# Laura Gwilliams

Department of Psychology
Stanford University
450 Jane Stanford Way
Stanford, CA 94305

Phone: +1 (415) 353 7500
Email: laura.gwilliams@stanford.edu
Home: http://lauragwilliams.github.io
ORCID iD: 0000-0002-9213-588X

## 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 (GLySN) Lab

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

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

## Grants and Awards

2024 *Community of Shared Research Platforms, Voucher*, Stanford University, $9,450

2024 *Early Career Research Grant*, Whitehall Foundation, $300,000

2024 *Community of Shared Research Platforms*, Stanford University, $1,982,000

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 *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

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. (submitted). Hierarchical dynamic coding coordinates speech comprehension in the brain. bioRxiv

[2] Abrams, E., Marantz, A., Krementsov, I. & **Gwilliams, L**. (re-submitted). Dynamics of pitch perception in the auditory cortex. bioRxiv

[3] Kries, J., De Clercq, P., Vandermosten, M. & **Gwilliams, L**. (submitted). The spatio-temporal dynamics of phonetic encoding in aging and aphasia. bioRxiv

[4] Ergin, I., Kries, J., Gupta, S. & **Gwilliams, L**. (in prep). Measuring Naturalistic Speech Comprehension in Real Time.

### Peer-reviewed articles

[5] **Gwilliams, L**., Bhaya-Grossman, I., Zhang, Y., Scott, T., Harper, S., Levy., D (2025). Computational Architecture of Speech Comprehension in the Human Brain. Annual Reviews. DOI: 10.1146/annurev-linguistics-031120-111245

[6] Degano, G., Donhauser, P., **Gwilliams, L**. Merlo, P., & Golestani, N. (2024). Speech prosody enhances the neural processing of syntax. DOI: 10.1038/s42003-024-06444-7

[7] Zuanazzi, A., Ripollés, P., Lin, WM., **Gwilliams, L**., *King, JR & *Poeppel, D (2024). Negation mitigates rather than inverts the neural representations of adjectives. *PLOS Biology*. DOI: 10.1371/journal.pbio.3002622

[8] ***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

[9] **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

[10] **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

[11] *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

[12] **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

[13] 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

[14] 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

[15] ***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

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

[17] 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

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

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

[20] 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

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

[22] **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

[23] **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

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

[25] 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

[26] **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

[27] **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

[28] 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

[29] **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

[30] **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

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

[32] 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

### 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 (last 5 years)

[1] *Plenary address, American Psychological Association.* DC, USA. (2025, May).

[2] *Colloquium Speaker, UC San Diego*. CA, USA. (2025, January).

[3] *Colloquium Speaker, USC, Center for Computational Language Sciences*. CA, USA. (2024, November).

[4] *Plenary address, Society for Language Development*. Boston, MA, USA. (2024, November).

[5] *NSF workshop, New horizons in language science*. Alexandria, VA, USA. (2024, May).

[6] *University of California, Santa Cruz Colloquium Speaker*. Santa Cruz, CA, USA. (2024, April).

[7] *EARS - Electronic Auditory Research Seminars*. Online. (2024, February).

[8] *ARO - Association for Research in Otolaryngology. Symposium speaker*. Anaheim, CA, USA. (2024, February).

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

[24] *19th SIGMORPHON Workshop, NAACL*. Seattle, USA. (2022, July).

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

## Teaching

| | |
|---|---|
| 2024 Spring | *Instructor*, Stanford University |
| | Data Science for Neuroscience Capstone, Undergraduate |
| 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

| | |
|---|---|
| 2024- | *Atlas Kazemian*, PhD Student, Stanford University Psychology |
| 2024- | *Caroline Kaicher*, PhD Student, Stanford University Psychology |
| 2024- | *William Turner*, Postdoc, Stanford University Psychology |
| 2023- | *Irmak Ergin*, PhD Student, Stanford University Psychology |
| 2023- | *Jill Kries*, Postdoc, 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

| | | |
|---|---|---|
| 2024 | Thesis Committee | Linnea Evanson, *Ecole Normale Superieure* |
| 2024 | Thesis Committee | Ajay Subramanian, *Stanford University* |
| 2024 | Thesis Committee | Alicia Mason, *New York University* |
| 2024 | Dissertation Chair | Jiayi Lu, *Stanford University* |
| 2024 | Dissertation Chair | Nay San, *Stanford University* |
| 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* |
| 2024– | DEI Representative | *Cognitive Computational Neuroscience* |
| 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)* |