

# LEILA WEHBE

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## Current Position

**Tenure Track Assistant Professor, August 2018 - now**  
**Carnegie Mellon University**  
School of Computer Science  
Machine Learning Department  
Neuroscience Institute

## Previous Positions

**Postdoctoral Researcher, August 2015 – July 2018**  
**University of California, Berkeley**  
Helen Wills Neuroscience Institute  
Advised by Jack Gallant

## Education

**Carnegie Mellon University, August 2015**  
School of Computer Science  
**PhD in Machine Learning**  
Special Track in the Center for the Neural Basis of Cognition  
Advised by Tom Mitchell  
*PhD thesis: The Time and Location of Natural Reading Processes in the Brain*  
Obtained Interim MS in Machine Learning in **May 2013**  
*Master Thesis: Tracking Story Reading in the Brain*

**American University of Beirut, June 2009**  
Faculty of Engineering and Architecture  
**B.Eng. in Electrical and Computer Engineering**  
Minors in Biology and Biomedical Engineering  
Awarded the American University of Beirut **Full Merit Scholarship** for undergraduates  
*Undergraduate thesis: A Real-Time Automated Spike-Sorting Algorithm for Epileptic Seizure Prediction*

## Awards and Scholarships

- **Google Faculty Research Award, 2018**
- **Multimodal Neuroimaging Training Program Fellowship, 2011-2012**
- **Rothberg Research Award in Human Brain Imaging, 2011-2012**
- **The Full Merit Scholarship from the American University of Beirut, 2005-2009**

## Peer-Reviewed Publications

- Toneva M, **Wehbe L**. **Interpreting and improving natural-language processing (in machines) with natural language-processing (in the brain)**. *Proceedings of the Conference on Neural Information Processing Systems (NeurIPS)*, 2019.
- Schwartz D, Toneva M, **Wehbe L**. **Inducing brain-relevant bias in natural language processing models**. *Proceedings of the Conference on Neural Information Processing Systems (NeurIPS)*, 2019.
- Wang A, Tarr M and **Wehbe L**. **Neural Taskonomy: Inferring the Similarity of Task-Derived Representations from Brain Activity**. *Proceedings of the Conference on Neural Information Processing Systems (NeurIPS)*, 2019.
- Chen H, Hu C, **Wehbe L** and Lin S. **Self-Discriminative Learning for Unsupervised Document Embedding**. *Proceedings of the Conference of the North American Chapter of the ACL (NAACL)*, 2019, *oral presentation*.
- Fyshe A, Sudre G, **Wehbe L**, Rafidi N, Mitchell T. **The Semantics of Adjective Noun Phrases in the Human Brain**. *Human Brain Mapping*, 2019.
- **Wehbe L**, Fyshe A, Mitchell T. **Language processing in the brain: Mapping neural activity to language meaning**. *Language in Interaction: the human language faculty from genes to behavior*, MIT Press, 2019.
- Murphy B, **Wehbe L**, Fyshe A. **Decoding Language from the Brain**. *Language, Cognition, and Computational Models*, Cambridge University Press, 2018.
- **Wehbe L**, Ramdas A, Steorts R, Shalizi C. **Regularized Brain Reading with Shrinkage and Smoothing**. *Annals of Applied Statistics*, 2015.
- Ramdas A\*, **Wehbe L\***. **Nonparametric Independence Testing for Small Sample Sizes**. *Proceedings of the International Joint Conference on Artificial Intelligence (IJCAI)*, 2015, *oral presentation*.
- Fyshe A, **Wehbe L**, Talukdar P, Murphy B, Mitchell T. **A Compositional and Interpretable Semantic Space**. *Proceedings of the Conference of the North American Chapter of the ACL (NAACL)*, 2015, *oral presentation*.
- **Wehbe L**, Murphy B, Talukdar P, Fyshe A, Ramdas A, Mitchell T. **Simultaneously uncovering the patterns of brain regions involved in different story reading subprocesses**. *PLOS ONE*, 2014.
- **Wehbe L**, Vaswani A, Knight K, Mitchell T. **Aligning context-based statistical models of language with brain activity during reading**. *Proceedings of the Conference on Empirical Methods in Natural Language Processing (EMNLP)*, 2014, *oral presentation*.
- Sudre G, Pomerleau D, Palatucci M, **Wehbe L**, Fyshe A, Salmelin R, Mitchell T. **Tracking neural coding of perceptual and semantic features of concrete nouns**. *Neuroimage*, 2012.

