Short CURRICULUM VITAE

1. Personal details:

Born: 1953, Jerusalem, Israel
IID: 05115713-9
Citizenship: Israel, USA
Familial Status: Married, 4 children
Military service: 1971-1980 (Atuda)

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2. Short Scientific Biography:

I was educated as a theoretical physicist in Statistical Mechanics and Dynamical Systems theory at the Hebrew university and as a postdoc at MIT. I was attracted to the interaction between dynamics and information, in particular the basic question of relevant information in complex dynamical systems. During my 5 years as a member of research staff at Bell Labs I explored the interface between statistical physics and cognitive phenomena through the emerging statistical physics models of neural networks. My focus then was primarily on models of speech and natural language on which I had already worked during my military service. I was one of the first to apply statistical physics to supervised learning in neural networks and discovered (with others) the phenomena of phase transitions in learning. On my return to the Hebrew University I launched the first Machine Learning lab and initiated this important branch of Computer Science in Israel. At the same time, I was among the founders of the Interdisciplinary Center for Neural Computation (later ELSC) and established the connections between Machine Learning, Information Theory, and Computational Neuroscience. Since then I have supervised more than 30 PhD students and postdocs, almost all are now professors or leading researchers at top institutes in Israel and abroad. Nurturing a whole generation of brilliant scientists in Machine Learning and Computational Neuroscience is certainly my greatest achievement.

Research themes and interests:

Among various contributions to Machine Learning, physics and computation, neuroscience, computational linguistics, and computational biology, two central original lines are threaded in my research. The first is the application of Information Theory to learning and Computational Neuroscience that stems from my Information Bottleneck method. This has become a central computational principle for describing both supervised and unsupervised learning in a model independent way. It is a bridge between Statistical Mechanics, Information Theory and Cognitive Science that has gradually turned into a key principle, recently providing a new theory of Deep Neural Networks. The second line of research is the connection between information, optimal control, and learning. This line combines these three complementary disciplines, generating a new principled paradigm for modeling perception and behavior. Our recent works connect information constrained control with the emergence of hierarchies in sensing-acting systems with the large scale structure of biological information processing and natural language.

Specific topics: Machine and statistical learning theory and applications; Statistical Mechanics; Theory of Dynamical Systems; Information Theory: Biological Information Processing and Learning Theory. Computational Neuroscience; Information theory of perception and action; Optimal Control, Computational Biology; Speech & Language; Signal Processing; data mining.

3. Education:

1971 – 1974	B.Sc. in Mathematics and Physics (Cum Laude), The Hebrew University, Jerusalem, Israel.
1977 – 1980	M.Sc. in Physics (Cum Laude), Tel-Aviv University. Thesis title: Spallation nuclear reactions in the galactic cosmic rays. Supervised by Prof. B.Z. Kozlovsky.
1980 – 1985	Ph.D. in Theoretical Physics, The Hebrew University, Jerusalem, Israel. Reduced Dynamical Description: An Information Theoretic Approach. Supervised by Prof. Shlomo Alexander and Prof. Raphael D. Levine.

4. Academic and Administrative Positions:

Since 1997	**Professor**, Compute Science, The Hebrew University
2010 -	Member of the Edmond and Lilly Safra Center for Brain Sciences (**ELSC**) Hebrew University
2011 -	PI, Intel Collaborative Research Institute for Computational Intelligence
2012 -	**Director**, MOST national knowledge center in Machine Learning & AI
2010 - 2013	**Director**, Interdisciplinary Center for Neural Computation (ICNC), .
2004 – 2008	Chair of the science appointments committee, Hebrew university
2003 – 2004	Visiting Professor, CIS Dept. University of Pennsylvania
1998 – 2003	Founding chair of the Computer Engineering program, Hebrew university.
1997 – 2000	Director of the Leibniz Research Center in Computer Science/
1997 – 1998	Visiting Senior Scientist, NEC Research Institute, Princeton, New- Jersey
1995 – 1997	**Associate professor**, Computer Science, The Hebrew University.
1992 – 1995	**Senior Lecturer**, Computer Science, The Hebrew University
1992 – 2002	Senior faculty, Computational Neuroscience course, Marine Biology Laboratories **(MBL), Woodshole**, MA (summers only).
1992 – 2013	Founding member of the Interdisciplinary Center for Neural Computation (ICNC), HUJI.
2002 – Present	Member of the Sudarsky Center for Computational Biology, HUJI.
2000 – Present	Member of the academic program of the Cognitive Science program.
1986 – 1991	**Member of Research** Technical Staff**, Bell Laboratories**, Murray Hill, New Jersey.
1985 – 1986	**Post-doctoral fellow, MIT**, Plasma Fusion Center and Physics Dept. Statistical physics of chaotic Hamiltonian systems (Chaim Weizman Fellow).

