Swarnendu **Moitra**

DATA SCIENTIST · LINGUIST · NEUROSCIENTIST · ELECTRONICS ENGINEER

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Professional Experience

Pre Doctoral Research Assistant on the [SaVANT Project](#)   *London, United Kingdom*

QUEEN MARY UNIVERSITY OF LONDON | NEW YORK UNIVERSITY, ABU DHABI

PI: [LINNAEA STOCKALL](#), Co-Is: [DUSTIN A. CHACÓN](#), [ALEC MARANTZ](#)   *Aug. 2021 – present*

1. Spearheaded groundbreaking research in neurolinguistics, leading projects from conception to publication (**1 peer-reviewed paper**) and dissemination (**10 conference presentations** & **2 invited talks**).
2. Recruited over 200 participants for diverse neuroimaging (MEG/EEG) and behavioural experiments conducted across two universities.
3. Leveraged **machine learning algorithms** (in **Python** & **R**) to **analyze and build statistical model** of complex experimental data, extracting key insights.
4. Established an EEG/MEG data processing pipeline that streamlines neural data acquisition, pre-processing, analysis, and visualization (using open source python packages like mne-python and eelbrain) for cognitive neuroscience experiments.
5. Empowered over 50+ students (including undergraduates) from diverse backgrounds with a foundational understanding of linguistics & neuroscience through summer school programs.
6. <u>Publications</u>: ① **Moitra, S. et al. (2024).** `How long is long? Word length effects in reading correspond to minimal graphemic units: An MEG study in Bangla.` **PLOS ONE, 19(4), e0292979** [[Link](#)].

Education

M.A in Linguistics – [Jadavpur University](#) (Distinction, GPA: 9.53/10)   *2017 – 2019*

- DISSERTATION: NEUROCOGNITION AND NEUROPHYSIOLOGY OF SCOPE AMBIGUITY IN HEAD FINAL LANGUAGES.
- CO-FOUNDED **LINGCLUB**: A STUDENT-LED BODY TO ORGANIZE COLLOQUIUMS AND READING GROUPS.

B.Tech in Electronics and Communications Engineering – [M.A.K.A.U.T](#) (GPA: 7.67/10)   *2013 - 2017*

- DISSERTATION: STUDY AND ANALYSIS OF DATA ENCRYPTION TECHNIQUES AND IMPLEMENTATION USING MATLAB.

Skills

Programming	**python** [Scikit-learn, tensorflow, spaCy, eelbrain, mne-python], **R** [tidyverse, brms, lme4], **JavaScript**, with **git**
Mark-up	LaTeX, (R)Markdown, quarto, HTML
Experiments	**jsPsych, presentation, Linger, OpenSesame, PsychoPy, Ibex Farm**
Other Softwares	**Microsoft Office, Inkscape, Adobe suite**
Exp. Hardware	**fMRI** (Siemens), **EEG** (BioSemi), **MEG** (Kanazawa Institute of Technology)

Projects

Stock Market Volatility of the G20 Countries: Effects of the 2007 Financial Crisis and Covid-19   *Dec 2023 - March 2024*

MS. EVA MONDAL (UNIVERSITY OF YORK)   *Collaborator*

1. Conducted an in-depth investigation of the effects of the 2007-08 Financial Crisis and COVID-19 pandemic on stock market volatility by analyzing 20 years of monthly stock market data from 8 countries from G20.
2. Performed a comprehensive **econometric analysis** of stock returns and volatility to identify trends.
3. Implemented a **fixed-effects panel regression model** to isolate the impact of the crises while controlling for country-specific factors.
4. Tested **hypotheses** on the differential impacts of the crises on stock market volatility, uncovering varied responses between Western and Asian countries.
5. The analysis revealed that during the COVID-19 pandemic, Asian countries experienced smaller increases in volatility compared to Western countries, whereas during the 2007-08 Financial Crisis, Asian countries exhibited significantly larger increases in volatility.