## Workshop Papers, Posters and Demonstrations

- **Wehbe L**, Huth A, Deniz F, Kieseler M, Gallant J. **BOLD predictions: automated simulation of fMRI experiments.** *Organization for Human Brain Mapping, OHBM 2017 poster and talk. CCN 2018 poster. Merit Travel Grant awarded.*
- Tseng C, **Wehbe L**, Deniz F, Gallant J. **Different contextual effects modulate the representation of word meaning in the human brain.** *Society for the Neurobiology of Language, SNL 2017 poster.*
- **Wehbe L\***, Nunez-Elizalde A\*, Huth A, Deniz F, Bilenko F, Gallant J. **Deep multi-view representation learning of brain responses to natural stimuli.** *Cognitive Computational Neuroscience, CCN 2017 poster.*
- **Wehbe L\***, Nunez-Elizalde A\*, Huth A, Deniz F, Bilenko F, Gallant J. **Deep multi-view representation learning of brain responses to natural stimuli.** *Computational and Systems Neuroscience, COSYNE 2017 poster. Merit Travel Grant awarded.*
- **Wehbe L**, Huth A, Deniz F, Kieseler M, Gallant J. **BOLD predictions: automated simulation of fMRI experiments.** *NeurIPS 2016 demonstration track. Demonstration of the online engine: <https://boldpredictions.gallantlab.org/>.*
- **Wehbe L**, Blank I, Mahowald K, Furell R, Piantadosi S, Tily H, Gallee J, Vishnevetsky A, Gibson E, Kanwisher N, Fedorenko E. **Neural activity in the fronto-temporal language system predicts online language comprehension difficulty.** *Society for the Neurobiology of Language, SNL 2015 poster.*
- **Wehbe L**, Vaswani A, Knight K, Mitchell T, **The dynamics of information integration in the brain during story reading,** *Society for the Neurobiology of Language, SNL 2014 poster.*
- **Wehbe L**, Murphy B, Talukdar P, Fyshe A, Ramdas A, Mitchell T. **Mapping the Reading Brain.** *NeurIPS 2013 Women in Machine Learning workshop, WiML poster.*
- **Wehbe L**, Talukdar P, Murphy B, Fyshe A, Sudre G, Mitchell T. **Tracking Story Reading in the Brain.** *NeurIPS 2012 Machine Learning and Interpretation in Neuroimaging, MLINI Workshop, oral presentation.*
- Fyshe A, Sudre G, **Wehbe L**, Murphy B and Mitchell T. **Decoding Word Semantics from Magnetoencephalography Time Series Transformations.** *NeurIPS 2012 Machine Learning and Interpretation in Neuroimaging, MLINI Workshop.*
- **Wehbe L**, Mitchell T. **Decomposing Neural Activity into Contributions from Distinct Tasks.** *Society for Neuroscience, SFN 2011 poster.*

