

Itamar Lerner

CURRICULUM VITAE

Rutgers University, Center for Molecular and Behavioral Neuroscience

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EDUCATION

The Hebrew University of Jerusalem, Jerusalem, IL

Doctor of Philosophy in Brain Sciences: Computation and Information Processing, 2013

Thesis: *Semantic Priming in Typical and Schizophrenics Individuals: An Attractor Network Model with Latching Dynamics*

Advisors: Dr. Shlomo Bentin, Dr. Oren Shriki.

The Hebrew University of Jerusalem, Jerusalem, IL

Bachelor of Science in Psychobiology, 2002

Magna Cum Laude

ACADEMIC APPOINTMENTS

Research Associate

December 2016 - Present

Rutgers University

Center for Molecular and Behavioral Neuroscience

Research Director: Dr. Mark A. Gluck

Postdoctoral Fellow

February 2013 – December 2016

Rutgers University

Center for Molecular and Behavioral Neuroscience

Research Director: Dr. Mark A. Gluck

AWARDS AND HONORS

2010

Robert J. Glushko & Pamela Samuelson Student Travel Grant

For quality of submission to the 32nd Annual Conference of the Cognitive Science Society, Portland, Oregon.

2010

Israel Foundation Trustees (IFT)

Competitive grant for PhD Students.

2007-2010 **Rector's Fellowship**
 For excellence in Ph.D studies, the Hebrew university of Jerusalem.

RESEARCH GRANTS

2019 – 2020 **NIH/NIMH 1R21MH119020-01A1 (Lerner, Co-PI)** **\$140,302**
 Enhancing the Efficiency of Non-REM Sleep Temporal Dynamics to Improve Insight Learning

2015 – 2019 **NSF/BCS 1461009 (Lerner, Co-PI)** **\$586,326**
 Neurocognitive Studies of Sleep and the Generalization of Emotional Learning and Threat Detection.

2016 – 2018 **DoD W911NF-16-C-0018 (Lerner, Co-PI)** **\$465,435**
 IMPACTS: Improving Memory Performance by Augmenting Consolidation with Transcranial Stimulation.

2012 – 2016 **NSF/SHB:EXP 1231515 *** **\$552,307**
 Long-Term Mobile Monitoring and Analysis of Sleep-Cognition Relationship.

* Due to my non-faculty status at Rutgers during submission of this grant, I was not officially listed as PI or Co-PI. However, I was the effective Co-PI with respect to: (1) Co-authoring the proposal, (2) Heading the ongoing research, (3) Authorizing distribution of funds, and (4) dealing with cognizant agency program officers.

PUBLICATIONS

REFEREED JOURNAL PUBLICATIONS

Lerner, I., Ketz, N. A., Jones, A.P., Bryant, N.B., Robert, B., Skorheim, S.W., Hartholt, A., Rizzo, A.S., Gluck, M.A., Clark, V.P., Pilly, P.K (*in press*). Transcranial Current Stimulation During Sleep Facilitates Insight into Temporal Rules, but does not Consolidate Memories of Individual Sequential Experiences. *Scientific Reports*.

Lerner, I., Sojitra, R., Gluck, M.A. (2018). How age affects reinforcement learning. *Aging* (Albany NY). 2018 Nov 12. <https://doi.org/10.18632/aging.101649> [Epub ahead of print]

Lerner, I. & Gluck, M.A. (2018). Individual Differences in Slow-Wave-Sleep Predict Acquisition of Full Cognitive Maps. *Frontiers in Human Neuroscience* 12, 404 (*as part of Research Topic: Learning & Memory*). doi: 10.3389/fnhum.2018.00404
<https://www.frontiersin.org/articles/10.3389/fnhum.2018.00404/full>

Sojitra, R. *, **Lerner, I. ***, Petok, J.R., & Gluck, M.A. (2018). Age Affects Reinforcement Learning Through Dopamine-Based Learning Imbalance and High Decision Noise – Not Through Parkinsonian Mechanisms. *Neurobiology of Aging*, 68, 102-113.
<https://www.sciencedirect.com/science/article/pii/S0197458018301283>

* *Authors contributed equally to this manuscript*

Lerner, I., Lupkin, S.M., Sinha, N., Tsai, A., & Gluck, M.A. (2017). Baseline Levels of Rapid-eye-Movement Sleep May Protect Against Excessive Activity in Fear-Related Neural Circuits. *Journal of Neuroscience*, 37 (46), 11233-11244.
<http://www.jneurosci.org/content/jneuro/37/46/11233.full.pdf>

