

# Laura Gwilliams

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## Education

Ph.D. 2015 - Present

Cognitive Neuroscience

New York University, USA

GPA: 4.0

Supervisors: Prof. Alec Marantz & Prof. David Poeppel

Committee: Alec Marantz, David Poeppel, Eero Simoncelli,

Liina Pytkkanen, Nima Mesgarani

M.Sc. 2012 - 2013

Cognitive Neuroscience of Language

Basque Center on Cognition, Brain and Language (BCBL), Spain

Grade: *Excellent*

Supervisors: Prof. Arthur Samuel & Dr. Philip Monahan

B.A. 2009 - 2012

Linguistics

Cardiff University, UK

Grade: *1<sup>st</sup> Class with honours*

Supervisor: Dr. Lise Fontaine

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## Awards and Scholarships

2019 *Dissertation Fellowship in the Cognitive, Clinical, and Neural*

*Foundations of Language*, Dingwall Foundation

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)

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## Preprints

Gwilliams, L.\*, Blanco-Elorrieta, E.\*, Marantz, A. & Pytkkanen, L. (Submitted). Neural adaptation to accented speech: prefrontal cortex aids attunement in auditory cortices. [\[PDF\]](#)

Gwilliams, L. & King, JR. (Submitted). Recurrent Processes Emulate a Cascade of Hierarchical Decisions: Evidence from Spatio-Temporal Decoding of Human Brain Activity. [\[PDF\]](#)

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## Publications

Gwilliams, L. (to appear). Hierarchical oscillators in speech comprehension: A commentary on Meyer, Sun & Martin (2020). *Language, Cognition and Neuroscience*. [\[PDF\]](#)

Stockall, L. & Gwilliams, L. (to appear). Distributed morphology and neurolinguistics. *The Cambridge Handbook of Distributed Morphology*.

Dikker, S., Assaneo, F., Gwilliams, L., Wang, L. & Kösem, A. (to appear). MEG and Language: Using Magnetoencephalography to Study the Neural Basis of Language. *Neuroimaging Clinics of North America*. [\[PDF\]](#)

Gwilliams, L. (2020). Composing morphemes into meaning. *Philosophical Transactions of the Royal Society B*. [\[PDF\]](#)

King, J-R., 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. *Cognitive Neurosciences*. [\[PDF\]](#)

Stockall, L, Manouildiou, C., Gwilliams, L., Neophytou, K., & Marantz, A. (2019). Prefix Stripping Re-Re-Re-visited: MEG Evidence. [\[PDF\]](#)

Gwilliams, L., Linzen, T., Poeppel, D., & Marantz, A. (2018). In spoken word recognition the future predicts the past. *Journal of Neuroscience*. [\[PDF\]](#)

Gwilliams, L. & Marantz, A. (2018). Morphological representations are extrapolated from morpho-syntactic rules. *Neuropsychologia*. [\[PDF\]](#).

Gwilliams, L., Poeppel, D. & Marantz, A., Linzen, T. (2018). Phonological (un)certainly weights lexical activation. *Cognitive Modelling and Computational Linguistics (CMCL)*. [\[PDF\]](#).

Gwilliams, L. & King, J-R. (2017). Performance-optimized hierarchical models only partially predict neural responses during perceptual decision making. *NIPS workshop: Cognitively Informed Artificial Intelligence: Insights From Natural Intelligence*. [\[PDF\]](#).

Gwilliams, L. & King, J-R. (2017). Perceptual decision making unfolds in a processing cascade within and across brain regions. *Cognitive Computational Neuroscience*. [\[PDF\]](#).

Brodbeck, C., Gwilliams, L. & Pykkänen, L. (2016). Language in context: MEG evidence for modality general and specific responses to reference resolution. *eNeuro*. [\[PDF\]](#).

Gwilliams, L., Lewis, G. & Marantz, A. (2016). Functional characterisation of letter-specific responses in time, space and current polarity using magneto-encephalography. *NeuroImage*. [\[PDF\]](#).

Brodbeck, C., Gwilliams, L. & Pykkänen, L. (2015). EEG can track the time course of reference resolution in small visual worlds. *Frontiers in Psychology*. [\[PDF\]](#).

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*. [\[PDF\]](#).

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*. [\[PDF\]](#).

Gwilliams, L. & Fontaine, L. (2015). Indeterminacy in process type classification. *Functions of Language*. [\[PDF\]](#).

Politzer-Ahles, S., & Gwilliams, L. (2015). Involvement of prefrontal cortex in scalar implicatures: Evidence from magnetoencephalography. *Language and Cognitive Neuroscience*. [\[PDF\]](#).

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## Manuscripts

\*Brooks, T., \*Gwilliams, L., Gramfort, A. & Marantz, A. (In prep). Investigating stages of word recognition with concurrent eye-tracking and MEG recordings.

Gwilliams, L., Poeppel, D. & King, J-R. (In Prep). Parsing continuous speech into linguistic representations.

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## Invited Talks

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

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

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

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

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

Gwilliams, L. (2018, February). *Transforming acoustic input into a hierarchy of linguistic representations*. École Normale Supérieure & Facebook AI Research. Paris, France

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

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

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.