## Talks

- Invited talk. **Natural language in real brains and artificial neural networks.** Montreal AI and Neuroscience (MAIN) conference, 2019.
- Invited talk. **Using insights from the human brain to interpret and improve NLP models.** Semantic Processing and Semantic Knowledge workshop, Dartmouth, 2019.
- Invited tea-talk. **Using insights from the human brain to interpret and improve NLP models.** Mila, 2019.
- Invited talk. **Machine Learning for automating analysis of big data in Neuroscience.** Machine Learning in Neuroscience: Fundamentals and Possibilities, SfN online conference, 2019.
- Invited keynote. **Language representations in human brains and artificial neural networks.** Cognitive Modeling and Computational Linguistics NAACL workshop, 2019.
- Invited talk. **Language representations in human brains and artificial neural networks.** Petuum, 2019.
- Invited talk. **What do naturalistic language experiments offer us?** CIMeC, University of Trento, 2018.
- Invited keynote. **Language representations in human brains and artificial neural networks.** First Blackbox NLP workshop, EMNLP 2018.
- Invited talk. **Studying the brain basis of language with naturalistic experiments: opportunities, challenges and progress.** Caltech, 2018.
- Invited talk. **Studying the brain basis of language with naturalistic experiments: opportunities, challenges and progress.** IBM research, 2018.
- Invited talk. **Studying the brain basis of language with naturalistic experiments: opportunities, challenges and progress.** Cornell University, 2018.
- Invited talk. **Studying the brain basis of language with naturalistic experiments: opportunities, challenges and progress.** Duke University, 2018.
- Invited talk. **Studying the brain basis of language with naturalistic experiments: opportunities, challenges and progress.** Stanford University, 2018.
- Invited talk. **Language and the brain: opportunities, challenges and progress.** ETH Zurich, 2018.
- Invited talk. **Language and the brain: opportunities, challenges and progress.** Carnegie Mellon University, 2018.
- Invited talk. **Naturalistic language experiments: opportunities, challenges and progress.** University of Michigan Ann Arbor, 2018.
- Invited talk. **Modeling brain responses to natural language stimuli.** University of Western Ontario, 2018.
- Invited talk. **Language and the brain: naturalistic paradigms and complex prediction problems.** Georgia Tech, 2018.
- Invited talk. **Modeling brain responses to natural language stimuli.** University of Illinois at Urbana-Champaign, 2017.
- Invited symposium. **Modeling brain responses to natural language stimuli.** Society for the Neurobiology of Language conference, 2017.
- Invited talk. **Modeling brain responses to natural language stimuli.** Fordham University, 2017.
- Lecture. **Language processing in the brain: Mapping neural activity to language meaning,** with A. Fyshe. Language in Interaction summer school, Donders Institute, 2016.
- Invited webcast talk. **Mapping the Reading Brain.** *AI with the best* online conference, 2016.

- Invited talk. **Harry Potter and the Activity in the Brain.** *Learning and the Brain* conference on the Science of Imagination, 2016.
- Oral Presentation. **A spatio-temporal map of reading processes in the brain.** NeurIPS WiML workshop, 2015.
- Oral Presentation. **Nonparametric Independence Testing for Small Sample Sizes.** IJCAI 2015.
- Oral Presentation. **One-step hypothesis testing for functional neuroimaging.** SAND7 2015.
- AI Seminar Talk. **Uncovering Meaning Construction and Representation in the Reading Brain.** Information Science Institute, University of Southern California, 2014.
- Oral Presentation. **Aligning context-based statistical models of language with brain activity during reading.** EMNLP 2014.
- Invited talk. **Predicting Brain Activity During Story Reading, Kanwisher Lab,** Brain and Cognitive Science Department. Massachusetts Institute of Technology, 2014.
- Invited talk to highlight Brain Initiative at Carnegie Mellon. **Harry Potter and the Reading Brain.** *Ceilidh Weekend*, 2014.
- Invited talk. **Tracking Story Reading in the Brain.** Reading and Learning Group, University of Pittsburgh, 2013.

## Teaching

- **Instructor.** 10-718 *Data Analysis (MS+PhD)*. Carnegie Mellon University, Fall 2019.
- **Instructor.** 10-701 *Introduction to Machine Learning (PhD)*. Carnegie Mellon University, Spring 2019.
- **Instructor.** *Data Science for Cognitive Neuroscience (Undergrad)*. UC Berkeley, Spring 2017. Co-Instructor with F. Deniz and M. Lescroart.
- **Instructor.** *Data Science for Cognitive Neuroscience (Undergrad)*. UC Berkeley, Fall 2016. Co-Instructor with F. Deniz and C. Holdgraf.
- **Instructor.** *Computational Neuroscience by the Mediterranean*. American University of Beirut, January 2016.
- **Teaching Assistant.** 10-701 *Machine Learning (PhD)*. Carnegie Mellon University, Fall 2013, taught by A. Smola and G. Gordon.
- **Teaching Assistant.** 10-701 *Machine Learning (PhD)*. Carnegie Mellon University, Spring 2013, taught by A. Smola and B. Póczos.
- **Teaching Assistant.** *Multi-modal Neuroimaging Training Program*. Joint program between Carnegie Mellon University and University of Pittsburgh, Summer 2013.
- **Teaching Assistant.** *Design and Analysis of Algorithms (Undergrad)*. American University of Beirut, Spring 2009, taught by L. Bazzi.
- **Tutor.** Math, Chemistry, Physics and Biology for students in grades 8 to 12, 2005-2009.