➤ *Paper chosen for press promotion by the Society for Neuroscience and featured in Time, the Atlantic, Huffington Post, CTV and others. See Selected Media Coverage.*

Lerner, I. (2017). Unsupervised Temporal Learning during Sleep Supports Insight. *Conference on Cognitive Computational Neuroscience (CCN) 2017*. Archived at:
<https://www2.securecms.com/CCNeuro/docs-0/5928daeb68ed3f7a4e8a2571.pdf>

Lerner, I., Lupkin, S.M., Corter, J.E., Peters, S.E., Cannella, L., & Gluck, M.A. (2016). The influence of sleep on emotional and cognitive processing is primarily trait- (but not state-) dependent. *Neurobiology of Learning and Memory*, 134, 275-286.
<http://www.sciencedirect.com/science/article/pii/S1074742716301320>

Lerner, I., Armstrong, B.C., & Frost, R. (2014). What can we learn from learning models about sensitivity to letter-order in visual word recognition? *Journal of Memory and Language*, 77, 4-58.
<http://www.sciencedirect.com/science/article/pii/S0749596X14001041>

Lerner, I., Bentin, S., & Shriki, O. (2014). Integrating the Automatic and the Controlled: Strategies in Semantic Priming in an Attractor Network with Latching Dynamics. *Cognitive Science*, 38(8), 1562-1603.
<http://onlinelibrary.wiley.com/doi/10.1111/cogs.12133/full>

Lerner, I., & Shriki, O. (2014). Internally- and externally-driven network transitions as a basis for automatic and strategic processes in semantic priming: theory and experimental validation. *Frontiers in Psychology* 5:314. doi: 10.3389/fpsyg.2014.00314
<https://www.frontiersin.org/articles/10.3389/fpsyg.2014.00314/full>

Lerner, I., Bentin, S., & Shriki, O. (2012). Spreading Activation in an Attractor Network with Latching Dynamics: Automatic Semantic Priming Revisited. *Cognitive Science*, 36 (8), 1339-1382.
<http://onlinelibrary.wiley.com/doi/10.1111/cogs.12007/abstract>

Lerner, I., Bentin, S., & Shriki, O. (2012). Excessive Attractor Instability Accounts for Semantic Priming in Schizophrenia. *PLoS One*, 7 (7): e40663. doi:10.1371/journal.pone.0040663
<http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0040663>

Lerner, I., Bentin, S., & Shriki, O. (2010). Automatic and controlled processes in semantic priming: an attractor neural network model with latching dynamics. In S. Ohlsson & R. Catrambone (Eds.) *Proceedings of the 32rd Annual Conference of the Cognitive Science Society*, (pp 1112-1117). Mahwah, NJ: Lawrence Erlbaum.
<https://escholarship.org/uc/item/6b83k8mt>

BOOK CHAPTERS

Lerner, I. (2017). Sleep is for the brain: Contemporary computational approaches in the study of sleep and memory and a Novel ‘Temporal Scaffolding’ Hypothesis. In: A. Moustafa (Ed), *Computational Models of Brain and Behavior* (pp. 245-256). Hoboken, NJ: Wiley.
<https://onlinelibrary.wiley.com/doi/abs/10.1002/9781119159193.ch18>

MANUSCRIPTS IN PREPERATION OR SUBMITTED

Lerner, I. & Gluck, M.A. Sleep and the Extraction of Hidden Regularities: A Systematic Review and the Importance of Temporal Rules. *Under Review*.

Lerner, I., Lupkin, S.M., Tsai, A. & Gluck, M. A. Slow wave sleep affects generalization of fear learning under conditions favoring threat and Safety Discrimination. *In Preparation*.

Lerner, I. & Gluck, M.A. Slow Wave Sleep Creates False Compound Memories. *In Preparation*.

CONFERENCE PROCEEDINGS

International conferences

Oral presentations

Lerner, I., Lupkin, S.M., Sinha, N., Tsai, A., & Gluck, M.A. *Baseline levels of Rapid-Eye-Movement sleep may protect against excessive fear learning*. The 2018 International Conference on Learning and Memory, Huntington Beach, CA, April, 2018.

Lerner I., Sojitra, R., Petok, J.R., & Gluck, M.A. *Reinforcement learning in healthy aging: Similar behavior to Parkinson's disease, opposite mechanisms?* The 47th Annual Meeting of the Society for Neuroscience (SfN), Washington, DC, November 2017.

