James A. Michaelov

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Academic Positions

Postdoctoral Researcher: Massachusetts Institute of Technology 2024 - Present
Department of Brain and Cognitive Sciences & MIT Libraries CREOS
Advisors: **Roger Levy** & **Micah Altman**

Education

Cognitive Science (PhD): The University of California, San Diego 2024
Thesis: *Understanding the role of statistics in the predictive processing of language*
Committee: **Benjamin Bergen**, Seana Coulson, Marta Kutas, Federico Rossano, Victor Ferreira

Cognitive Science (MSc), with Distinction: The University of Edinburgh 2018
Thesis: *Converting from Universal Dependencies to Discourse Representation Theory*
Supervisor: **Federico Fancellu**

Philosophy and Linguistics (MA Hons), First Class Honours: The University of Edinburgh 2017
Thesis: *How universal are prominence hierarchies? Evidence from native English speakers*
Supervisors: **Hannah Rohde** & **Jennifer Culbertson**

Industry Experience

Applied Scientist Intern: Amazon (Alexa Games), *Seattle, WA* 2023
Project: Utilizing and developing state-of-the-art natural language understanding systems.
Skills: Applied research, production-level code, product development, product evaluation.

Publications

Michaelov, J. A., Estacio, R., Zhang, Z., & Bergen, B. K. (2025). 'Not quite Sherlock Holmes: Pretrained language models cannot reliably differentiate impossible from improbable events'. *Findings of the Association for Computational Linguistics: ACL 2025.*

Arnett, C., Chang, T. A., **Michaelov, J. A.**, & Bergen, B. K. (2025). 'On the Acquisition of Shared Grammatical Representations in Bilingual Language Models'. *Proceedings of the 63rd Annual Meeting of the Association for Computational Linguistics (ACL 2025).*

Michaelov, J. A., Arnett, C., & Bergen, B. K. (2024). 'Revenge of the Fallen? Recurrent Models Match Transformers at Predicting Human Language Comprehension Metrics'. *The Proceedings of the First Conference on Language Modeling (COLM).*

Michaelov, J. A. & Bergen, B. K. (2024). 'On the Mathematical Relationship Between Contextual Probability and N400 Amplitude'. *Open Mind.*

Michaelov, J. A., Bardolph, M. D., Van Petten, C. K., Bergen, B. K., & Coulson, S. (2024). 'Strong Prediction: Language model surprisal explains multiple N400 effects'. *Neurobiology of Language.*

Michaelov, J. A.*, Arnett, C.*, Chang, T. A., & Bergen, B. K. (2023). 'Structural priming demonstrates abstract grammatical representations in multilingual language models'. *The 2023 Conference on Empirical Methods in Natural Language Processing (EMNLP 2023).* *Equal Contribution.

Michaelov, J. A. & Bergen, B. K. (2023). 'Emergent inabilities? Inverse scaling over the course of pretraining'. *Findings of the Association for Computational Linguistics: EMNLP 2023*.

Michaelov, J. A. & Bergen, B. K. (2023). 'Ignoring the alternatives: The N400 is sensitive to stimulus preactivation alone'. *Cortex*.

Michaelov, J. A. & Bergen, B. K. (2023). '*Rarely* a problem? Language models exhibit inverse scaling in their predictions following *few*-type quantifiers'. *Findings of the Association for Computational Linguistics: ACL 2023*.

Rezaii, N., **Michaelov, J. A.**, Josephy-Hernandez, S., Ren, B., Hochberg, D., Quimby, M., & Dickerson, B. C. (2023). 'Measuring Sentence Information via Surprisal: Theoretical and Clinical Implications in Nonfluent Aphasia'. *Annals of Neurology*.

Trott, S.*, Jones, C.*, Chang, T., **Michaelov, J.**, & Bergen, B. (2023). 'Do Large Language Models know what humans know?'. *Cognitive Science, 47*(7). *Equal Contribution.

Michaelov, J. A. & Bergen, B. K. (2022). 'Collateral facilitation in humans and language models'. *Proceedings of the 26th Conference on Computational Natural Language Learning (CoNLL 2022)*.

Michaelov, J. A. & Bergen, B. K. (2022). 'Do language models make human-like predictions about the coreferents of Italian anaphoric zero pronouns?'. *Proceedings of the 28th International Conference on Computational Linguistics (COLING 2022)*.

Michaelov, J. A., Coulson, S., & Bergen, B. K. (2022). 'So Cloze yet so Far: N400 Amplitude is Better Predicted by Distributional Information than Human Predictability Judgements'. *IEEE Transactions on Cognitive and Developmental Systems*.

Michaelov, J. A. & Bergen, B. K. (2020). 'How well does surprisal explain N400 amplitude under different experimental conditions?'. *Proceedings of the 24th Conference on Computational Natural Language Learning (CoNLL2020)*.

Michaelov, J. A. (2017). 'The Young and the Old: (T) Release in Elderspeak'. *Lifespans and Styles 3 (1)*: 2–9.

