
Laura Gwilliams

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New York University
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Education

- 2015–2020 *Ph.D., Psychology (focusing on Cognitive Neuroscience)*
New York University, USA
Thesis Title: Towards a mechanistic account of speech comprehension
Supervisors: Alec Marantz and David Poeppel
GPA: 4.0/4.0
- 2012–2013 *M.Sc., Cognitive Neuroscience of Language*
Basque Center on Cognition, Brain and Language (BCBL), Spain
Supervisors: Arthur Samuel and Phillip Monahan
Grade: Excellent
- 2009–2012 *B.A., Linguistics*
Cardiff University, UK
Supervisor: Lise Fontaine
Grade: 1st class with honours

Research positions

- 2020-present *Post-doctoral Fellow, Chang Lab*
University of California, San Francisco
Supervisors: Edward Chang and Matthew Leonard

2013–2015 *Research Assistant, Neuroscience of language lab*
New York University Abu Dhabi
Supervisors: Alec Marantz and Liina Pylkkänen

Awards and Scholarships

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

- [1] **Gwilliams, L.**, & Wallisch, P. (submitted). Immediate ambiguity resolution in speech perception based on prior acoustic experience. [PsyArXiv](#)
- [2] **Gwilliams, L.**, King, JR., *Marantz, A. & *Poeppel, D. (submitted). Neural dynamics of phoneme sequencing in real speech jointly encode order and invariant content. [bioRxiv](#)

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- [3] **Gwilliams, L.**, *Blanco-Elorrieta, E., Marantz, A. & Pylkkänen, L. (submitted). Perceptual adaptation to accented speech: prefrontal cortex aids attunement in auditory cortices. [bioRxiv](#)

Peer-reviewed articles

- [1] **Gwilliams, L.** & King, JR. (2020). Recurrent processes support a cascade of hierarchical decisions. *eLife*. DOI: [10.7554/eLife.56603](#)
- [2] 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](#)
- [3] **Gwilliams, L.** (2020). Hierarchical oscillators in speech comprehension: A commentary on Meyer, Sun & Martin. *Language, Cognition and Neuroscience*. DOI: [10.1080/23273798.2020.1740749](#)
- [4] **Gwilliams, L.** (2019). How the brain composes morphemes into meaning. *Philosophical Transactions of the Royal Society B*. DOI: [10.1098/rstb.2019.0311](#)
- [5] 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](#)
- [6] **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](#)
- [7] **Gwilliams, L.**, Poeppel, D., Marantz, A., & Linzen, T. (2018). Phonological (un)certainly weights lexical activation. In *Proceedings of the 8th Workshop on Cognitive Modeling and Computational Linguistics (CMCL 2018)* (pp. 29-34). [arXiv](#)
- [8] **Gwilliams, L.** & Marantz, A. (2018). Morphological representations are extrapolated from morpho-syntactic rules. *Neuropsychologia*. DOI: [10.1016/j.neuropsychologia.2018.04.015](#)
- [9] 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](#)
- [10] **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](#)
- [11] 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](#)
- [12] **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](#)
- [13] **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](#)
- [14] **Gwilliams, L.** & Fontaine, L. (2015). Indeterminacy in process type classification. *Functions of Language*. DOI: [10.1186/s40554-015-0021-x](#)

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- [15] 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](https://doi.org/10.1080/23273798.2015.1027235)

Conference proceedings

- [1] **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](https://doi.org/10.1101/191111)
- [2] **Gwilliams, L.**, & King, JR. (2017). Perceptual decision making unfolds in a processing cascade within and across brain regions. *Cognitive Computational Neuroscience*.

Book chapters

- [1] Stockall, L. & **Gwilliams, L.** (under review). Distributed morphology and neurolinguistics. In *The Cambridge Handbook of Distributed Morphology*.
- [2] 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*.

Manuscripts

- [1] ***Gwilliams, L.**, *Brooks, T., Gramfort, A. & Marantz, A. (in prep). Investigating stages of word recognition with concurrent eye-tracking and MEG recordings.
- [2] **Gwilliams, L.**, Marantz, A., Poeppel, D. & King, JR. (in prep). Parsing continuous speech into linguistic representations.
- [3] **Gwilliams, L.** & Davis, M.H. (in prep). Information theory as a window into speech processing.
- [4] **Gwilliams, L.** & Poeppel, D. (in prep). Elucidating the dynamics of linguistic representation and computation using neural decoding.
- [5] Lewis, G., van Rijn, P., **Gwilliams, L.**, Larrouy-Maestri, P., Poeppel, D. & Ghitza, O. (in prep). NyU-BU contextually controlled stories Corpus: NUBUC.
- [6] **Gwilliams, L.** & Marantz, A. (in prep). Neural processing of morphological structure in speech production, listening and reading. In *Current Issues in the Psychology of Language*.