Lerner I., Armstrong B., Frost R. *Letter-Position Sensitivity is Modulated by the Linguistic Environment: Evidence From an Elementary Learning Model*. The 54th Annual meeting of the Psychonomic Society, Toronto, Ontario, Canada, November 2013.

Lerner I., Bentin S., Shriki O. *Automatic and controlled processes in semantic priming: an attractor neural network model with latching dynamics*. The 32nd Annual Conference of the Cognitive Science Society. Portland, USA, August, 2010.

Poster presentations

Lerner I. *Unsupervised Temporal Learning During Sleep Supports Insight.* Cognitive Computational Neuroscience (CCN) 2017. New-York, NY, September 2017.

Lupkin, S.M., **Lerner, I.**, Sinha, N., Tsai, A., & Gluck, A.M. *Trait-like variations in rapid-eye-movement sleep modulate hippocampus-amygdala connectivity during fear conditioning.* The 2016 Annual Meeting of the Pavlovian Society, Jersey City, NJ, October 2016.

Sojitra, R., Petok, J.R., Gluck, M.A., & **Lerner, I.** *Reinforcement learning model reveals adult age group differences in cognitive strategies for probabilistic categorization.* The 15th Neural Computation and Psychology Workshop, Philadelphia, PA, August 2016.

Lupkin, S.M., **Lerner, I.**, Tsai A., Gluck M.A. *Sleep Facilitates Rule Learning through “Temporal Scaffolding.”* The 2016 Annual Meeting of the Cognitive Neuroscience Society (CNS), New York, NY, April 2016.

Lerner, I., Peters, S.E., Lupkin S.M., Cannella, L., Gluck, M.A. *Trait-like individuals differences in sleep affect cognitive and emotional processing.* The 29th Annual Meeting of the Associated Professional Sleep Societies (APSS), Seattle, WA, June 2015.

Lerner, I., Lupkin S.M., Peters, S.E., Cannella, L., Gluck, M.A. *Consumer-based mobile sleep monitoring devices reveal trait-like effects of sleep on the evaluation of facial expressions in a multiple-night study.* The 2015 Annual Convention of the Association for Psychological Science (APS), New York, NY, May 2015.

Lerner, I., & Gluck, M.A. *A neurocomputational model of how memory replay during slow-wave sleep inspires insight.* The 44th Annual Meeting of the Society for Neuroscience (SfN), Washington, DC, November 2014.

Cannella, L., **Lerner, I.**, Ohshima, D., & Gluck, M.A. *Sleep Inspires Temporal Insight but not Categorical Insight.* The 44th Annual Meeting of the Society for Neuroscience (SfN), Washington, DC, November 2014.

Lerner, I., & Gluck, M.A. (2014). *Sleep facilitates memory by providing ‘temporal scaffolding’ of experience: A network model.* The 28th Annual Meeting of the Associated Professional Sleep Societies (APSS), Minneapolis, MN, June 2014.

Other presentations

Lerner I., Sojitra, R., Petok, J.R., & Gluck, M.A. *Reinforcement learning in healthy aging: Similar behavior to Parkinson's disease, opposite mechanisms?* Oral Presentation at the Neuroscience Mini-Symposium at the Center for Molecular and Behavioral Neuroscience, Rutgers University. Newark, NJ, November 2017.

Lerner I. *Semantic priming in Schizophrenia: An attractor network model with attractor instability.* Oral Presentation at the Annual meeting of the Interdisciplinary Center for Neural Computation. Ein-Gedi, Israel, January 2011.

Lerner I. *Automatic and Controlled Processes in Semantic Priming: An Attractor Neural Network Model.* Oral Presentation at the weekly colloquium of the Psychology department at the Hebrew University. Jerusalem, Israel, December 2009.

Lerner I., Bentin S., Shriki O. *Aberrant Semantic Priming in Schizophrenia: A network model with accelerated latching dynamics.* Poster presented at the Annual meeting of the Interdisciplinary Center for Neural Computation. Ein-Gedi, Israel, January 2009.

INVITED LECTURES

Effects of sleep on insight learning is explained by a 'temporal scaffolding' mechanism based on compressed memory-replay. Park City Conference on the Neurobiology of Learning and Memory, Park City, UT, January 2017.

Novel Approaches to Study Long-Term Sleep Effects and Sleep-Dependent Insight Learning. DARPA Sleep Workshop, Arlington, VA, April 2015.

TEACHING EXPERIENCE

COURSES TAUGHT

Center for Molecular and Behavioral Neuroscience, Rutgers University, Newark ,NJ
Lecturer, "Foundations in Neuroscience" graduate course, April 2018.