Democratizing AI Project

Dr. Haim Dubossarsky (Queen Mary University of London & Alan Turing-fellow)

Feb 2024 - Ongoing

Collaborator

1. Developed an innovative Word Sense Disambiguation (WSD) dataset adhering to the contemporary Word-in-Context (WiC) paradigm, addressing critical Natural Language Processing (NLP) challenges in low-resource languages.
2. Investigated the intricacies of polysemy in two Indian Languages, revealing the limitations of multilingual models (restructured into a binary classification task to accommodate contextualized embeddings) in direct transfer learning from English to Indian Languages.
3. Conducted an exhaustive evaluation of pre-trained contextualized models (e.g., mBERT, XLM-R) under zero-shot and few-shot conditions.
4. Indian language-specific fine-tuning significantly improved performance (accuracy: 50% to 90%)

Effects of scope interactions : An experimental study on Scrambling | **Project Website**

Dr. Paul Marty (L-Università ta' Malta)

Dr. Ishani Guha (Indian Institute of Technology - Delhi)

Feb 2020 - Ongoing

Collaborator(s)

1. **Co-designed and executed** behavioural psycholinguistic experiments to investigate the influence of *syntactic ambiguity* in sentence processing on speakers of Bangla from India and English from the UK.
2. Designed 100+ experimental stimuli, utilizing the jsPsych framework to build the online experiment.
3. Deployed the experiment on a local Linux server with recruitment platforms (Amazon Mechanical Turk/ Prolific) and implemented Node.js backend for real-time data collection and storage.
4. Presented findings at **3** international conferences (2 proceedings published). The research is currently under peer-review in a high-impact journal.

Decoding Visual Stimulus from Visual Cortex Data | **Neuromatch Project**

Fatemeh Abdollahi (University of Alberta), Rekha Crawford (Swarthmore College)

Sreekar Reddy (University of Cincinnati), Pranjal Gupta (Indian Institute of Technology, Bombay)

July 2020

Collaborator(s)

1. Leveraged Neuropixel data from the mouse visual cortex (Steinmetz dataset) to decode visual stimuli using machine learning classifiers (LDA, Random Forest) during a Neuromatch Academy group project.
2. Classified stimulus vs. no stimulus conditions and left vs. right visual contrasts with high accuracy using firing rate data. Random Forest achieved the best performance among the employed classifiers.

Publications & Presentations

Invited Talks

Tracing word length in non-alphabetic orthographies

Language and Mind, 30th November 2023

UK Research and Innovation (UKRI)

London, UK

Understudied languages in neuroscience: from Slovenian to Arabic and more

University of Ljubljana, 18th May 2023

V nevroznanosti šibkeje zastopani jeziki: od slovenščine do arabščine in še naprej

Ljubljana, Slovenia

Publications

How long is long? Word length effects in reading correspond to minimal graphemic units: An MEG study in Bangla.

Moitra, Swarnendu, Dustin A. Chacón, & Linnaea Stockall.

PLOS ONE 19(4), e0292979.

[Preprint] [doi]

2024

Study and analysis of data encryption techniques and implementation using MATLAB programming

Ananya Banerjee, Swarnendu Moitra, Urmee Karmakar, Sayan Ghosh, Saheli Datta and Sandipan Debnath

International Journal of Advanced Research in Computer Engineering and Technology (IJARCET)

Volume 06, Issue 05, May 2017, ISSN : 2278 - 1323

[link]

2017

Manuscripts

Beyond the Left Hemisphere: MEG Evidence for Right Temporal Lobe recruitment in Processing Morphosyntax

osf.io/3bc69

WITH DUSTIN A. CHACÓN AND LINNAEA STOCKALL

in prep

Impossible Numbers: Experimental Investigations into the Marked Values of Phi Features

osf.io/b7yex

WITH JANE MIDDLETON AND DANIEL HARBOUR

in prep

Interaction between Word Order, Quantifier Scope and Lexical Information.

osf.io/bkz72

WITH ISHANI GUHA AND PAUL MARTY

in prep

Proceedings

Interaction between Word Order, Quantifier Scope and Lexical Information: Experimental Evidence from Bangla.