Presentations

Invited talks

- [1] **Gwilliams, L.** & King, JR. (2020, October). Is it that simple? The use of linear models in cognitive neuroscience. *Cognitive Computational Neuroscience*. Generative Adversarial Collaborations Debate. (presented remotely).
- [2] **Gwilliams, L.** (2020, October). Rapid transformation of phoneme sequences into (sub)lexical units. *Society for the Neurobiology of Language*. Symposia presentation. (presented remotely).

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- [3] **Gwilliams, L.** (2020, October). Towards a mechanistic account of speech comprehension. *Society for the Neurobiology of Language*. Dissertation award talk. (presented remotely).
 - [4] **Gwilliams, L.** (2020, July). Neural dynamics of phoneme sequencing. *Martin Lab, Max Planck Institute for Psycholinguistics*. Nijmegen, The Netherlands (presented remotely).
 - [5] **Gwilliams, L.** (2020, January). Recurrent processes emulate a cascade of hierarchical decisions. *Kriegeskorte Lab, Columbia University*. New York City, USA.
 - [6] **Gwilliams, L.** (2019, September). How can we model the computations of human language perception? *Cognitive, computational neuroscience: Breakout session host*. Berlin, Germany.
 - [7] **Gwilliams, L.** (2019, July). Transforming acoustic input into a hierarchy of linguistic representations. *Max Planck Institute for Empirical Aesthetics*. Frankfurt, Germany.
 - [8] **Gwilliams, L.** (2019, June). Transforming acoustic input into a hierarchy of linguistic representations. *BCBL*. Donostia, Basque Country.
 - [9] **Gwilliams, L.** (2019, May). Transforming acoustic input into a hierarchy of linguistic representations. *Bedny Lab, Johns Hopkins University*. Baltimore, USA.
 - [10] **Gwilliams, L.** (2019, April). Towards a mechanistic account of speech comprehension in the human brain. *University of Maryland*. Maryland, USA.
 - [11] **Gwilliams, L.** (2019, February). Transforming acoustic input into a hierarchy of linguistic representations. *École Normale Supérieure & Facebook AI Research*. Paris, France
 - [12] **Gwilliams, L.** (2018, December). Parsing continuous speech into linguistic representations. *Mesgarani Lab, Columbia University*. New York, USA.
 - [13] **Gwilliams, L.** (2018, November). Towards a mechanistic account of speech comprehension in the human brain. *brainLENS Lab, UCSF*. San Fransisco, USA.
 - [14] **Gwilliams, L.** (2018, October). From brain responses to algorithms: advances in parsing the computational architecture of perceptual decision making with MEG and machine learning. *Perception and Brain Dynamics Lab, NYU Langone Medical Center*. New York, USA.
 - [15] **Gwilliams, L.** (2018, August). Towards a mechanistic account of speech comprehension in the human brain. *Trueswell Lab, University of Pennsylvania*. Philadelphia, USA.
 - [16] **Gwilliams, L.** (2018, July). Towards a mechanistic account of speech comprehension in the human brain. *Max Planck Institute for Empirical Aesthetics*. Frankfurt, Germany.
 - [17] **Gwilliams, L.** (2018, March). Back to the future: Investigating the neural mechanisms supporting speech comprehension. *Chang Lab, UCSF*. San Fransisco, USA.
 - [18] **Gwilliams, L.** (2018, February). Back to the future: Investigating the neural mechanisms supporting speech comprehension. *Neuroscience Society, Columbia University*. USA.
 - [19] **Gwilliams, L.** (2018, January). Postdictive processing in spoken word recognition. *Mesgarani Lab, Columbia University*. New York, USA.
 - [20] **Gwilliams, L.** (2017, October). Decomposing hierarchical perceptual decision making. *Shadlen Lab, Columbia University*. New York, USA.
 - [21] **Gwilliams, L.** (2017, June). In spoken word recognition the future predicts the past. *Cognition and Brain Sciences Unit, Cambridge University*. Cambridge, UK.

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- [22] **Gwilliams, L.** (2016, November). In spoken word recognition the future predicts the past. *HLP Lab, University of Rochester*. New York, USA.
 - [23] **Gwilliams, L.** & Marantz, A. (2016, February). Taking morphology seriously: MEG studies of morphological representations. *Presentation at 17th international morphology meeting*. Vienna, Austria.