## Mentorship

- **Current PhD students:** Mariya Toneva (co-advised with Tom Mitchell), Jennifer Williams, Aria (Yuan) Wang (co-advised with Michael Tarr), Ruogu Lin.
- **Current Master's students:** Aniketh Reddy, Srinivas Ravishankar.
- **Rotation PhD student:** Shenghao Wu (2018, co-advised with Aaditya Ramdas).
- **Previous Undergraduate students:** Stephanie You, Aditri Bhagirath.
- **Previously mentored first year PhD students:** (mentored as postdoc at Berkeley) Christine Tseng, Jessie Liu.
- **PhD thesis committee member:** Qiong Zhang, Daniel Schwartz.
- **Master's thesis committee member:** Maryam Honari Jahromi (University of Victoria).

## Service

- **Reviewer.** academic journals (*PNAS, Nature Neuroscience, NeuroImage, Journal of Experimental Psychology: General, Journal of Neurolinguistics, Biological Psychiatry, Journal of Neuroscience, Neuroscience & Biobehavioral Reviews, Scientific Reports*) and conferences (*JCAI, NeurIPS, CCN, ICLR, ICML*).
- **Co-organizer.** CVPR *Minds vs. Machines: How far are we from the common sense of a toddler?* Workshop, 2020.
- **Member.** *Neuroscience Institute Faculty Search Committee.* Carnegie Mellon University, 2019-2020.
- **Co-organizer.** *NeurIPS Context and Compositionality in Biological and Artificial Neural Systems Workshop,* 2019.
- **Member.** *Machine Learning Department Admissions Committee.* Carnegie Mellon University, 2018-2019.
- **Main organizer.** *NeurIPS Representation Learning in Artificial and Biological Neural Networks Workshop,* 2016.
- **Co-organizer.** *NeurIPS Machine Learning and Interpretation in Neuroimaging Workshop,* 2014-2015.
- **Member.** *President's Student Advisory Council.* Carnegie Mellon University, 2013-2014.
- **Member.** *Machine Learning Department Admissions Committee.* Carnegie Mellon University, 2013-2014.
- **Organizing member.** *Machine Learning Lunch Seminar* (2011-2013) and **chief organizer** (2013-2014), Carnegie Mellon University.

## Selected Press Coverage

- Interviewed in **Artificial Intelligence, Perspectives from Leading Practitioners in AI and the Science of the Brain**, by Jack Clark, O'Reilly Media 2017.
- **Associated Press.** Lab-coated Muggles use Harry Potter to study brain, picked up by more than 300 news outlets, 2014.
- **Time.** Reading Harry Potter Provides Clues to Brain Activity, 2014.
- **Scientific American.** How our Brains Process Books, 2014.
- **Futurity.** Scans map the brain as people read 'Harry Potter', 2014.
- **Bioscience Technology.** Reading Leaves a Dramatic Imprint on the Brain, 2014.
- **NSF Science Now.** EPISODE 29.
- **Science News for Students.** Harry Potter reveals secrets of the brain, 2015.
- **Huffington Post.** What Harry Potter Can Teach Us About Neuroscience, 2014.
- **Trib Live.** Reading Harry Potter provides clues to brain activity, CMU researchers say, 2014.

## Undergraduate Research Experience

**Massachusetts Institute of Technology, June-September 2008**  
McGovern Institute of Brain Research,  
**Intern, Kanwisher lab**