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CITIZENSHIP	Israeli	
US STATUS	Permanent resident (National Interest Waiver)	
RESEARCH	Plasticity of synaptic communication plays an important role in molding the flow of information in the brain; dysfunction in synaptic communication is responsible for a wide array of brain disorders, such as epilepsy and schizophrenia. Glial cells occupy a special position due to their capacity to modulate synaptic information transfer, but the dynamics and the role of these cells remain largely elusive. I seek to understand the contribution of glial cells to the dynamics of neuronal ensembles in health and disease, employing a computational approach that is based on close interaction with glial- and neuro- biologists.	
CURRENT POSITION	Research Associate <i>Computational Neurobiology Laboratory (Professor Terrence Sejnowski)</i>	Nov 2009-present
	Research in translational neuroscience: computational models of post-traumatic epilepsy, with particular emphasis on glial involvement in the neuro-immune response to trauma events. Additional emerging project related to the modeling of sensorimotor gating deficits in neuropsychiatric disorders (emphasis on schizophrenia).	
DEGREES	Ph.D. Physics, School of Physics & Astronomy, Tel-Aviv U., Israel Supervisor: Professor Eshel Ben-Jacob.	Sep 2006
	M.Sc. Physics, School of Physics & Astronomy, Tel-Aviv U., Israel Supervisor: Professor Eshel Ben-Jacob. Magna Cum Laude.	April 2003
	B.Sc. Physics, School of Physics & Astronomy, Tel-Aviv U., Israel Summa Cum Laude.	April 2001
FELLOWSHIPS AND AWARDS	Center for Complexity Studies, post-doctoral fellowship, declined ICAM exchange scientist award for collaborative studies, 2008 ICAM exchange scientist award for collaborative studies, 2006	
EMPLOYMENT	Research Associate at Computational Neurobiology Lab (Prof. Terrence Sejnowski), Salk Institute. November 2009-present.	
	Research in translational neuroscience: computational models of post-traumatic epilepsy, with particular emphasis on glial involvement in the neuro-immune response to trauma events. Computational models of glial activation by neuronal and synaptic activity. Work supported by NIH grant R01 NS059740.	

Research Associate at Center for Theoretical Biological Physics (Prof. Herbert Levine), University of California at San Diego. *October 2006-November 2009*.

Research in computational neuroscience: signal processing in neuronal circuits, role of synaptic plasticity in information processing by single neurons and neuronal circuits, active dendrites as computational devices. Work supported by NSF sponsored Center for Theoretical Biological Physics, grant PHY-0822283.

Teaching Assistant at School of Physics & Astronomy, Tel Aviv University. *September 2003-September 2006*.

Developed, taught, and graded a variety of courses for undergraduate students: Mathematical Methods (vector and tensor analysis) for physics students; Wave Physics (wave equation, molecule vibrations, electro-magnetic waves) for chemistry students; Mechanics (classical mechanics) for biology students; Electricity and Magnetism (electrical circuits, Maxwell's equation, magnetism) for engineering students.

October 2002-March 2003: Developed and taught a special support course in Analytical Mechanics (variational methods, etc.) for sophomore physics students.

Sophomore Physics Lab Instructor at School of Physics & Astronomy, Tel Aviv University. *September 2000-September 2002*.

QA at Insightec Israel (formerly Insight Therapeutics, www.insightec.com).

Devised and performed protocols to test the quality of state-of-the-art therapeutic software (treatment of breast cancer and tumors by ultra-sonic waves) developed by the company. *September 1999-September 2000*.

Freelancer at Israeli Institute for Vision Research (with Uri Polat, MD, currently head of unit at Goldschleger Eye Institute, School of Medicine, Tel Aviv University, urip@post.tau.ac.il).

Participated in the development of empirical model, to study long range lateral interactions in primary visual cortex. Part of this modeling effort is used for the treatment of amblyopia (lazy eye disease). *September 1998-September 1999*.

QUALIFICATIONS

Programming languages and environments: C, Lisp, HTML, NEURON. Parallel programming with OpenMP. Operating systems and applications: Windows, Unix, MatLab.

Languages: English (fluent), Hebrew (fluent), Russian (mother tongue), Romanian (basic).

REVIEWER

Journal of Neurophysiology, Physical Biology, Neural Computation, Journal of Computational Neuroscience, Biophysical Journal, New Journal of Physics,

Journal of Neural Engineering, Journal of Theoretical Biology, Journal of Physics A – Mathematical and Theoretical, Journal of Biological Physics, Chaos, IEEE Transactions in Biomedical Engineering, Mathematical Biosciences, Cognitive Computation, PLOS One, Scholarpedia.