ISHANI GUHA, SWARNENDU MOITRA, PAUL MARTY

Forthcoming

in Proceedings of `the 57th Annual Meeting of the Chicago Linguistic Society.`

Inverse Scope in Scrambling Languages: the case of Bangla

ISHANI GUHA, SWARNENDU MOITRA, PAUL MARTY

IN PRESS

in Proceedings of the `39th West Coast Conference on Formal Linguistics.`

Conference Presentations (Talks/Posters)

Syntactic licensing and semantic interpretation processes occur in parallel in complex word recognition in Abugidas

Belgrade, Serbia

SWARNENDU MOITRA, DUSTIN A. CHACÓN AND LINNAEA STOCKALL

`International Word Processing Conference [WoProc 2024],`

University of Belgrade, Serbia. 2024

Tracing word length in non-alphabetic orthographies

Belgrade, Serbia

SWARNENDU MOITRA, DUSTIN A. CHACÓN AND LINNAEA STOCKALL

`International Word Processing Conference [WoProc 2024],`

University of Belgrade, Serbia. 2024

Towards developing a functional localiser for letter-specific brain responses for Bangla: An MEG Study

Kanpur, India

SWARNENDU MOITRA, DUSTIN A. CHACÓN AND LINNAEA STOCKALL

`Annual Conference of Cognitive Science [ACCS - 10],`

Indian Institute of Technology - Kanpur, 9 - 11 December, 2023

Syntactic vs. semantic computation in posterior temporal lobe: an MEG study on Bangla nominal prefixes.

Marseille, France

SWARNENDU MOITRA, DUSTIN A. CHACÓN AND LINNAEA STOCKALL

`The Society for the Neurobiology of Language [SNL-2023],`

The Palais du Pharo, Marseille, 24 - 26 October, 2023

Morphological decomposition in bilateral fusiform areas in Bangla: An MEG study.

Marseille, France

SWARNENDU MOITRA, DUSTIN A. CHACÓN AND LINNAEA STOCKALL

`The Society for the Neurobiology of Language [SNL-2023],`

The Palais du Pharo, Marseille, 24 - 26 October, 2023

The Effect of Determiner Type on Quantifier Scope Ambiguity in English and Bengali

Pittsburgh, USA

ISHANI GUHA, SWARNENDU MOITRA, AND PAUL MARTY

`Human Sentence Processing [HSP - 36],`

University of Pittsburgh, Pittsburgh, 8 - 11 March, 2023

How long is long? An MEG study of M100 response in tracking word length in Bangla/Bengali   *New Delhi, INDIA*

Swarnendu Moitra, Dustin A. Chacón and Linnaea Stockall

`9th Annual Conference of Cognitive Science [ACCS-9]`,

Indian Institute of Technology, Delhi, 8 - 10 December, 2022

How long is long? M100 response in Bangla tracks number of phonemes not graphemes of glyphs   *Philadelphia, USA*

Swarnendu Moitra, Dustin A. Chacón and Linnaea Stockall

`The Society for the Neurobiology of Language [SNL-2022]`,

Loews Philadelphia Hotel, Philadelphia, 6 - 8 October, 2022

Morphological recomposition and the concrete/abstract distinction in Bangla   *York, UK*

Swarnendu Moitra, Dustin A. Chacón and Linnaea Stockall

`Architectures and Mechanisms for Language Processing [AMLaP-2022]`,

The Principal, York, 7 - 9 September, 2022

Complex word de/recomposition across languages: lexical decision and MEG studies   *Zurich, Switzerland*

Linnaea Stockall, Dave Kenneth Cayado, Dustin Alfonso Chacón, Karin Kavcic, Swarnendu Moitra, Christina Manouilidou, Alec Marantz, Suhail Matar, Bojana Ristić, Samantha Wray and Rok Žaucer

`The Crosslinguistic Perspectives on Processing and Learning [X-PPL 2022]`,

University of Zurich, 12 - 13 September, 2022

Interaction between Word Order, Quantifier Scope and Lexical Information: Experimental Evidence from Bangla   *Illinois, USA*

Ishani Guha, Swarnendu Moitra and Paul Marty

`Annual Meeting of the Chicago Linguistic Society 57 [CLS - 57]`,

University of Chicago, 6 - 8 May, 2021

Inverse Scope in Scrambling Languages: the case of Bangla   *Tucson, USA*

Ishani Guha, Swarnendu Moitra and Paul Marty

`West Coast Conference on Formal Linguistics 39 [WCCFL - 39]`,

University of Arizona, 8 - 11 April, 2021.

