

## Nori Jacoby: Curriculum Vitae

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### Education and Postdoctoral Training:

- July 2016–present: Presidential Scholar in Society and Neuroscience,  
The Center for Science and Society, Columbia University
- 2016: Visiting Postdoctoral Fellow, Berkeley (Griffiths Lab)
- 2014–2016: Postdoctoral Research Fellow, MIT (McDermott Lab)
- 2007–2014: PhD in Computational Neuroscience (Ahissar and Tishby Lab)  
The Edmond and Lily Safra Center for Brain Sciences (ELSC),  
The Hebrew University of Jerusalem
- 2001–2003: MSc. in Mathematics, *Magna cum Laude*,  
The Hebrew University of Jerusalem
- 1998–2000: BSc in Mathematics and Physics, *Magna cum Laude*,  
Talpiot Military Academy, the Hebrew University Jerusalem

### Publications

- 2017: **Jacoby, Nori**, and Josh McDermott. “Integer ratio priors on musical rhythm revealed cross-culturally by iterated reproduction.” *Current Biology* <http://dx.doi.org/10.1016/j.cub.2016.12.031>.
- Langlois,\* Thomas A., **Nori Jacoby**\* Jordan Suchow, and Thomas L. Griffiths. “Uncovering visual priors in spatial memory using serial reproduction.” Proceedings of the 39th Annual Meeting of the Cognitive Science Society. \*Equal Contribution
- Mehta, Anahita H., **Nori Jacoby**, Ifat Yasin, Andrew J. Oxenham, and Shihab Shamma. “An Auditory illusion reveals the role of streaming in the temporal misallocation of perceptual objects.” *Philosophical Transactions B* 372: 20160114. doi: 10.1098/rstb/372/1714.
- Polak, Rainer, **Nori Jacoby**, and Justin London. “Afrikanistische Rhythmusforschung und die politische Dimension von Daten. Drei Analysen eines Mehrspur-Audio-Korpus von Percussion-Ensemblemusik aus Mali.” *Zeitschrift der Gesellschaft für Musiktheorie*, 13.2, 2016.
- Elliott, Mark T., Ryan Stables, Dominic Ward, Dagmar Fraser, **Nori Jacoby**, and Alan M. Wing. “Analysing multi-person timing in music and movement: event based methods.” *Accepted*.
- 2016: Neomi Singer, **Nori Jacoby**, Tamar Lin, Gal Raz, Lavi Shpigelman, Gadi Gilam, Roni Y. Granot, Talma Hendler. “Common modulation of limbic network activation underlies the unfolding of musical emotions and its temporal attributes.” *Neuroimage* 141, 517–29.

