study, Brown University, Physics Department, February 2008

2010

- Synaptic plasticity and stability: from molecule to synapse, UT San Antonio, October 2010

2011

- Learning reward timing using reinforced expression of synaptic plasticity, CIRM Workshop, Marseille, France, November 2011
- What does Weber's law tell us about spike statistics, UT Austin, CPS Seminar October 2011

2012

- Faculty member of LASCON IV summer school, University of Sao Paulo State, Brazil, January 2012
- What does Weber's law tell us about spike statistics, Rice University, Department of Psychology, Cognitive Tea, February 2012

2013

- What Does Weber's law tell us about neural tuning curves? Redwood Center for Theoretical Neuroscience, UC Berkeley, California, May 2013

- Speaker in, 3rd NAMASEN workshop, Sheffield UK. Computational modeling from neurons to systems and behavior. September 2013

2014

- Speaker, satellite workshop of the TDLC meeting, Salk Institute/UCSD February 2014

2015

- Speaker, XXXIV Dynamics Days Conference, Houston. January 2015
- Seminar speaker, Baylor College of Medicine, Houston. March 2015
- Speaker, Mini symposium, Society for Neuroscience, Chicago. October 2015
- Speaker, Neural Engineering Annual Symposium, GCC, Houston, October 2015

2016

- Speaker, FENS Symposium, Copenhagen, Denmark, July 2016
- Session Chair, and Speaker. *Texas FreshAIR,* Grand challenges in Neuroscience. Austin, October 2016

2017

- Lecturer, Memory School: Center de Recerca Mathematica, Spain, January 2017
- Seminar speaker, UTSA Neuroscience Institute, February 2017
- Speaker, Symposia on memory: Center de Recerca Mathematica, Spain, March 2017
- Seminar Speaker, Rice University Theoretical Biological Physics, November 2017

2019

- Seminar Speaker, Duke University, Computational and Theoretical Seminar Series, December 2019