Submitted Papers and Preprints

Michaelov, J. A., Levy, R. P., & Bergen, B. K. (Under Review). 'Language Model Behavioral Phases are Consistent Across Scale and Architecture'.

Michaelov, J. A. & Bergen, B. K. (Under Review). 'A Comparison of Language Model Scaling Effects on the Prediction of N400 Amplitude and Reading Time'.

Refereed Conference Papers (Non-Archival)

Michaelov, J. A., Coulson, S., & Bergen, B. K. (2023). 'Can Peanuts Fall in Love with Distributional Semantics?'. *Proceedings of the Annual Meeting of the Cognitive Science Society, 45*. Sydney, Australia.

Michaelov, J. A. & Bergen, B. K. (2022). 'The more human-like the language model, the more surprisal is the best predictor of N400 amplitude'. *NeurIPS 2022 Workshop on Information-Theoretic Principles in Cognitive Systems (InfoCog)*. New Orleans, USA.

Jones, C. R., Chang, T. A., Coulson, S., **Michaelov, J. A.,** Trott, S., & Bergen, B. (2022). 'Distrubutional Semantics Still Can't Account for Affordances'. In *Proceedings of the Annual Meeting of the Cognitive Science Society, 44*. Toronto, Canada.

Michaelov, J. A., Bardolph, M. D., Coulson, S., & Bergen, B. K. (2021). 'Different kinds of cognitive plausibility: why are transformers better than RNNs at predicting N400 amplitude?'. *Proceedings of the Annual Meeting of the Cognitive Science Society, 43*. Vienna, Austria.

Presentations and Posters

Michaelov, J. A., & Levy, R. P. (2025). 'The effect of orthographic neighborhood density on reading time in 9 languages'. *The 38th Annual Conference on Human Sentence Processing*. College Park, USA.

Arnett, C., Chang, T. A., **Michaelov, J. A.**, & Bergen, B. K. (2023). 'Crosslingual Structural Priming and the Pre-Training Dynamics of Bilingual Language Models'. *The 3rd Multilingual Representation Learning Workshop (MRL 2023)*. Singapore.

Michaelov, J. A., Coulson, S., & Bergen, B. K. (2022). 'Do we need situation models? Distributional semantics can explain how peanuts fall in love'. *The 35th Annual Conference on Human Sentence Processing (HSP 2022)*. Santa Cruz, USA.

Michaelov, J. A., Coulson, S., & Bergen, B. K. (2022). 'Cloze behind: Language model surprisal predicts N400 amplitude better than cloze'. *The 35th Annual Conference on Human Sentence Processing (HSP 2022)*. Santa Cruz, USA.

Michaelov, J. A., Bardolph, M. D., Coulson, S., & Bergen, B. K. (2021). 'Is the relationship between word probability and processing difficulty linear or logarithmic?'. *The 34th CUNY Conference on Human Sentence Processing (CUNY 2021)*. Philadelphia, USA.

Michaelov, J. A., Bardolph, M. D., Coulson, S., & Bergen, B. K. (2020). 'Surprisal is a good predictor of the N400 effect, but not for semantic relations'. *AMLaP 2020: 26th Architectures and Mechanisms for Language Processing conference*. Presentation in *Special Session: Computational models of language processing*. Potsdam, Germany.

Michaelov, J. A., Culbertson, J., & Rohde, H. (2017). 'How universal are prominence hierarchies? Evidence from native English speakers'. *AMLaP 2017: 23rd Architectures and Mechanisms for Language Processing conference*. Lancaster, UK.

Michaelov, J. A. (2017). 'The Young and the Old: (t) Release in Elderspeak'. *ULAB 2017: 7th Undergraduate Linguistics Association of Britain Conference*, University of Cambridge, Cambridge, U.K.

Media Interviews

Sandrine Ceurstemont (2023). 'Bigger, Not Necessarily Better'. *Communications of the ACM*.
(Interviewed and quoted in article).

Invited Talks and Panels

'What can psycholinguistics and natural language processing learn from each other?'
- *Language & Cognition Research Seminar*, Harvard University. 2025
- *Computation and Psycholinguistics Lab*, New York University. 2025
- *Cog Lunch*, Massachusetts Institute of Technology. 2025

Panelist for 'Decoding the Mind: What is thought?'
- *Ideas on Consciousness*, University of California, Berkeley. 2025

'What can language models tell us about the N400?'
- *Center for Research in Language*, University of California San Diego. 2024
- *Distinguished Speakers in Language Science*, Saarland University. 2024
- *Psycholinguistics Group*, Saarland University. 2024

'Using language models to understand the N400 (and vice-versa)'
Computational Psycholinguistics Laboratory, Massachusetts Institute of Technology. 2023
Language Processing Group, University of California, Irvine. 2023

'Can Peanuts Fall in Love with Distributional Semantics?'
Lupyan Lab, University of Wisconsin-Madison. 2023
Cognition at the Shore, University of California San Diego. 2023

Panelist for 'Academic Panel: Postgraduate Studies'
The 8th Undergraduate Linguistics Association of Britain Conference,
The University of Edinburgh. 2018