- London, Justin, Rainer Polak, and **Nori Jacoby**. “Rhythm histograms and musical meter: a corpus study of malian percussion music,” *Psychonomic Bulletin and Review*, doi: 10.3758/s13423-016-1093-7.
- Polak, Rainer\*, **Nori Jacoby\***, and Justin London\*. “Both isochronous and non-isochronous metrical subdivision afford precise and stable ensemble entrainment: A corpus study of Malian jembe drumming.” *Frontiers in Auditory Neuroscience*, doi: 10.3389/fnins.2016.00285. \*Equal contribution
- Eloul, Shaltiel, Gil Zissu, Yehiel H. Amo, and **Nori Jacoby**. “Motion tracking as a novel way to control electronic music performance,” *Leonardo*, 49.3, 203-10.
- Honisch, Juliane J., Mark T. Elliott, **Nori Jacoby**, and Alan M. Wing. “Cue properties change timing strategies in group movement synchronization.” *Scientific Reports* 6: 19439. Doi:10.1038/srep19439.
- 2015: **Jacoby, Nori**, and Merav Ahissar. “Assessing the applied benefits of perceptual training: lessons from studies of working-memory training.” *Journal of Vision*, August 2015, Vol.15.6. Doi: 10.1167/15.10.6.
- Jaffe-Dax, Sagi, Ofri Raviv, **Nori Jacoby**, Yonatan Loewenstein and Merav Ahissar. “Towards a computational model of dyslexia.” *The Journal of Neuroscience* 35.35: 12116-26.
- Jacoby, Nori**, Bruno H. Repp, Merav Ahissar, Naftali Tishby, and Peter Keller. “Parameter estimation of linear sensorimotor synchronization models: Phase correction, period correction and ensemble synchronization.” *Timing & Time Perception*, Doi: 10.1163/22134468-00002048.
- Jacoby, Nori**, Naftali Tishby, and Dmitri Tymoczko. “Information bottleneck and functional harmony.” *Journal of New Music Research*, Doi: 10.1080/09298215.2015.1036888.
- Jacoby, Nori**, Peter E. Keller, Bruno H. Repp, Merav Ahissar, and Naftali Tishby. “Lower bound on the accuracy of parameter estimation methods for linear sensorimotor synchronization models.” *Timing & Time Perception*, Doi: 10.1163/22134468-00002047.
- Van der Steen, Marieke, **Nori Jacoby**, Merle T. Fairhurst, and Peter E. Keller. “Sensorimotor synchronization with tempo changing auditory sequences: modeling temporal adaptation and anticipation.” *Brain Research*, Doi: 10.1016/j.brainres.2015.01.053.
- 2013: Lipkind, Dina, Gary Marcus, Douglas Bemis, Kazutoshi Sasahara, **Nori Jacoby**, Miki Takahashi, Kenta Suzuki, Olga Feher, Primož Ravbar, Kazuo Okanoya and Ofer Tchernichovski. “Stepwise acquisition of vocal combinatorial capacity in songbirds and human infants.” *Nature*, vol. 498, 104–8.
- Jacoby, Nori** and Merav Ahissar. “On the limitations of perceptual learning as a rehabilitation tool.” In *Progress in Brain Research: Changing Brains - Applying Brain Plasticity to Advance and Recover Human Ability*. Michael Merzenich, Mor Nahum and Tom Van Vleet, eds. Elsevier, 2013.
- Gurion, Tom, and **Nori Jacoby**. “Audio-only augmented reality system for social interaction.” *HCI International 2013-Posters' Extended Abstracts*. Springer Berlin Heidelberg, 2013. 322-6.

- 2012: **Jacoby, Nori** and Bruno H. Repp. "A General linear framework for the comparison and evaluation of models of sensorimotor synchronization." *Biological Cybernetics*, vol. 106/3, 135-154. doi:10.1007/s00422-012-0482-x.
- Bohannon, Philip, Nilesh Dalvi, Yuval Filmus, **Nori Jacoby**, Sathiya Keerthi, and Alok Kirpal. "Automatic web-scale information extraction." *Proceedings of the 2012 ACM SIGMOD International Conference on Management of Data*, 609-612.
- 2011: Repp, Bruno H., Peter E. Keller, and **Nori Jacoby**. "Quantifying phase correction in sensorimotor synchronization: empirical comparison of three paradigms." *Acta Psychologica* 139, no. 2: 281-90.
- Granot, Roni Y., and **Nori Jacoby**. "Musically puzzling I: Sensitivity to overall structure in sonata form?" *Musica Scientiae* 15, no. 3: 365-86.
- Granot, Roni Y., and **Nori Jacoby**. "Musically puzzling II: Sensitivity to overall structure in a Haydn e-minor sonata?" *Musica Scientiae* 16, no.1, 67-80.
- 2004: Lawrence, Ruth and **Nori Jacoby**. "Some computations of Ohtsuki series." *Advances in Topological Quantum Field Theory*, J. Bryden, ed. Kluwer, 53-70.

### Conference Presentations

- 2017: "Musical rhythm: Evolutionary and cross-cultural perspectives," A symposium featuring Andrea Ravignani, **Nori Jacoby**, Ani Patel, and Jessica Grahn. 1<sup>st</sup> Conference of the Timing Research Forum, October 23-25, 2017.
- "Priors on musical rhythm revealed cross-culturally by iterated reproduction," **Jacoby, Nori**, Jessica Grahn, Daniel Cameron, Kyung Myun Lee, Eduardo A. Undurraga, Ricardo Godoy, and Josh McDermott. Poster presentation, 6<sup>th</sup> Meeting of the International Conference on Auditory Cortex, Banff, 2017.
- "Cross-cultural variation in sensorimotor synchronization with simple rhythms: a comparative tapping study." Polak, Rainer, **Nori Jacoby**, Timo Fischinger, Daniel Goldberg, Andre Holzapfel, and Justin London. 16<sup>th</sup> Rhythm Production and Perception Workshop, July 3-5, 2017.
- "Rhythmic perceptual priors revealed by iterated reproduction." **Jacoby, Nori**, and Josh McDermott. 16th Rhythm Production and Perception Workshop, July 3-5, 2017.
- "Universality of infant-directed music." Mehr, Samuel, Manvir Singh, **Nori Jacoby**, Hunter York, Timothy O'Donnell, Max Krasnow, and Luke Glowacki. 29<sup>th</sup> Annual Meeting of the Human Behavior and Evolution Society, May 31-June 3, 2017.
- "Rhythmic perceptual priors revealed by iterated reproduction." **Jacoby, Nori**, and Josh McDermott. New England Sequencing and Timing (NEST) Meeting, March 25, 2017.
- "Perceptual priors on musical rhythm revealed by iterated reproduction." **Jacoby, Nori**, and Josh McDermott. 40<sup>th</sup> ARO Mid Winter Meeting, Baltimore, February 11-15, 2017.
- 2016: "Cue properties change timing strategies in group movement synchronisation." Honisch, Juliane J., Mark T. Elliott, **Nori Jacoby**, and Alan M. Wing. Sport Plaisir Conference on Motor Behavior and Emotion, University of Lille, France, Nov. 21-23, 2016.