OUTREACH

Supervised M.Sc. student (summa cum laude, University of Pisa, Italy), Sep 2007.

Lecture on Computational Neuroscience as part of a course “Special topics in biophysics”, California State University at San Marcos, March 2011.

Co-organizer, “International Workshop on Neuro-Glial interaction: information processing and engineering perspectives”, University of Pisa, Italy, Sep 2007.

PUBLICATIONS

Volman V, Bazhenov M, Sejnowski TJ. *Divide and conquer*: Functional segregation of synaptic inputs by astrocytic microdomains could alleviate paroxysmal activity following brain trauma, *in preparation*.

Volman V, Behrens MM, Sejnowski TJ. Compensatory regulation of cortical GABA synaptic transmission can explain reduction of gamma oscillation power in schizophrenia, *in preparation*.

De Pitta M, Volman V, Berry H, Ben-Jacob E. A tale of two stories: astrocyte regulation of synaptic depression and facilitation, *PLOS Computational Biology*, 2011.

Volman V, Behrens MM, Sejnowski TJ. Downregulation of parvalbumin at cortical GABA synapses reduces network gamma activity, *Journal of Neuroscience*, 31: 18137-18148. doi:10.1523/JNEUROSCI.3041-11.2011.

Volman V, Sejnowski TJ, Bazhenov M. Topological basis of epileptogenesis in a model of severely traumatized cortex, *Journal of Neurophysiology*, 106: 1933-1942. doi:10.1152/jn.00458.2011.

Volman V, Bazhenov M, Sejnowski TJ. Pattern of trauma determines the threshold for epileptic activity in the model of cortical deafferentation, *Proc. Natl. Acad. Sci. USA*, [epub September 6, 2011], doi:10.1073/pnas.1112066108.

Volman V, Gerkin RC. Synaptic scaling stabilizes persistent activity driven by asynchronous neurotransmitter release. *Neural Computation*, 23(4):927-57. PMID: 21222524.

Volman V, Levine H, Sejnowski TJ. Shunting inhibition controls the gain modulation mediated by asynchronous neurotransmitter release in early development, *PLOS Computational Biology*, 6(11):e1000973 (2010). doi: 10.1371/journal.pcbi.1000973. PMID: 21079676.

Goldberg M, De Pitta M, Volman V, Berry H, Ben-Jacob E. Nonlinear gap junctions are predicted from a model for the propagation of pulsating calcium waves in astrocytes. *PLOS Computational Biology*, 6(8):e1000909 (2010). doi: 10.1371/journal.pcbi.1000909. PMID: 20865153.

Volman V, Perc M. Fast random rewiring and strong connectivity impair sub-threshold signal detection in excitable networks. *New Journal of Physics*, 12:043013 (2010). doi: 10.1088/1367-2630/12/4/043013.

Volman V, Levine H, Ben-Jacob E, Sejnowski TJ. Locally balanced dendritic integration by short-term synaptic plasticity and active dendritic conductances.

Journal of Neurophysiology, 102:3234-3250 (2009). doi: 10.1152/jn.00260.2009. PMID: 19759328.

Volman V, Levine H. Signal processing in neuronal networks based on activity-dependent noise and competition. *Chaos*, 19:033107 (2009). doi: 10.1063/1.3184806. PMID: 19791987.

De Pitta M, Goldberg M, Volman V, Berry H, Ben-Jacob E. Glutamate regulation of calcium and IP3 oscillating and pulsating dynamics in astrocytes. *Journal of Biological Physics*, 36:383-411 (2009). doi: 10.1007/s10867-009-9155-y. PMID: 19669422.

De Pitta M, Volman V, Levine H, Ben-Jacob E. Multimodal encoding in a simplified model of intracellular calcium signaling. *Cognitive Processing* 1:S55-70 (2009). PMID: 19030904.

Shein M, Volman V, Raichman N, Hanein Y, Ben-Jacob E. Management of synchronized activity by highly active neurons. *Physical Biology*, 5:036008 (2008). doi: 10.1088/1478-3975/5/3/036008. PMID: 18780962.

Baruchi I, Volman V, Shein M, Raichman N, Ben-Jacob E. The emergence and properties of mutual synchronization in in vitro coupled cortical networks. *European Journal of Neuroscience*, 28:1825-1835 (2008). doi: 10.1111/j.1460-9568.2008.06487.x. PMID: 18973597.

