Laura Gwilliams

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Education

2015–2020 *Ph.D., Psychology*
New York University, USA
Thesis Title: Towards a mechanistic account of speech comprehension
Supervisors: Alec Marantz and David Poeppel
Committee: Eero Simoncelli, Liina Pylkkänen, Nima Mesgarani

2012–2013 *M.Sc., Cognitive Neuroscience of Language*
Basque Center on Cognition, Brain and Language (BCBL), Spain
Supervisors: Arthur Samuel and Phillip Monahan

2009–2012 *B.A., Linguistics*
Cardiff University, UK
Supervisor: Lise Fontaine

Research positions

2023-present *Assistant Professor*, Department of Psychology, Stanford University
Faculty Scholar Wu Tsai Neurosciences Institute and Stanford Data Science
Courtesy appointment in the Linguistics Department
PI of the Laboratory of Speech Neuroscience (LySN) Lab

2020-2023 *Post-doctoral Fellow*, University of California, San Francisco

2013–2015 *Research Assistant*, New York University Abu Dhabi

Grants and Awards

2023 *BRAIN Research Award*, The BRAIN Foundation, $178,202

2022 *Trainee Professional Development Award*, Society for Neuroscience (SfN)

2021 *Glushko Dissertation Prize*, The Cognitive Science Society

2021 *Douglas H. and Katharine Fryer Thesis Award*, New York University
(Award for Best Doctoral Thesis)

2020 *Dissertation Award*, Society for the Neurobiology of Language

2020 *Martin Braine Fellowship*, New York University

2019 *William Orr Dingwall Dissertation Fellowship*
Fellowship in the Cognitive, Clinical, and Neural Foundations of Language

2019 *Facebook PhD Fellowship*, Facebook (Finalist)

2018 *Trainee Professional Development Award*, Society for Neuroscience (SfN)

2018 *Poster Prize*, Salzburg Mind Brain Annual Meeting (SAMBA)

2018 *Travel Award*, Society for the Neurobiology of Language Conference

2018 *Travel Award*, Cognitive Modelling and Computational Linguistics

2017 *Travel Award*, Cognitive Computational Neuroscience Conference

2016 *Dean's Travel Grant*, New York University

2016 *Travel Award*, Society for the Neurobiology of Language Conference

2016 *Helmsley Fellowship* Cold Spring Harbor
(Genetics and Neurobiology of Language Course attendance fee)

2015 *Henry M. MacCracken Fellowship*, New York University
(Full funding of PhD tuition and maintenance)

2012 *Tuition Waiver*, Basque Center on Cognition, Brain and Language

2012 *Dell Hymes Commendation for Academic Achievement*, Cardiff University
(Awarded to the top graduating student within the department)

Publications

Preprints & Manuscripts

[1] **Gwilliams, L**., Marantz, A., Poeppel, D. & King, JR. (in prep). Parsing continuous speech into linguistic representations.

[2] Zuanazzi, A., Ripollés, P., Lin, WM., **Gwilliams, L**., *King, JR & *Poeppel, D (submitted). Tracking the online construction of linguistic meaning through negation. bioRxiv

[3] Degano, G., Donhauser, P., **Gwilliams, L**. Merlo, P., & Golestani, N. (submitted). Speech prosody enhances the neural processing of syntax. bioRxiv

Peer-reviewed articles

[4] ***Gwilliams, L**., *Leonard, M.K., Sellers, K.K., Chung, J.E., Dutta, B., & Chang, E.F. (2023). Large-scale single-neuron speech sound encoding across the depth of human cortex. *Nature*. DOI: 10.1038/s41586-023-06839-2

[5] **Gwilliams, L**., Flick, G., Marantz, A., Pylkkanen, L., Poeppel, D. & King, J.R. (2023). Introducing MEG-MASC a high-quality magneto-encephalography dataset for evaluating natural speech processing. *Nature Scientific Data*. DOI: 10.1038/s41597-023-02752-5

[6] **Gwilliams, L**., Marantz, A., Poeppel, D. & King, J.R. (2023). Top-down information shapes lexical processing when listening to continuous speech. *Language, Cognition and Neuroscience*. DOI: 10.1080/23273798.2023.2171072

[7] *Chung, J.E., *Sellers, K.K., Leonard, M.K., **Gwilliams, L**., Xu, D., Dougherty, M., Kharazia, V., Welkenhuysen. M., Dutta, B., Chang, E.F. (2022). High density single-unit human cortical recordings using the Neuropixels probe. *Neuron*. DOI: 10.1016/j.neuron.2022.05.007