Grants and Fellowships

Cognitive Science Society Student Travel Grant ($1,200) 2023
CARTA Annette Merle-Smith Fellowship ($20,000) 2021-2022
Center for Academic Research and Training in Anthropogeny Fellowship ($20,000) 2020-2021
Glushko Travel and Research Account ($500/year) 2018-2022

Mentorship

University of California San Diego
Van Nguyen: *Honors Program Graduate Student Advisor* 2024
Reeka Estacio: *Undergraduate Research Assistant Mentor* 2023-2024
Zhien Zhang: *Undergraduate Research Assistant Mentor* 2023-2024
Norah Kerendian: *Undergraduate Research Assistant Mentor* 2023
Srija Sankavaram: *Undergraduate Research Assistant Mentor* 2023

Teaching Experience

University of California San Diego
TA: *Introduction to Python* 2024 (Spring Quarter)
TA: *Data Science in Practice* 2024 (Winter Quarter)
TA: *Introduction to Data Science* 2023 (Fall Quarter)
TA: *Learning, Memory, and Attention* 2023 (Spring Quarter)
TA: *Neurobiology of Cognition* 2023 (Winter Quarter)
TA: *Cognitive Consequences of Technology* 2022 (Fall Quarter)
TA: *Cognitive Perspectives* 2022 (Summer Session 2)
TA: *What the *#!?: An Uncensored Introduction to Language* 2021 (Fall Quarter)
TA: *Cognitive Neuroeconomics* 2020 (Fall Quarter)
TA: *Cognitive Neuroeconomics* 2020 (Summer Session 2)
TA: *Language Comprehension* 2020 (Summer Session 1)
TA: *Cognitive Neuroeconomics* 2020 (Winter Quarter)
TA: *What the *#!?: An Uncensored Introduction to Language* 2019 (Fall Quarter)
TA: *Minds and Brains* 2019 (Spring Quarter)

University of Edinburgh
Tutor (TA role): *Logic 1* 2018 (Semester 2)
Tutor (TA role): *Informatics 1: Computation and Logic* 2017 (Semester 1)

Tools Developed

PsychFormers (11 stars, 4 forks):
`https://github.com/jmichaelov/PsychFormers`
Command-line tool that allows the user to use transformer neural network language models to calculate metrics that are relevant to psycholinguistic experiments. Uses the *transformers* Python package and the OpenAI GPT-3 API.

Easy-FAS (1 star):
`https://github.com/jmichaelov/easy-fas`
Command-line tool that allows a user to easily calculate the Forward Association Strength between any two words based on norms gathered from human participants. Uses the *Edinburgh Associative Thesaurus* and the *University of South Florida Free Association Norms*.

Word Embedding Similarity Calculator:
`https://github.com/jmichaelov/word-embedding-similarity`
Command-line tool that allows the user to calculate the similarity between two words, or the similarity between a word and its context, based on word embeddings. Compatible with *GloVe* and *fastText*.

Contributions to Open Source Projects

Language Model Evaluation Harness (7k stars, 1.9k forks):
`https://github.com/EleutherAI/lm-evaluation-harness`
Project: EleutherAI's framework for testing generative language models on a large number of different evaluation tasks (used for Hugging Face's Open LLM Leaderboard).
Contributions (commits): `9b0b15b`, `c3c05b0`, `de4ce48`.

Peer Review Experience

Journals:
Journal of Memory and Language: Reviewer
Language, Cognition and Neuroscience: Reviewer
Northern European Journal of Language Technology: Reviewer
Lifespans and Styles: Reviewer

Conferences:
The Annual Conference on Neural Information Processing Systems (NeurIPS): Reviewer
The Annual Meeting of the Association for Computational Linguistics (ACL): Reviewer
The Conference on Language Modeling (COLM): Reviewer
Annual Meeting of the Cognitive Science Society (CogSci): Reviewer, Meta-Reviewer
The Workshop on Cognitive Modeling and Computational Linguistics (CMCL): Reviewer

Service Roles

Program Committee: Cognitive Modeling and Computational Linguistics Workshop	2023–2024
Graduate Student Representative: Department of Cognitive Science, UCSD	2019–2020
Cognitive Science Department Representative: UCSD Graduate Student Association	2018–2019
National Committee: The Undergraduate Linguistics Association of Britain	2017–2018
Webmaster: The University of Edinburgh Linguistics and English Language Society	2016–2017
Webmaster: The Undergraduate Linguistics Association of Britain	2015–2016
Treasurer: The University of Edinburgh Linguistics and English Language Society	2015–2016

Technical Skills and Experience

Tool	Proficiency	Experience	Notable Packages/Applications/Versions
Python	Proficient	general programming, deep learning	numpy, matplotlib, seaborn, pandas, scipy, tensorflow, keras, sklearn, pytorch, transformers
R	Proficient	statistical analysis	tidyverse packages, lme4, glmnet, brms
LaTeX	Proficient	general	
Linux	Working Knowledge	general	Scientific Linux, Ubuntu/Mint/Pop!_OS
SQL	Working Knowledge	general	
MATLAB	Working knowledge	general	
Praat	Working knowledge	general	