- “Cross-modal ‘goodness of fit’ judgments of auditory and visual meter in musical rhythms.” Palmer, Stephen E, Joshua Peterson, and Nori Jacoby. 57<sup>th</sup> Annual Meeting, Psychonomic Society, Boston, Nov. 17-20, 2016.
- “Musical roles and individual behavior in ensemble entrainment in jembe drum ensemble music from Mali.” **Jacoby, Nori**, Polak, Rainer, and Justin London. Annual Meeting, Society for Music Theory, Vancouver, BC, Nov. 3-6, 2016.
- “Empirical musicology, African rhythm, and the politics of data: Cross-cultural research depends on interdisciplinary collaboration.” Polak, Rainer, **Nori Jacoby**, and Justin London. Internationaler Kongress der Gesellschaft für Musikforschung, Johannes Gutenberg-Universität Mainz, September 14-17, 2016.
- “Ensemble synchronization and leadership in Jembe drumming music from Mali.” **Jacoby, Nori**, Rainer Polak, and Justin London. 14<sup>th</sup> Biennial International Conference on Music Perception and Cognition (ICMPC), UCSF, San Francisco, July 5-9, 2016.
- “Statistical learning for musical meter revisited: A corpus study of Malian percussion music.” London, Justin, **Nori Jacoby**, and Rainer Polak. 14<sup>th</sup> Biennial International Conference on Music Perception and Cognition (ICMPC), UCSF, San Francisco, July 5-9, 2016.
- Individual differences and reading skills: another PATH needed?" **Jacoby, Nori**, Naftali Tishby, Hilla Jakoby, Merav Ahissar 14<sup>th</sup> Biennial International Conference on Music Perception and Cognition (ICMPC), UCSF, San Francisco, July 5-9, 2016.
- “Rhythmic perceptual priors revealed by iterated reproduction.” **Jacoby, Nori** and Josh McDermott. 14<sup>th</sup> Biennial International Conference on Music Perception and Cognition (ICMPC), UCSF, San Francisco, July 5-9, 2016.
- “How West African drummers keep in time together: Musical roles and individual behavior in ensemble entrainment in jembe music from Mali.” Polak, Rainer, **Nori Jacoby**, and Justin London. 4<sup>th</sup> International Conference on Analytical Approaches to World Music (AAWM), The New School, NYC, June 8-11, 2016.
- 2015: “The Cognitive correlates of sensorimotor synchronization.” **Jacoby, Nori**, Naftali Tishby, Hilla Jakoby, and Merav Ahissar. Biennial meeting of the Society for Music Perception & Cognition (SMPC), Vanderbilt University, August 1-5, 2015.
- “Ensemble entrainment in jembe music from mali.” Polak, Rainer, **Nori Jacoby**, and Justin London. RPPW 15 (Rhythm Production and Perception Workshop), University of Amsterdam, Netherlands, July 6–8, 2015.
- “An Information-theoretic approach to chord categorization: from corpus analysis to cognitive experiment.” **Jacoby, Nori**, Naftali Tishby, Itay Lieder, and Dmitri Tymoczko. Talk at NEMCOG (Northeast Music Cognition Group), Wesleyan University, Middletown, CT. April 4, 2015.
- “The Cognitive correlates of sensorimotor synchronization.” **Jacoby, Nori**, Naftali Tishby, Hilla Jakoby, Merav Ahissar. New England Sequencing and Timing (NEST), UMass Amherst, March 7, 2015.
- “Towards a computational model of dyslexia.” Sagi Jaffe-Dax, Ofri Raviv, **Nori Jacoby**, Yonatan Loewenstein, Merav Ahissar. Poster at Cosyne, Salt Lake City March 5-8, 2015.