[8] **Gwilliams, L**., King, JR., *Marantz, A. & *Poeppel, D. (2022). Neural dynamics of phoneme sequences: Position-invariant code for content and order. *Nature Communications*. DOI: 10.1038/s41467-022-34326-1

[9] Dikker, S., Mech, EM., **Gwilliams, L**., West, T., Dumas, G. & Federmeier, KD. (2022). Exploring age-related changes in inter-brain synchrony during verbal communication. *Psychology of Learning and Motivation*. DOI: 10.1016/bs.plm.2022.08.003

[10] Iemi, L., **Gwilliams, L**., Samaha, J., Auksztulewicz, R., Cycowicz, Y., King, JR., Thesen, T., Doyle, W., Devinsky, O., Schroeder, C.E., Melloni, L. & Haegens, S. (2021). Ongoing neural oscillations influence behavior and sensory representations by suppressing neuronal excitability. *NeuroImage*. DOI: 10.1016/j.neuroimage.2021.118746

[11] ***Gwilliams, L**., *Blanco-Elorrieta, E., Marantz, A. & Pylkkänen, L. (2021). Perceptual adaptation to accented speech: prefrontal cortex aids attunement in auditory cortices. *Nature Scientific Reports*. DOI: 10.1038/s41598-020-79640-0

[12] **Gwilliams, L**. & King, JR. (2020). Recurrent processes support a cascade of hierarchical decisions. *eLife*. DOI: 10.7554/eLife.56603

[13] Dikker, S., Assaneo, F., **Gwilliams, L**., Wang, L. & Kösem, A. (2020). MEG and Language: Using Magnetoencephalography to Study the Neural Basis of Language. *Neuroimaging Clinics of North America*. DOI: j.nic.2020.01.004

[14] **Gwilliams, L**. (2020). Hierarchical oscillators in speech comprehension: A commentary on Meyer, Sun & Martin. *Language, Cognition and Neuroscience*. DOI: 10.1080/23273798.2020.1740749

[15] **Gwilliams, L**. (2019). How the brain composes morphemes into meaning. *Philosophical Transactions of the Royal Society B*. DOI: 10.1098/rstb.2019.0311

[16] Stockall, L., Manouildiou, C., **Gwilliams, L**., Neophytou, K., & Marantz, A. (2019). Prefix Stripping Re-Re-Re-visited: MEG Evidence. *Frontiers in Psychology*. DOI: 10.3389/fpsyg.2019.01964

[17] **Gwilliams, L**., Linzen, T., Poeppel, D., & Marantz, A. (2018). In spoken word recognition the future predicts the past. *Journal of Neuroscience*. DOI: 10.1523/JNEUROSCI.0065-18.2018

[18] **Gwilliams, L**., Poeppel, D., Marantz, A., & Linzen, T. (2018). Phonological (un)certainty weights lexical activation. In *Proceedings of the 8th Workshop on Cognitive Modeling and Computational Linguistics (CMCL 2018)* (pp. 29-34). arXiv

[19] **Gwilliams, L**. & Marantz, A. (2018). Morphological representations are extrapolated from morpho-syntactic rules. *Neuropsychologia*. DOI: 10.1016/j.neuropsychologia.2018.04.015

[20] Brodbeck, C., **Gwilliams, L**. & Pylkkänen, L. (2016). Language in context: MEG evidence for modality general and specific responses to reference resolution. *eNeuro*. DOI: 10.1523/ENEURO.0145-16.2016

[21] **Gwilliams, L**., Lewis, G. & Marantz, A. (2016). Functional characterisation of letter-specific responses in time, space and current polarity using magneto-encephalography. *NeuroImage*. DOI: 10.1016/j.neuroimage.2016.02.057

[22] Brodbeck, C., **Gwilliams, L**. & Pylkkänen, L. (2015). EEG can track the time course of reference resolution in small visual worlds. *Frontiers in Psychology*. DOI: 10.3389/fpsyg.2015.01787

[23] **Gwilliams, L**. & Marantz, A. (2015). Tracking non-linear prediction in a linear speech stream: Influence of morphological structure on spoken word recognition. *Brain and Language*. DOI: 10.1016/j.bandl.2015.04.006

[24] **Gwilliams, L**., Monahan, P., & Samuel, A. (2015). Sensitivity to morphological composition: Evidence from grammatical and lexical decision tasks. *Journal of Experimental Psychology: Language, Memory and Cognition*. DOI: 10.1037/xlm0000130