5. Other positions

2007-present	Head of the Board of Directors, the Hebrew University Secondary School (Leyada)
2008-present	Member of the Board of "Azrieli Jerusalem College of Engineering"
2007	Member of the international evaluation committee of the Finnish computer science institutes.
2007-2012	Member of the Minerva foundation fellowship & grants committee
2006-2011	Member of the German Bernstein computational neuroscience centers advisory board.
2004, 2008	Visiting positions at the Kavili ITP at Santa Barbara (UCSB)
2002-present	Founding Member of "Machshava" forum.
1997	Visiting Member of the Newton Institute at Cambridge Institute
1999-2004	Advisory board of "Banter Co."
2005-2007	Advisory board of "SDS Co."
1980-1984	Teaching assistant, Physics Dept. & Talpiot, Hebrew University
1982-1983	Open University TA
1974-1989	Research officer and section head, IDF (ending rank: major)
1973-1974	Math. Teacher (Leyada)

Editorial boards (past and present)

Scientific Reports (Nature)
Entropy
Neuroinformatics
Network: Computation in Neural Systems
Journal of Machine Learning Research (JMLR)
Neurocomputing,

Conference Chair & Program Committees:

ICPR (Program chair 1995)
NIPS (Program committee 1996, 1999)
NIPS Workshops (1996, 2000, 2002, 2009, 2010, 2013…)
ICML (Program committee 2002, 2010)
From Perception to Action & Back (IAS yearly program & 2 conferences, 2008-9.)
Music & Brain (2011)
Learning Days in Jerusalem (1993)
…

6. Grants & Awards:

Awards:

1. **Google Research award (2017-18)**
2. **Landau Prize in Computer Science (2015)**
3. **PI, Intel Collaborative Research Institute in Computational Intelligence**
4. Incumbent of the **Flinkman family Chair in Brain Research** (Since 2010)
5. IBM Faculty Award (2005,2006,2007)
6. Alon Fellowship (1991)
7. Weizmann postdoctoral fellowship (1985)
8. Israel's Security Award (1980)

Research grants and centers:

1. [2017-2018] Google Student research award
2. [2011-…] PI, Intel Collaborative Research Institute in Computational Intelligence
3. [2012-…] Director of MOST knowledge Center in ML & AI
4. [2011-2015] DARPA MSEE grant (w S Soatto, A Krause, R Murray, A Censi) 10M$.
5. [2011-2015] ISF Center of Excellence grant (with A. Globerson, G. Elidan, N. Friedman, Y. Weiss). Total 5,000,000 NIS.
6. [2009-2012] ISF Bikura 942/09 grant (with Merav Ahissar) (180,000$)
7. [2008-2010] Complexity Science grant (with Israel Nelken and Merav Ahissar) (90,000$).
8. [2007-2008] NATO SfP BESAFE CBM.MD.SFPP-982480 grant, with Rita Cucchiara (UNIMORE). Total 200,000 Euro. For 2 years.
9. [2007] BINCA Grant on "The Prehistory of the Hebrew Language". With: N. Agmon, Anna Balfer-Cohen, and Steven Fassberg.
10. [2005-2008] IBM Faculty Award
11. [11/ 2000 – 9/2005] Neuronal representation of voluntary complex movements in the primary motor cortex, Israel science foundation (8006/00-1) excellence research center with H. Bergman, E. Vaadia, M. Abeles, H. Sompolinsky, $1,400,000,
12. [2003-2004]Nano-Biomolecular Computers. Israels' Ministry of Science and Technology. with Ehud Shapiro (2 years)
13. [2002-2004]Computational methods in whole genome analysis. Israels' Ministry of Science and Technology. With H. Margalit, N Friedman, N Linial, M. Linial.
14. [11/1998-8/2002:] Human Frontiers Science Project (HFSP). Discriminating Foreground and Background Sounds at Multiple Levels of the Brain. With Eric

Young, Israel Nelken, Ad Artsen. ($650,000 for 3 years)