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- 2014: “The Effect of ensemble size, musical role, and individual performer on collective entrainment in khasonka drumming from mali,” London, Justin, **Nori Jacoby**, Rainer Polak. ICMPC 13-APSCOM 5, Yonsei University, Seoul, South Korea, August 4–8, 2014.
- “An Information-theoretic approach to functional harmony.” **Nori Jacoby** and Naftali Tishby. IMS Annual Musicology Conference, Tel-Aviv, June 23, 2014.
- “Movement Entrainment when walking (and bouncing!) in group formations.” Mark Elliott, **Nori Jacoby**, and Alan Wing. ISPGR Symposium on Multi-Person Entrainment in Gait and Posture, Vancouver, Canada. June 29- July 3, 2014.
- “Finger-tapping, rhythm and working memory: the cognitive correlates of sensorimotor synchronization.” **Nori Jacoby** and Merav Ahissar. Annual Conference, HUJI Psychology Department, Jerusalem, Israel. June 19, 2014.
- 2013: “Information, working memory and prediction: a mathematical metaphor for art, music and perception?” 2013 Annual Meeting of the Society for Psychophysiological Research, Florence, Italy.
- “Parameter estimation of sensorimotor synchronization models.” RPPW '13 (Rhythm Production and Perception Workshop), Birmingham, UK.
- “Audio-only augmented reality system for social interaction.” Tom Gurion and **Nori Jacoby**. Paper at IEEE ISTAS '13, Toronto.
- “Information, categorization and prediction: a mathematical metaphor for art music and perception?” Information, Representation and Learning: An international workshop in honor of Naftali Tishby, Jerusalem.
- “Information, Categorization and Prediction: A Mathematical Metaphor for Art Music and Perception?” “Music and Brains: the Surprising Link” Conference, Jerusalem.
- 2012: “Tapping working memory with sensorimotor synchronization.” Poster at the Israel Society for Neuroscience's Annual Conference, Eilat.
- “Kernel information bottleneck.” Neural Information Processing Systems Foundation (NIPS) workshop: “Information in Perception and Action,” Nevada, USA.
- “Tapping working memory with sensorimotor synchronization.” Poster at the Society for Neuroscience's Annual Conference, New Orleans, USA.
- “Kernel information bottleneck as a metaphor for music and art perception.” Monte Verita Workshop on Music and Neuroscience, Ascona, Switzerland.
- “Kernel Information Bottleneck.” Interdisciplinary Center for Neural Computation's Annual Retreat, Ein Gedi.
- 2011: “When the rat heard Ligeti: neural sensitivity to auditory structure.” Yael Bitterman, Ayael Hashahar-Shapira, Itai Hershenhoren, **Nori Jacoby**, Amit Yaron and Israel Nelken. Poster at the 20th Annual Meeting of the Israel Society for Neuroscience, Eilat.
- “Multiple neural networks depicted by continuous measurement of the musical emotional experience.” Neomi Singer, Donna Abecasis, Eran Pasternak, **Nori Jacoby**, Roni Y. Granot, Talma Hendler. Poster at Neurosciences and Music Conference IV: Learning and Memory. Edinburgh, Scotland.

“Preliminary results with the action perception model of tapping.” The Columbia / Gatsby / ICNC Workshop, Columbia University, New York.

“A General linear framework for the comparison and evaluation of models of sensorimotor synchronization.” **Nori Jacoby** and Bruno Repp, Western Society for Sequence and Timing (WEST) annual meeting, Santa Barbara, California.