[25] **Gwilliams, L**. & Fontaine, L. (2015). Indeterminacy in process type classification. *Functions of Language*. DOI: 10.1186/s40554-015-0021-x

[26] Politzer-Ahles, S. & **Gwilliams, L**. (2015). Involvement of prefrontal cortex in scalar implicatures: Evidence from magnetoencephalography. *Language and Cognitive Neuroscience*. DOI: 10.1080/23273798.2015.1027235

Conference proceedings

[27] **Gwilliams, L**., & Wallisch, P. (2019). Immediate ambiguity resolution in speech perception based on prior acoustic experience. PsyArXiv

[28] **Gwilliams, L**., & King, JR. (2017). Performance-optimized hierarchical models only partially

predict neural responses during perceptual decision making. *NIPS workshop: Cognitively Informed Artificial Intelligence: Insights From Natural Intelligence* bioRxiv

[29] **Gwilliams, L**., & King, JR. (2017). Perceptual decision making unfolds in a processing cascade within and across brain regions. *Cognitive Computational Neuroscience*.

Published Datasets, Corpora and Open Source Code

[1] *Lewis, G., *van Rijn, P., **Gwilliams, L**., Larrouy-Maestri, P., Poeppel, D. & Ghitza, O. NyU-BU contextually controlled stories Corpus: NUBUC. DOI: 10.5281/zenodo.4075183

[2] **Gwilliams, L**., Flick, G., Marantz, A., Pylkkanen, L., Poeppel, D. & King, J.R. (2023). Introducing MEG-MASC a high-quality magneto-encephalography dataset for evaluating natural speech processing. *Nature Scientific Data*. DOI: 10.1038/s41597-023-02752-5

[3] Waskom, M., Larson, E., Brodbeck, C., Gramfort, A., Burns, S ... **Gwilliams, L**., King, JR., Liu, D. nipy/PySurfer:0.10.0. [Link]

[4] Larson, E., Gramfort, A., Engemann, DA., Leppakangas, J., Brodbeck, C ... **Gwilliams, L**., ... mne-python-v1.2.0 [Link]

Book chapters

[1] Stockall, L. & **Gwilliams, L**. (2023). Distributed morphology and neurolinguistics. In *The Cambridge Handbook of Distributed Morphology*.

[2] **Gwilliams, L**. & Marantz, A. (2022). Neural processing of morphological structure in speech production, listening and reading. In *Current Issues in the Psychology of Language*.

[3] **Gwilliams, L**. & Davis, M.H. (2021). Extracting language content from speech sounds: The information theoretic approach. In *The Auditory Cognitive Neuroscience of Speech Perception*. Link

[4] King, JR., **Gwilliams, L**., Holdgraf, C., Sassenhagen, J., Barachant, A., Engemann, D., Larson, E. & Gramfort, A. (2020). Encoding and Decoding Framework to Uncover the Algorithms of Cognition. In *The Cognitive Neurosciences*.

Presentations

Invited talks

[1] *McGovern Institute Special Seminar, MIT*. Cambridge, MA, USA. (2024, February).

[2] *Johns Hopkins University Colloquium Speaker*. Baltimore, MD, USA. (2024, February).

[3] *Keynote Speaker, Annual Meeting on Phonology (AMP)*. Online. (2023, October).

[4] *Center for Computer Research in Music and Acoustics*. Stanford University, CA, USA. (2023, October).

[5] *UC Irvine Colloquium Speaker*. Irvine, CA, USA. (2023, October).

[6] *UC San Francisco, Houde and Nagarajan Lab*. San Francisco, CA, USA. (2023, September).

[7] *NeuroMorphic Computing*. Telluride, CO, USA. (2023, July).

[8] *Keynote Speaker, Neurolinguistics in Sweden; Lund University*. Lund, Sweden. (2023, June).

[9] *CogHear Workshop*. Maryland, USA. (2023, June).

[10] *Levy Lab, MIT*. Boston, USA. (2023, March).

[11] *Cambridge University*. Cambridge, UK. (2023, February).

[12] *Queen Mary University London*. London, UK. (2023, February).

[13] *Stanford University*. California, USA. (2023, February).

[14] *NeuroSpin*. Paris, France. (2022, December).

[15] *Psycholinguistics of Language Representation (PoLaR) Lab at UiT the Arctic University of Norway*. Tromsø, Norway. (2022, November).

[16] *19th SIGMORPHON Workshop, NAACL*. Seattle, USA. (2022, July).