15. [9/1999-8/2002:] US-Israel Binational Science Foundation (BSF). Extracting relevant information: An information theoretic approach to neural codes and language modeling. With William Bialek and Fernando C. Pereira ($60,000 for 3 years)
16. [8/1998-9/2002:] Israels' Ministry of Science and Technology. Internet and Intranets: Heterogeneous Information Sources and Digital Libraries. With C. Beeri, G. Alber, R. El-Yaniv, T. Milo, Y. Sagiv, and O. Shmueli. (1,200,000 NIS per year).
17. [9/1997-8/2000:] Israeli Academy of Science, Analysis of cortical recordings using Hidden Markov Models ($70,000)
18. [1/1997-12/2000:] German-Israel Science Foundation (GIF). Self-organization and Learning from Examples via Statistical Computational Processes. With E. Shamir S. Ben-David, J. Bhumann, H.U. Simon. (Hebrew University part per year: 52,500DM)
19. [12/1996-11/97:] France-Israel Scientific Collaboration (AFIRST). High level structuring and intelligent content based retrieval. With Xavier Rodet and Shlomo Dubnov, IRCAM, Paris. ($27,000)
20. [8/1995-11/98:] Israels' Ministry of Science and Technology. Intelligent Utilization of Heterogeneous Information Sources and Digital Libraries. With C. Beeri, G. Alber, T. Milo, Y. Sagiv, and O. Shmueli. (735,000 NIS for this period). Extended for another year.
21. [7/1995-6/96:] Israel Defense Ministry, Parallel ATR and clustering methods.} (with S. Peleg, M. Werman and D. Weinshall, $74,650).
22. [9/1995-8/98:] US-Israel Binational Science Foundation (BSF). Statistical Learning in Natural Language Modeling . With Fernando C. Pereira, AT\&T Bell Laboratories ($50,000)
23. [1993-6:] Israel Ministry of Science and Technology. Learning and Adaptation in Man-Machine Communication} ($30K a year)
24. [1992-4:] Hungary-Israel scientific collaboration. Support for travel and joint research in Learning in Neural Networks.With Geza Gyorgyi, Etvos University.
25. [1992-3:] Support for research in Cursive Handwriting Recognition, under contract with Yissum and ART (Advance Recognition Technology Ltd. Tel-Aviv) ($30K a year).
26. [1992-3:] Research grant for learning laboratory and research. Center for Neural Computation. With Haim Sompolinsky and Shaul Hochstein. ($100K).
27. Goldberg foundation. Support for research on man-machine interaction. ($30 for 3 years).
28. [1992-5:] Israeli Academy of Science (ISF), Learning Invariants in Visual and Temporal Pattern Recognition}, with Daphna Weinshall ($50K for 3 years).
29. [1992:] Basic Research Foundation (VATAT), ($100K)
30. [1991-4:] US-Israel Bi-National Science Foundation (BSF), Statistical Methods in Machine Learning, with Eli Shamir, David Haussler and Manfred Warmuth ($64K for 3 years).

Invited Lectures & Tutorials (last 2 years):

ELSC Workshop on Deep Learning and the Brain (Jerusalem, January 2019)
New Directions in Theoretical Physics (Edinburgh University, January 2019)
ICSEE, Deep Learning Workshop, (Eilat, Dec. 2018
Israel CS Theory Day (Dec. 2018)
ICTP – Mini-Course on the Information Theory of Deep Learning (Nov. 2018)
Invited Physics Colloquium, ETH, (Zurich, Oct. 2018)
Keynote Speaker, Machine Learning Summit (Berlin, Oct. 2018)
Invited speaker, Neural Networks and Machine Learning Workshop, (Paris, Oct. 2018)
Keynote Speaker, Swiss Data Science Summit (Bern, Sep. 2018)
Tutorial on Deep Learning Theory, InterSpeech, (Hydrabad, India, Sep. 2018)