In Search of Inverse Scope in Bangla   *Minneapolis, USA*

Ishani Guha, Swarnendu Moitra and Paul Marty

`11th (Formal) Approaches to South Asian Languages, [(F)ASAL - 11]`

University of Minnesota 26th - 28th March 2021

Internships & Summer Schools

Internships

2018 - 19	**Intercultural Communication in Multilingual Urban Spaces - Uni of Calcutta**	*Kolkata*
2019	**Neuro Cognition Lab - Sir C V RAMAN Centre for Physics and Music - Jadavpur University**	*Kolkata*
2019	**Indian Statistical Institute - Kolkata**	*Kolkata*

Summer Schools

2022	**SMLP 2022,** Summer School on Statistical Methods for Linguistics and Psychology, **Uni of Potsdam**	*Germany*
2021	**CuttingEEG,** 5th symposium for cutting edge methods on EEG research, **Aix-en-Provence**	*France*
2020	**Neuromatch Academy,** Computational Neuroscience (Org. by : **UPenn, DeepMind and others**)	*Online*
2019	**ESSLLI - 31,** European Summer School in Logic, Language and Information, **Uni of Latvia**	*Riga, Latvia*

Grants and Achievements

United Kingdom Research and Innovation (UKRI) - Global Talent   *2021*

Endorsed by **UKRI**, sponsored by the Department for Science, Innovation and Technology (DSIT) in support of the Global Talent Migrant Visa for conducting Neuroscience research in the UK.

Rashtriya Uchchatar Shiksha Abhiyan (RUSA) - Travel Grant for Overseas Conference *2019*

Awarded **1125 USD** Travel Grant in support for paper presentation at **25th Himalayan Languages Symposium**

Neuromatch Academy Summer School *2019-20*

Awarded Full scholarship to attend the Summer School

Swami Vivekananda Merit-cum-Means Scholarship *2019-20*

Awarded **850 USD** scholarship per-annum for MPhil.

University Grants Commission (UGC) - (NET) National Eligibility Test in Linguistics *2018*

Qualified for Assistant Professor in India

Services

Teaching

2024 **Course Instructor**, 15 pupils | Experimental Linguistics Taster Day - 12th June, **Queen Mary University of London**

2023 **Course Instructor**, 15 pupils | Winter Workshop on Neurolinguistics, **Queen Mary University of London**

2023 **Teaching Assistant**, 15 pupils | London Summer School on Neurolinguistics, **Queen Mary University of London**

2022 **Teaching Assistant**, 9 pupils | London Summer School on Neurolinguistics, **Queen Mary University of London**

Others

2022 **London School Outreach**, London Summer School on Neurolinguistics, **Queen Mary University of London**

2020 **Organizing Committee**, Rhythm in Speech and Music Conference, **Jadavpur University**

Extracurricular Activity

LingClub, Jadavpur University *Jadavpur University*

Co-founder and Coordinator *Aug. 2018 - 2021*

• Organised student lead Colloquiums, Reading Groups and Outreach programmes

Hindustani Classical Flautist

Trained in North - Indian Style Classical Music

• Completed 2nd Year Diploma in Hindustani Classical Music : Bamboo Flute (Bansuri)

Referees

Dr. Dustin A. Chacón (PhD, University of Maryland) *University of Georgia ⇒UC Santa Cruz*

Assistant Professor, Department of Linguistics

dustin.chacon@uga.edu

Prof. Linnaea Stockall (PhD, Massachusetts Institute of Technology) *Queen Mary University of London*

Professor, Department of Linguistics

l.stockall@qmul.ac.uk