Laura Gwilliams

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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

Awards and Scholarships

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 Waver*, 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)

Research positions

2013–2015 *Research Assistant*, Neuroscience of language lab

New York University Abu Dhabi

Supervisors: Alec Marantz and Liina Pylkkänen

2012–2014 *Research Assistant*, Cardiff University

Supervisor: Lise Fontaine

Publications

Preprints

[1] **Gwilliams, L**., King, JR., *Marantz, A. & *Poeppel, D. (submitted). Neural dynamics of phoneme sequencing in real speech jointly encode order and invariant content. bioRxiv

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

[3] **Gwilliams, L**. & King, JR. (submitted). Recurrent Processes Emulate a Cascade of Hierarchical Decisions: Evidence from Spatio-Temporal Decoding of Human Brain Activity. bioRxiv

Peer-reviewed articles

[1] 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

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

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

[4] 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

[5] **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

[6] **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

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

[8] 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

[9] **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

[10] 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

[11] **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

[12] **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

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

[14] 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

[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

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

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.

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. (in press). Encoding and Decoding Framework to Uncover the Algorithms of Cognition. In *The Cognitive Neurosciences*.

Presentations

Invited talks

[1] **Gwilliams, L**. (2020, January). Recurrent processes emulate a cascade of hierarchical decisions. *Kriegeskorte Lab, Columbia University*. New York City, USA.

[2] **Gwilliams, L**. (2019, September). How can we model the computations of human language perception? *Cognitive, computational neuroscience: Breakout session host.* Berlin, Germany.

[3] **Gwilliams, L**. (2019, July). Transforming acoustic input into a hierarchy of linguistic representations. *Max Planck Institute for Empirical Aesthetics.* Frankfurt, Germany.

[4] **Gwilliams, L**. (2019, June). Transforming acoustic input into a hierarchy of linguistic representations. *BCBL*. Donostia, Basque Country.

[5] **Gwilliams, L**. (2019, May). Transforming acoustic input into a hierarchy of linguistic representations. *Bedny Lab, Johns Hopkins University*. Baltimore, USA.

[6] **Gwilliams, L**. (2019, April). Towards a mechanistic account of speech comprehension in the human brain. *University of Maryland.* Maryland, USA.

[7] **Gwilliams, L**. (2019, February). Transforming acoustic input into a hierarchy of linguistic representations. *École Normale Supérieure & Facebook AI Research*. Paris, France

[8] **Gwilliams, L**. (2018, December). Parsing continuous speech into linguistic representations. *Mesgarani Lab, Columbia University*. New York, USA.

[9] **Gwilliams, L**. (2018, November). Towards a mechanistic account of speech comprehension in the human brain. *brainLENS Lab, UCSF*. San Fransisco, USA.

[10] **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.

[11] **Gwilliams, L**. (2018, August). Towards a mechanistic account of speech comprehension in the human brain. *Trueswell Lab, University of Pennsylvania*. Philadelphia, USA.

[12] **Gwilliams, L**. (2018, July). Towards a mechanistic account of speech comprehension in the human brain. *Max Planck Institute for Empirical Aesthetics*. Frankfurt, Germany.

[13] **Gwilliams, L**. (2018, March). Back to the future: Investigating the neural mechanisms supporting speech comprehension. *Chang Lab, UCSF*. San Fransisco, USA.

[14] **Gwilliams, L**. (2018, February). Back to the future: Investigating the neural mechanisms supporting speech comprehension. *Neuroscience Society, Columbia University*. USA.

[15] **Gwilliams, L**. (2018, January). Postdictive processing in spoken word recognition. *Mesgarani Lab, Columbia University*. New York, USA.

[16] **Gwilliams, L**. (2017, October). Decomposing hierarchical perceptual decision making. *Shadlen Lab, Columbia University*. New York, USA.

[17] **Gwilliams, L**. (2017, June). In spoken word recognition the future predicts the past. *Cognition and Brain Sciences Unit, Cambridge University*. Cambridge, UK.

[18] **Gwilliams, L**. (2016, November). In spoken word recognition the future predicts the past. *HLP Lab, University of Rochester*. New York, USA.

[19] **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)certainty 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 *AMLAP*. 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**. & Pylkkänen, L. (2014, February). Reference resolution and prediction in a visual world: MEG evidence from English and Arabic. Presentation at *The NYUAD Annual Research Conference*. Abu Dhabi, UAE.

Poster presentations

[1] *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.

[2] **Gwilliams, L**., Poeppel, D. & King, JR. (2019, March). Parsing continuous speech into linguistic representations. Poster presented at the *Cognitive Neuroscience Society Conference (CNS)*. San Fransisco, USA.

[3] **Gwilliams, L**., King, JR. Poeppel, D. (2018, November). Parsing continuous speech into linguistic representations. Poster presented at *Society for Neuroscience*. San Diego, USA.

[4] **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.

[5] **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.

[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 the

Salzburg Mind Brain Annual Meeting (SAMBA). Salzburg, Austria.

[7] **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.

[8] ***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.

[9] **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.

[10] **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.

[11] **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.

[12] 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.

[13] **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

[14] Brodbeck, C., **Gwilliams, L**. & Pylkkänen, L. (2016, April). Amodal reference resolution in medial parietal cortex. Poster presented at the *2016 CNS Annual meeting*. New York, USA

[15] **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

[16] Brodbeck, C., **Gwilliams, L**. & Pylkkänen, 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

[17] **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

[18] 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

[19] 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

[20] Oseki, Y., **Gwilliams, L**., Blanco-Elorrieta, E., Gaston, P., Pylkkänen, 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

[21] Brodbeck, C., **Gwilliams, L**. & Pylkkänen, 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

[22] **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

[23] 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.

[24] ***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.

[25] ***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	*Teaching Assistant*, New York University
	Cognition, Undergraduate
	Instructor: Pascal Wallisch
2018	*Guest Lecturer*, Columbia University
	Cognitive Neuroscience, Undergraduate
	Instructor: Pascal Wallisch
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
	Neural Bases of Language: Perceptual Attunement, Undergraduate
	Instructor: Liina Pylkkänen
2016	*Guest Lecturer*, New York University
	Linguistics as a Cognitive Science, Undergraduate
	Instructor: Alec Marantz

Supervision

2019–2020	*Ellie Abrams*, 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

2020–present	Review editor	*Frontiers in Psychology*
Ad-hoc	Reviewer	*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*

Programming languages

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