Volman V, Levine H. Activity-dependent stochastic resonance in recurrent neuronal networks. *Physical Review E*, 77:060903(R) (2008). doi: 10.1103/PhysRevE.77.060903. PMID: 18643209.

De Pitta M, Volman V, Levine H, Pioggia G, De Rossi D, Ben-Jacob E. Coexistence of amplitude and frequency modulations in intracellular calcium dynamics. *Physical Review E*, 77:030903(R) (2008). doi: 10.1103/PhysRevE.77.030903. PMID: 18517322.

Volman V, Gerkin RC, Lau P, Ben-Jacob E, Bi GQ. Calcium and synaptic dynamics underlying reverberatory activity in neuronal networks. *Physical Biology*, 4:91-103 (2007). doi: 10.1088/1478-3975/4/2/003. PMID: 17664654.

Volman V, Ben-Jacob E, Levine H. The astrocyte as a gatekeeper of synaptic information transfer. *Neural Computation*, 19:303-326 (2007). doi: 10.1162/neco.2007.19.2.303. PMID: 17206866.

Baruchi I, Grossman D, Volman V, Shein M, Hunter J, Towle VL, Ben-Jacob E. Functional holography analysis: simplifying the complexity of dynamical networks. *Chaos*, 16:015112 (2006). doi: 10.1063/1.2183408. PMID: 16599778.

Raichman N, Volman V, Ben-Jacob E. Collective plasticity and individual stability in cultured neuronal networks. *Neurocomputing*, 69:1150-1154 (2006).

Hulata E, Volman V, Ben-Jacob E. Self-generated complexity in neural networks. *Natural Computing*, 4:363-386 (2005).

Blinder P, Baruchi I, Volman V, Levine H, Baranes D, Ben-Jacob E. Functional topology classification of biological computing networks. *Natural Computing*, 4:339-361 (2005).

Volman V, Baruchi I, Ben-Jacob E. Manifestation of function-follow-form in cultured neuronal networks. *Physical Biology*, 2:98-110 (2005). doi: 10.1088/1478-3975/2/2/003. PMID: 16204862.

Persi E, Horn D, Volman V, Segev R, Ben-Jacob E. Modeling of synchronized bursting events: the importance of inhomogeneity. *Neural Computation*, 16(12): 2577-2595 (2004). doi: 10.1162/0899766042321823. PMID: 15599972.

Persi E, Horn D, Segev R, Ben-Jacob E, Volman V. Neural modeling of synchronized bursting events. *Neurocomputing*, 58-60(C): 179-184 (2004).

Volman V, Baruchi I, Persi E, Ben-Jacob E. Generative modeling of regulated dynamical behavior in cultured neuronal networks. *Physica A*, 335: 249-278 (2004). doi: 10.1016/j.physa.2003.11.015

Ben-Jacob E, Shapira Y, Becker I, Raichman N, Volman V, Hulata E, Baruchi I. Communication-based regulated freedom of response in bacterial colonies. *Physica A*, 330: 218-231 (2003). doi: 10.1016/j.physa.2003.08.033

PROCEEDINGS

Volman V, Levine H, Sejnowski TJ. Active dendritic conductances enhance processing of plastic synaptic stimuli, *BMC Neuroscience* (2008).

Volman V, Baruchi I, Ben-Jacob E. Self-regulated homoclinic chaos in neural networks activity. *Proceedings of the 8th Experimental Chaos Conference, AIP Conference Proceedings*, 742(1): 197-209 (2004).

BOOK CHAPTERS

Raichman N, Rubinsky L, Shein M, Baruchi I, Volman V, Ben-Jacob E. Cultured neuronal networks express diverse patterns of activity and morphological memory, *Handbook on Networks* (2010), editors: S. Boccaletti, V. Latora, Y. Moreno.

INVITED TALKS

Brain Awareness Workshop, Indian Institute of Statistics, Bangalore, India (March 14-15, 2011).

Sloan-Swartz Center workshop "Dendrites, Synapses, and Spikes", La Jolla, CA (August 2010).

Society for Applied Mathematics meeting on applications of dynamical systems, Snowbird, Utah (May 2009).

American Physical Society March Meeting, Pittsburgh, PA (March 2009).

Interdisciplinary Approaches to Functional Electronic and Biological Materials (INTELBIOMAT) meeting, Cavendish Laboratory, Cambridge, UK (January 2009).

International workshop on neuro-glial interaction: "Information processing and engineering perspectives", University of Pisa, Italy (September 2007).

7th "Understanding Complex Systems" meeting, University of Illinois at Urbana-Champaign, IL (May 2007).

REFERENCES

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