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

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

Gwilliams, L. (2018, March). *Back to the future: Investigating the neural mechanisms supporting speech comprehension*. Chang Lab, University of California San Francisco, USA.

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

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

Gwilliams, L. (2017, October). *Decomposing hierarchical perceptual decision making*. Shadlen Lab, Columbia University, USA.

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

Gwilliams, L. (2016, November). *In spoken word recognition the future predicts the past*. HLP Lab, University of Rochester, NY, USA.

Gwilliams, L. & Marantz, A. (2016, February). *Taking Morphology Seriously: MEG Studies of Morphological Representations*. Presentation at 17th International Morphology Meeting, Vienna, Austria

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## Slide Presentations

\*Abrams, E., \*Gwilliams, L. & Marantz, A. (2019, August). *Tracking the building blocks of pitch perception in auditory cortex*. SMPC, New York, USA.

Gwilliams, L. & King, J-R. (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.

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

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.

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.

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.

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.

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

Gwilliams, L. (2015, March). *Letter specific sensitivities in the brain: located in time, space and current direction*. Presentation at the Neuroscience of Language Workshop 2015, Abu Dhabi, UAE

Gwilliams, L., & Marantz, A. (2015, February). *Non-linear processing of a linear speech stream*. Presentation at the NYUAD Annual Research Conference 2015, Abu Dhabi, UAE.

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.

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 2014, Abu Dhabi, UAE.

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## Poster Presentations

Gwilliams, L., Poeppel, D. & King, J-R. (2019, March). *Parsing continuous speech into linguistic representations*. Poster presented at the Society for Cognitive Neuroscience. San Fransisco, USA.

Gwilliams, L., King, J-R. & Poeppel, D. (2018, November). *Parsing continuous speech into linguistic representations*. Poster presented at the Society for Neuroscience. San Diego, USA.

Gwilliams, L. & King, J-R. (2018, August). *Perceptual decision making is supported by a hierarchical processing cascade in both biological and artificial neural networks. Identifying the neural architecture of perceptual decision making with normative, shallow and deep neural network approaches*. Poster presented at BioMag, Philadelphia, USA.

Gwilliams, L. & King, J-R. (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.

Gwilliams, L. & King, J-R. (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.

Gwilliams, L. & King, J-R. (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.

\*Gwilliams, L., \*King, J-R. & 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.

Gwilliams, L. & King, J-R. (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.

Gwilliams, L. & King, J-R. (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.

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.

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.

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

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

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

Brodbeck, C., Gwilliams, L. & Pyllkanen, 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

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

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

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

Oseki, Y., Gwilliams, L., Blanco-Elorrieta, E., Gaston, P., Pylkkanen, 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

Brodbeck, C., Gwilliams, L. & Pylkkanen, 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

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. [PDF].

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. [PDF].

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. [PDF].

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.

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## Teaching

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| 2018: | Teaching Assistant<br><i>Cognition</i><br>Department: Psychology<br>Instructor: Prof. Pascal Wallisch<br><br>Guest Lecturer<br><i>Cognitive Neuroscience</i><br>Department: Neuroscience |
| 2017: | Guest Lecturer<br><i>Problem of Babel</i><br>Departments: Psychology and Linguistics<br>Instructor: Prof. Alec Marantz   |
| 2016: | Teaching Assistant<br><i>Mathematical Tools for Cognitive and Neural Science</i><br>Departments: Psychology and Neural Science   |



Instructor: Prof. Eero Simoncelli

Guest Lecturer

*Neural Bases of Language: Auditory Lexical Access*

Departments: Psychology and Linguistics

Instructor: Prof. Liina Pylkkanen

Guest Lecturer

*Neural Bases of Language: Perceptual Attunement*

Departments: Psychology and Linguistics

Instructor: Prof. Liina Pylkkanen

Guest Lecturer

*Linguistics as a Cognitive Science*

Departments: Psychology and Linguistics

Instructor: Prof. Alec Marantz

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## Research Positions

- 2013 - 2015    *Research Assistant, New York University Abu Dhabi*  
                    *Supervisors: Dr. Alec Marantz and Dr. Liina Pylkkänen*
- 2012 - 2014    *Research Assistant, Cardiff University*  
                    *Supervisor: Dr. Lise Fontaine*
- 2011 - 2012    *Graduate Research Team, Cardiff University*

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## Mentoring

Spring 2017: Supervised an undergraduate intern.

Spring 2017: Supervised an undergraduate independent study student

Project title:

*Neurological mechanisms of perceptual attunement to accented speech*

Spring 2016: Supervised an undergraduate independent study student

Project title:

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

Fall 2015: Supervised an undergraduate intern

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## Service

Review editor, *Frontiers in Psychology* (2020 - present)

Ad hoc reviewer for: *PNAS*, *eLife*, *PLOS Biology*, *Journal of Neuroscience*, *NeuroImage*, *Human Brain Mapping*, *Cognition*, *Cerebral Cortex*, *Psychonomic Bulletin & Review*, *Brain & Language*, *PLOS ONE*, *Cortex*

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## Programming Languages

- *Python* (particularly *scikit-learn*, *MNE*, *keras*): 6 years, highly proficient
- *MATLAB*: 4 years, proficient
- *R*: 3 years, competent
- *JavaScript*, *Perl*, *Bash*, *C++*: Some knowledge