[17] *Meta AI and ENS*. Paris, France. (2022, May).

[18] *Max Planck Institute for Psycholinguistics*. Special Talk Series. Neurobiology of language: Key issues and ways forward II. (2022, March).

[19] *New York University*. New York, USA. (2022, February).

[20] *Duke University*, Duke Institute for Brain Sciences. North Carolina, USA. (2021, November).

[21] *University of Massachusetts Amherst*, Linguistics Department. Amherst, USA. (2021, April).

[22] *University of California, Davis*. Davis, USA. (2021, April).

[23] *University of Oxford*. Oxford, UK. (2021, March).

[24] *Institute of Neuroscience and Psychology, University of Glasgow*. Glasgow, UK. (2021, January).

[25] *Mini-Workshop on Morphological Processing*. (2020, December).

[26] *University of Maryland, Linguistics Department*. Maryland, USA. (2020, December).

[27] *Cognitive Computational Neuroscience*. Generative Adversarial Collaborations Debate. (2020, October).

[28] *Society for the Neurobiology of Language*. Symposia presentation. (2020, October).

[29] *Society for the Neurobiology of Language*. Dissertation award talk. (2020, October).

[30] *Martin Lab, Max Planck Institute for Psycholinguistics*. Nijmegen, The Netherlands. (2020, July).

[31] *Kriegeskorte Lab, Columbia University*. New York City, USA. (2020, January).

[32] *Cognitive, computational neuroscience: Breakout session host*. Berlin, Germany. (2019, September).

[33] *Max Planck Institute for Empirical Aesthetics*. Frankfurt, Germany. (2019, July).

[34] *BCBL Colloquium*. Donostia, Basque Country. (2019, June).

[35] *Bedny Lab, Johns Hopkins University*. Baltimore, USA. (2019, May).

[36] *University of Maryland, Linguistics Department*. Maryland, USA. (2019, April).

[37] *École Normale Supérieure & Facebook AI Research*. Paris, France (2019, February).

[38] *Mesgarani Lab, Columbia University*. New York, USA. (2018, December).

[39] *brainLENS Lab, UCSF*. San Fransisco, USA. (2018, November).

[40] *Perception and Brain Dynamics Lab, NYU Langone Medical Center*. New York, USA. (2018, October).

[41] *Trueswell Lab, University of Pennsylvania*. Philadelphia, USA. (2018, August).

[42] *Max Planck Institute for Empirical Aesthetics*. Frankfurt, Germany. (2018, July).

[43] *Chang Lab, UCSF*. San Fransisco, USA. (2018, March).

[44] *Neuroscience Society, Columbia University*. USA. (2018, February).

[45] *Mesgarani Lab, Columbia University*. New York, USA. (2018, January).

[46] *Shadlen Lab, Columbia University*. New York, USA. (2017, October).

[47] *Cognition and Brain Sciences Unit, Cambridge University*. Cambridge, UK. (2017, June).

[48] *HLP Lab, University of Rochester*. New York, USA. (2016, November).

[49] *Presentation at 17th international morphology meeting*. Vienna, Austria. (2016, February).

Slide presentations

[1] ***Gwilliams, L**., *Leonard, M.K., Sellers, K.K., Chung, J.E., Dutta, B., & Chang, E.F. (2022, October). Single neuron encoding of speech across cortical layers of the human superior temporal gyrus. Presentation at *Neurobiology of Language Conference*. Philadelphia, USA.

[2] *Abrams, E., ***Gwilliams, L**. & Marantz, A. (2019, August). Tracking the building blocks of pitch perception in auditory cortex. Presentation at *The Society for Music Perception and Cognition conference (SMPC)*. New York, USA.

[3] **Gwilliams, L**. & King, JR. (2018, August). From brain responses to algorithms: advances in parsing the computational architecture of perceptual decision making with MEG and machine learning. *Symposia presentation, BioMag*. Philadelphia, USA.

[4] **Gwilliams, L**., King, JR. & Poeppel, D. (2018, August). Parsing continuous speech into linguistic representations. Presentation at the *Society for the Neurobiology of Language Conference*. Québec City, Canada.

[5] **Gwilliams, L**., Poeppel, D. & Marantz, A., Linzen, T. (2018, January). Phonological (un)certainty weights lexical activation. Presentation at *Cognitive Modelling and Computational Linguistics (CMCL)*. Salt Lake City, USA.