### **Invited Lectures and Colloquia**

- 2017: “Computational music cognition in the field: Studying perceptual priors cross-culturally with iterated reproduction,” Conference on the Origins of Music in Non-State Societies, Abbaye de Royaumont, 14-16 December 2017.
- “Music and neuroscience: cross-cultural research,” Workshop on Sound Studies, Columbia University and Paris Sciences et Lettres, September 22, 2017.
- “Perceptual priors revealed by iterated reproduction,” Psychology Department Colloquium, Durham University, March 10, 2017.
- “What can rhythm tell us about cognition? insights from iterated reproduction,” Music Department Colloquium, Columbia University, March 3, 2017.
- 2016: “Integer ratio priors on musical rhythms.” Invited talk, Cog Lunch Series, MIT, October 18, 2016.
- “Perceptual priors in music and speech revealed by iterated learning.” Guest lecture, CCRMA, Stanford University, August 17, 2016.
- “Rhythmic perceptual priors revealed by iterated learning.” Pandora, Oakland.
- “Perceptual priors in music and speech revealed by iterated learning.” Starkey Hearing Research Center, Berkeley.
- “Parameter estimation of linear models.” Workshop on Interpersonal Entrainment in Music Performance, Durham University.
- “Iterated learning in musical rhythms.” Keynote, Bay Innovative Signal Hackers Bash hosted by Dolby San Francisco.
- “Discovering rhythmic perceptual priors with iterated learning.” Max Planck Institute for Empirical Aesthetics, Frankfurt.
- “Discovering rhythmic perceptual priors with iterated learning.” Colloquium, the Music, Mind, and Society series at Vanderbilt University, Jan. 27, 2016.
- 2015: “Discovering rhythmic perceptual priors with iterated learning.” New York University (David Poeppel’s Lab).
- 2014: “Finger tapping, rhythm and working memory: the cognitive correlates of sensorimotor synchronization.” ELSC Nervous Club, Hebrew University of Jerusalem.
- “Parameter estimation of sensorimotor synchronization models.” University of Birmingham (Alan Wing’s Lab).
- “Finger tapping, rhythm and working memory: the cognitive correlates of sensorimotor synchronization.” MIT (Josh McDermott’s Lab).
- 2013: “Measuring multi-person timing: state of the art methods and analyses.” Invited speaker, Pre-Conference Workshop, RPPW, University of Birmingham.

“Information, categorization and prediction: A Mathematical metaphor for art music and perception?” Guest lecture at the Electrical Engineering Systems Department Seminar Series at Tel-Aviv University.

“Information, categorization and prediction: A Mathematical metaphor for art music and perception?” Invited lecture at the Gonda Brain Research Center Weekly Seminar (Spring-Summer Series) at Bar-Ilan University.

2011: “Reinforcement learning and computational methods in music cognition.” Tutorial at the 3rd International Conference on Mathematics and Computation in Music at IRCAM, Paris.

“Sound editing for experimental design.” Tutorial at the 3rd meeting of the Israeli Music Cognition Group (IMCOG), Bar-Ilan University.

2010: “Linear models of sensorimotor synchronization.” Guest lecture, the Center for Computer Research in Music and Acoustics (CCRMA), Stanford University.

### Honors and Awards

- 2014: ELSC Brain Sciences Postdoctoral Fellowship for Training Abroad.
- 2012: Daniel Amit Memorial Prize in Computational Neuroscience, the Edmond and Lily Safra Center for Brain Sciences, Hebrew University of Jerusalem.
- 2008: Margalit Prize for music for Ruti Kanner’s play Go’al
- 2004: Israeli Defense Forces C<sup>4</sup>I Prize for Significant Creative Research
- 2003: *Magna Cum Laude*, the Hebrew University of Jerusalem, for MSc.
- 2003: Israeli Defense Forces’ Prize for Algorithmic Development
- 2000: *Magna Cum Laude*, the Hebrew University of Jerusalem, for BSc.
- 1997–1998: Award, the America-Israel Cultural Foundation for Composition
- 1995–1998: Deans List Awards for Excellence in Mathematics, the Open University

### Professional Experience

- 2009-2014: Lecturer, Music Technology Program, Bar-Ilan University
- 2010-2014: Data scientist, Yahoo Israel
- 2007-2010 Senior algorithmic developer, Dapper (acquired by Yahoo in Oct. 2010)
- 2006–2008: Lecturer, the Naggar School for Music, Media and Photography
- 2012: Instructor, Hebrew University of Jerusalem
- 2000-2007: Captain in a research and development unit, the Israeli Defense Forces.  
Headed an academic research team of over a dozen scientists doing classified work in machine learning and computer science. Authored a significant advance in computer science, which received the C<sup>4</sup>I Prize.
- 1998–2000: Cadet, Talpiot Military Academy, Israeli Air Force

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**References****Josh McDermott (Postdoctoral PI)**

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