Center for Molecular and Behavioral Neuroscience, Rutgers University, Newark ,NJ
Guest Lecturer. "Critical Thinking" graduate course, March 2016.

Center for Molecular and Behavioral Neuroscience, Rutgers University, Newark ,NJ
Lecturer. "Learning and Memory" graduate course, May 2013.

Center for Brain Sciences (ELSC), The Hebrew University of Jerusalem, Jerusalem, IL
Head lecturer, "Cognitive Psychology" graduate course. October 2009 – June 2012.

Center for Brain Sciences (ELSC), The Hebrew University of Jerusalem, Jerusalem, IL
Teaching Assistant. "Computation and Cognition" undergraduate course. October 2005 – September 2009.

Department of Cognitive Sciences, The Hebrew University of Jerusalem, Jerusalem, IL
Head Lecturer, "Introduction to Matlab" undergraduate course. November 2005.

Center for Brain Sciences (ELSC), The Hebrew University of Jerusalem, Jerusalem, IL
Teaching Assistant, “Theory of Neural Networks 2” graduate course. October 2004 - June 2006.

MENTORING

Undergraduate

Kerbaj Tony (2016 – present)
 Alan Tsai (2015 – present)
 Donald Ohiona (2013 –2014)

Graduate and Post-Baccalaureate

Anosha Khawaja (2017-2018)
 Shira Lupkin (2014 –2017)
 Lee Anne Cannella (2013 – 2014).

Thesis: Individual trait-like differences in long-term sleep patterns modulate emotional and cognitive processing

SELECTED MEDIA COVERAGE

CTV. A Better Sleep Can Tame Your Fears. *Live TV interview.*
<http://www.ctvnews.ca/video?playlistId=1.3646566>

Time. Why Dreaming May Be Important for Your Health.
<http://time.com/4970767/rem-sleep-dreams-health/>

The Atlantic. Better Sleep Can Build Emotional Resilience.
<https://www.theatlantic.com/health/archive/2017/10/rem-and-trauma/543573/>

Newsweek. Getting a Full Night’s Rest Means You’re Probably More Resilient Than Everyone Else.
<http://www.newsweek.com/getting-full-nights-rest-means-youre-probably-more-resilient-everyone-else-690701>.

Huffington Post. The Sleep Phase Where You Dream May Make You Less Prone to Fear.
https://www.huffingtonpost.com/entry/rem-sleep-fear_us_59f749fce4b077d8dfcb3ea1

Daily Mail. Poor Sleep Makes You Fearful – and Can Increase a Soldier’s risk of PTSD.
<http://www.dailymail.co.uk/health/article-5009483/Poor-sleep-makes-FEARFUL-increase-risk-PTSD.html>

The Naked Scientists. Sleep Reduces Fear Learning Activity in the Brain. *Podcast Interview.*
<https://www.thenakedscientists.com/articles/science-news/sleep-reduces-fear-learning-activity-brain>

ADDITIONAL PROFESSIONAL EXPERIENCE

Research-Related

ConicIT Ltd: Petah-Tikva, IL.
Research Consultant. 2011- 2012.

Advanced Course in Computational Neuroscience (ACCN), Freiburg, Germany
Summer-school for graduate students, August, 2008.

Department of Psychiatry, Columbia University, New York, NY (work done mostly from Israel).
Research assistant (under Dr. *Bruce Dohrenwend*). January 2003 - August 2004.

The Institute of Life Sciences, The Hebrew University of Jerusalem, Jerusalem, IL
Research assistant (under Dr. *Ariel Darvasi*). March 2002 - January 2003.

Department of Psychology, The Hebrew University of Jerusalem, Jerusalem, IL
Research assistant (under Dr. *Yehuda Shavit*). October 2001 - July 2002.

Falk Institute for Mental Health and Behavioral Studies, Jerusalem, IL.
Research assistant, 2001 -2002.

Military Service

Nuclear Research Center - Negev: 1997-1999.

Preparation course in nuclear physics and radiation: 1996.

MEMBERSHIP IN PROFESSIONAL SOCIETIES

Society for Neuroscience

The Cognitive Science Society

Sleep Research Society

AD HOC REVIEWER

The 33rd Annual Conference of the Cognitive Science Society (CogSci 2011)

Cognitive Neurodynamics

Journal of Cognitive Psychology

Journal of Computational Neuroscience

PLoS One

Scientific Studies of Reading

Neurobiology of Learning and Memory

Memory and Cognition