Invited Lecturer, Cargese Summer School on ML and Stat. Phys. (Aug. 2018)
Distinguished Speaker – Gatsby Computational Neuroscience Unit, UCL (Sep. 2018)
Keynote Speaker – ECML (Dublin, Sep. 2018)
Keynote Speaker – International Conference on Neural Networks, Rio, Brazil (June 2018)
Physics Colloquium - Racah Inst. (June 2018)
Physics Colloquium – Weizmann Inst. (June 2018)
Physics Colloquium – Technion (May 2018)
Distinguished Invited Speaker – Dept. Of EECE, Texas A&M (May 2018)
Invited Speaker, North America School of Information Theory (May 2018)
Invited Colloquium – SISSA (Trieste, May 2018)
Distinguished Colloquium Speaker – TTI , Chicago University April 2018)
Invited Physics Colloquium - Perimeter Institute, Waterloo, Canada (April 2018)
Distinguished Invited Speaker - Vector Institute, Toronto University
Distinguished Physics Colloquium – Emroy University (April 2018)
Invited Public Simons Inst. Talk, Berkeley University (April 2018)
Invited talks in Program & Workshops on Brain and Computation, Simons Inst. (2018)
Invited CSEE Colloquium at Stanford University (April 2018)
Invited Seminar - Google, Mountain View (April 2018)
Keynote speaker – International Conference on Medical Imaging (March 2018)
Invited Colloquium, CS, UCLA (March 2018)
American Physical Society March 2018 – Invited speaker
Workshop on Deep Learning, Berlin, (June 2017)
Invited Neuroscience Colloquium, Center for the Unknown, Lisbon (June 2017)
Intel Workshop on Machine Learning and Architectures, Portland (June 2017)
American Physical Society March 2016 - Invited speaker
CNLS Physics Informed Machine Learning January 2016
TRUCE Conference, London Sep. 2015
Gatsby Tri-Center Conference (NY, 2015)
ITW May 2015
EU NETADIS Feb 2015, Workshop on Biological networks, (Bardonecchia, Italy)
Information Theory in Biology, Sep. 2014 (Banff Center, Canada)
NIPS 2014 Workshop on Novel Trends and Applications in RL (Montreal)
ECML Sep 2013 (Prague)
ITW May 2013 (Seville)
NIPS 2013 Workshop on Planning with Information Constraints (Montreal)
Statistical physics of inference and control, Sep. 2012 (Granada)
NIPS Tutorial, 2012 (Granada).
ITA 2008,2010, 2012 (UCSD)
…

8. Alumni Graduate Students and Postdocs:

- Stas Tyomkin (PhD 2018, Co advisor: Daniel Polani)
- Michal Moshkovich (PhD 2018)
- Roy Fox (PhD-2016)
- Nori Jacoby (PhD-2014, Co-advisor: Merav Ahissar)
- Asaf Gal (PhD-2013, Co-Advisor: Shimon Marom)
- Jonathan Rubin (PhD-2013, Co-advisor: Israel Nelken)
- Sivan Sabato (PhD-2012)

- Yuval Tassah (PhD-2012, Advisor: Emo Todorov)
- Ohad Shamir (PhD-2011)
- Naama Parush (PhD, 2010, Co-advisor: Hagai Bergman)
- Yevgeny Seldin (PhD, 2010)
- Eyal Krupka (PhD 2008)
- Amir Navot (PhD 2006)
- Ran Gilad-Bachrach (PhD 2005)
- Amir Globerson. (PhD 2005) (Co-advisor: Eilon Vaadia)
- Yacov Engel (PhD 2005) (Co-advisor: Ron Meir)
- Shmuel Brody (MSc 2005)
- Amit Rosner (Co-advisor: Udi Shapiro)
- Gill Bejerano (PhD 2003. Co-advisor: Hanah Margalit)
- Gal Chechik (PhD 2003. Co-advisor: Eli Nelken)
- Noam Slonim (PhD 2002)
- Elad Schneidman (PhD 2001. Co-advisor: Idan Segev)
- Adi Schreibman (MSc 2000)
- Shai Fine (MSc 1996, PhD 1999)
- Itay Gat (MSc 1995, PhD 1999. Co-advisor: Moshe Abeles)
- Golan Yona (PhD 1998. Co-advisors: Nati & Michal Linial)
- Lidror Troyansky (PhD 1997)
- Shlomo Dubnov (PhD 1996. Co-advisor: Dalia Cohen)
- Dana Ron (PhD 1995)
- Yoram Singer (PhD 1995)
- Pedro Ortega (Postdoc, 2012)
- Michal Rosen-Zvi (IBM, PostDoc 2004-2005)
- Jan Stiller (Postdoc 2000)
- Shahar Mendelson (Postdoc 1999)
- Ran El-Yaniv (Postdoc 1996-98)