Slide presentations

- [1] *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.
- [2] **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.
- [3] **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.
- [4] **Gwilliams, L.**, Poeppel, D. & Marantz, A., Linzen, T. (2018, January). Phonological (un)certainly weights lexical activation. Presentation at *Cognitive Modelling and Computational Linguistics (CMCL)*. Salt Lake City, USA.
- [5] **Gwilliams, L.**, Linzen, T., Neophytou, K., Poeppel, D. & Marantz, A. (2016, September). Phonological commitment and sensitivity to subphonemic detail are independent. Presentation at *AM-LAP*. Bilbao, Basque Country.
- [6] 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.
- [7] **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.
- [8] **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.
- [9] **Gwilliams, L.** & Marantz, A. (2015, March). Letter specific sensitivities in the brain: located in time, space and current direction. Presentation at *The Neuroscience of Language Workshop*, Abu Dhabi, UAE.
- [10] **Gwilliams, L.** & Marantz, A. (2015, February). Non-linear processing of a linear speech stream. Presentation at *The NYUAD Annual Research Conference*, Abu Dhabi, UAE.
- [11] **Gwilliams, L.** & Fontaine, L. (2014, July). Ambiguity in process type selection in systemic functional linguistics. Presentation at *The 25th European Systemic Functional Linguistics Conference*. Paris, France.
- [12] Brodbeck, C., **Gwilliams, L.** & Pytkänen, L. (2014, February). Reference resolution and prediction in a visual world: MEG evidence from English and Arabic. Presentation at *The NYUAD*

Poster presentations

- [1] Lang, B., ***Gwilliams, L.**, Blanco-Elorrieta, E. & Marantz, A. (2020, October). Do bilinguals better discriminate novel vowel contrasts? Neural correlates of perceptual assimilation using MEG decoding. Poster presented at *Society for Neurobiology of Language*. Virtual conference.
- [2] ***Abrams, E.**, ***Gwilliams, L.** & Marantz, A. (2019, October). Tracking the building blocks of pitch perception in auditory cortex. Dynamic poster presented at *Society for Neuroscience*. Chicago, USA.
- [3] **Gwilliams, L.**, Poeppel, D. & King, JR. (2019, March). Parsing continuous speech into linguistic representations. Poster presented at the *Cognitive Neuroscience Society Conference (CNS)*. San Francisco, USA.
- [4] **Gwilliams, L.**, King, JR. Poeppel, D. (2018, November). Parsing continuous speech into linguistic representations. Poster presented at *Society for Neuroscience*. San Diego, USA.
- [5] **Gwilliams, L.** & King, JR. (2018, August). Identifying the neural architecture of perceptual decision making with normative, shallow and deep neural network approaches. Poster presented at *BioMag*. Philadelphia, USA.
- [6] **Gwilliams, L.** & King, JR. (2018, July). Perceptual decision making is supported by a hierarchical processing cascade in both biological and artificial neural networks. Poster presented at *cuttingEEG*. Paris, France.
- [7] **Gwilliams, L.** & King, JR. (2018, July). Perceptual decision making is supported by a hierarchical processing cascade in both biological and artificial neural networks. Poster presented at the *Salzburg Mind Brain Annual Meeting (SAMBA)*. Salzburg, Austria.
- [8] **Gwilliams, L.** & King, JR. (2018, March). Perceptual decision making is supported by a hierarchical processing cascade in both biological and artificial neural networks. Poster presented at the *Cognitive Neuroscience Society conference (CNS)*. Boston, USA.
- [9] ***Gwilliams, L.**, ***King, JR.** & Poeppel, D. (2017, November). Decoding how the human brain parses continuous speech into linguistic representations. Dynamic poster presented at the *Society for Neuroscience*. Washington D.C., USA.
- [10] **Gwilliams, L.** & King, JR. (2017, November). Uncovering the cascade of computations involved in ambiguity resolution: Decoding from MEG and neural network activity. Poster presented at the *2017 Society for the Neurobiology of Language Conference*. Baltimore, USA.
- [11] **Gwilliams, L.** & King, JR. (2017, September). Perceptual decision making unfolds in a processing cascade within and across brain regions. Poster presented at *Annual Conference on Cognitive Computational Neuroscience*. New York, USA.
- [12] **Gwilliams, L.**, Linzen, T., Neophytou, K., Poeppel, D. Marantz, A. (2016, September). Phonological commitment and sensitivity to subphonemic detail are independent Presentation at the *Society for the Neurobiology of Language*. London, UK.
- [13] Mow, J., **Gwilliams, L.**, Khalighinsjad, B., Mesgarani, N. & Marantz, A. (2016, September). Encoding and organisation of phonemes by feature in STG. Poster presentation at the *Society for the Neurobiology of Language*. London, UK.