[6] **Gwilliams, L**., Linzen, T., Neophytou, K., Poeppel, D. & Marantz, A. (2016, September). Phonological commitment and sensitivity to subphonemic detail are independent. Presentation at *AMLAP*. Bilbao, Basque Country.

[7] Stockall, L., Manouilidou, C. **Gwilliams, L**. & Marantz, A. (2016, February). Un/Re-packing argument and event structure restrictions on prefixation: MEG evidence. *Workshop on the syntax of argument structure: empirical advancements and theoretical relevance*. Leipzig, Germany.

[8] **Gwilliams, L**. & Marantz, A. (2015, June). Abstract representation of the root morpheme: A magnetoencephalography study of spoken Arabic. Presentation at *The 9th Morphological Processing Conference*. Potsdam, Germany.

[9] **Gwilliams, L**. & Marantz, A. (2015, March). Decomposition of spoken Arabic words into root morphemes during processing: Evidence from magnetoencephalography. Presentation at *Linguistics in the Gulf 5 Conference*. Doha, Qatar.

Teaching

2021&2022	*Guest Lecturer*, New York University
	Linguistics and Cognitive Science, Undergraduate
	Instructor: Alec Marantz
2021	*Instructor*: Cognition and Natural Sensory Processing Workshop
	Decoding models
2021	*Instructor*, Universitat Rovira
	Neurolinguistics Summer Course
	Experimental design, neural recording techniques and statistical methods
2018-2020	*Tutor*, New York University
	Advanced Stats, Undergraduate
	Instructor: Pascal Wallisch
2018	*Teaching Assistant*, New York University
	Cognition, Undergraduate
	Instructor: Pascal Wallisch
2018	*Guest Lecturer*, Columbia University
	Cognitive Neuroscience, Undergraduate
2017	*Guest Lecturer*, New York University
	Problem of Babel, Undergraduate
	Instructor: Alec Marantz

2016 *Teaching Assistant*, New York University

Mathematical Tools for Cognitive and Neural Science, Graduate

Instructor: Eero Simoncelli

2016 *Guest Lecturer*, New York University

Neural Bases of Language: Auditory Lexical Access, Undergraduate

Instructor: Liina Pylkkänen

2016 *Guest Lecturer*, New York University

Linguistics as a Cognitive Science, Undergraduate

Instructor: Alec Marantz

2016 *Guest Lecturer*, New York University

Neural Bases of Language: Perceptual Attunement, Undergraduate

Instructor: Liina Pylkkänen

Supervision

2023 *Irmak Ergin*, PhD Student, Stanford University Psychology

2023 *Jill Kries*, Postdoc, Stanford University Psychology

2023 *Derek Rosenzweig*, Lab Manager, Stanford University Psychology

2023 *Ellie Abrams*, PhD Student, New York University

2022 *Alvincé Pongos*, PhD Student, UC Berkeley Bio Engineering

Project: *Neural encoding of grammatical class during natural listening*

2022 *Jenn DiSanto*, UCSF lab rotation student

Project: *Recurrent processes support speech-sound perception*

2020 *Praxal Patel*, Center for Data Science Summer Project, New York University

Project: *Developing automated neural data analysis tools for neuro-typical and a-typical populations*

2019–2020 *Ben Lang*, Research Assistant, New York University

2017 *Jessa Alexander*, Intern, New York University

2017 *Anna Cho*, Honours student, New York University

Project: *Neurological mechanisms of perceptual attunement to accented speech*

2015–2016 *Lena Warnke*, Honours student, New York University

Project: *Unconscious, arbitrary visual symbols as a cue for phoneme identification*

Service

2023	Thesis Committee	Vinay Raghavan, *Columbia University*
2023	Thesis Committee	Jill Kries, *KU Leuven*
2022	Thesis Committee	Juliett Millet, *Université de Paris*
2022	Thesis Committee	Théo Desbordes, *Meta AI & Neurospin*
2022–	Program Committee	*Cognitive Computational Neuroscience*
2020–2022	Review editor	*Frontiers in Psychology*
Ad-hoc	Reviewer	*Nature Neuroscience, Nature Human Behaviour, PNAS, eLife, PLOS Biology, Journal of Neuroscience, NeuroImage, Human Brain Mapping, Cognition, Frontiers in Neuroscience, Glossa, Neurobiology of Language, Experimental Psychology, European Journal of Neuroscience, Mind Brain & Education, Cerebral Cortex, Psychonomic Bulletin & Review, Brain & Language, PLOS ONE, Cortex*
Ad-hoc	Reviewer	*National Science Foundation (USA)*