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- [14] **Gwilliams, L.** Linzen, T., Neophytou, K., Warnke, L., Poeppel, D & Marantz, A. (2016, April). Early and asymmetric sensitivity to phonological boundaries and within-category variation across hemispheres. Poster presented at the *2016 CNS Annual meeting*. New York, USA
- [15] Brodbeck, C., **Gwilliams, L.** & Pykkänen, L. (2016, April). Amodal reference resolution in medial parietal cortex. Poster presented at the *2016 CNS Annual meeting*. New York, USA
- [16] **Gwilliams, L.** Linzen, T., Neophytou, K., Warnke, L., Poeppel, D & Marantz, A. (2016, March). Phoneme ambiguity is reflected very early in primary auditory cortex. Poster presented at the *29th Annual CUNY Conference on Human Sentence Processing*. Florida, USA
- [17] Brodbeck, C., **Gwilliams, L.** & Pykkänen, L. (2016, March). Modality general and specific brain responses during reference resolution. Poster presented at the *29th Annual CUNY Conference on Human Sentence Processing*. Florida, USA
- [18] **Gwilliams, L.** & Marantz, A. (2015, October). Representations stems you can't see: An MEG study of morphological decomposition. Poster presented at the *Society for the Neurobiology of Language Conference*. Chicago, USA
- [19] Stockall, L., **Gwilliams, L.** Manouilidou, C. & Marantz, A. (2015, October). Access to lexical category and verb argument structure in the early stages of processing morphologically complex words: MEG investigations of prefixation. Poster presented at the *Society for the Neurobiology of Language Conference*. Chicago, USA
- [20] Gaston, P., **Gwilliams, L.** & Marantz, A. (2015, October). The time-course of cohort restriction in syntactic context: MEG evidence for a single auditory word-form. Poster presented at the *Society for the Neurobiology of Language Conference*. Chicago, USA
- [21] Oseki, Y., **Gwilliams, L.**, Blanco-Elorrieta, E., Gaston, P., Pykkänen, L. & Marantz, A. (2015, October). Neural Dynamics of Morphological and Phrasal Composition. Poster presented at the *Society for the Neurobiology of Language Conference*. Chicago, USA
- [22] Brodbeck, C., **Gwilliams, L.** & Pykkänen, L. (2015, October). EEG can track the time course of successful reference resolution in small visual worlds. Poster presented at the *Society for the Neurobiology of Language Conference*. Chicago, USA
- [23] **Gwilliams, L.**, Lewis, G. & Marantz, A. (2014, August). Revealing the cortical dynamics of letter string perception. Poster presented at the *Society for the Neurobiology of Language Conference*. Amsterdam, Netherlands
- [24] Linzen, T., Gaston, P., **Gwilliams, L.** & Marantz, A. (2014, August). Competition and prediction in the auditory processing of morphologically complex words. Poster presented at the *Society for the Neurobiology of Language Conference*. Amsterdam, Netherlands.
- [25] ***Gwilliams, L.**, Monahan, P. & Samuel, A. (2013, June). Why an Avalanche is faster than an Explosion. Poster presented at *The 8th international morphological processing conference*. Cambridge, UK.
- [26] ***Gwilliams, L.**, Monahan, P., & Samuel, A. (2013, March). Decompositional processing of nominalisations. Poster presented at the *Basque Center on Cognition, Brain and Language (BCBL)*. San Sebastian, Spain.

Teaching

- 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 Pykkänen
- 2016 *Guest Lecturer*, New York University
Neural Bases of Language: Perceptual Attunement, Undergraduate
Instructor: Liina Pykkänen
- 2016 *Guest Lecturer*, New York University
Linguistics as a Cognitive Science, Undergraduate
Instructor: Alec Marantz

Supervision

2020	<i>Praxal Patel</i> , Center for Data Science Summer Project, New York University Project: <i>Developing automated neural data analysis tools for neuro-typical and atypical populations</i>
2019–2020	<i>Ellie Abrams</i> , Research Assistant, New York University
2017	<i>Jessa Alexander</i> , Intern, New York University
2017	<i>Anna Cho</i> , Honours student, New York University Project: <i>Neurological mechanisms of perceptual attunement to accented speech</i>
2015–2016	<i>Lena Warnke</i> , Honours student, New York University Project: <i>Unconscious, arbitrary visual symbols as a cue for phoneme identification</i>

Service

2020–present	Review editor	<i>Frontiers in Psychology</i>
Ad-hoc	Reviewer	<i>PNAS, eLife, PLOS Biology, Journal of Neuroscience, NeuroImage, Human Brain Mapping, Cognition, European Journal of Neuroscience, Cerebral Cortex, Psychonomic Bulletin & Review, Brain & Language, PLOS ONE, Cortex</i>

Programming languages

- Python (particularly scikit-learn, MNE): 8 years, highly proficient
- R: 8 years, proficient
- MATLAB: 6 years, proficient