

James A. Michaelov

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Education

- Cognitive Science (PhD)** 2018 -
The University of California, San Diego
Department of Cognitive Science
Advisor: Benjamin Bergen
- Cognitive Science (MSc), with Distinction** 2017 - 2018
The University of Edinburgh
School of Informatics
Thesis: *Converting from Universal Dependencies to Discourse Representation Theory*
Supervisor: Federico Fancellu
- Philosophy and Linguistics (MA Hons), First Class Honours** 2013 - 2017
The University of Edinburgh
School of Philosophy, Psychology and Language Sciences
Thesis: *How universal are prominence hierarchies? Evidence from native English speakers*
Supervisors: Hannah Rohde & Jennifer Culbertson

Professional Experience

- Applied Scientist Intern** 2023
Amazon: Alexa Games
Project: Utilizing and developing state-of-the-art natural language understanding systems.

Publications

- 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*.
- Rezaei, 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., Bardolph, M. D., Van Petten, C. K., Bergen, B. K., & Coulson, S. (2023). 'Strong Prediction: Language model surprisal explains multiple N400 effects'. *Neurobiology of Language*.

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)*. **(Nominated for best paper)**.

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., Arnett, C., & Bergen, B. K. (2024). ‘Revenge of the Fallen? Recurrent Models Match Transformers at Predicting Human Language Comprehension Metrics’. <https://arxiv.org/abs/2404.19178>.

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). ‘Distributional 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

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)*.

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

‘What can language models tell us about the N400?’ (2024). *Center for Research in Language*, University of California San Diego.

‘What can language models tell us about the N400?’ (2024). *Distinguished Speakers in Language Science*, Saarland University.

‘Using language models to understand the N400 (and vice-versa)’ (2023). Computational Psycholinguistics Laboratory, Massachusetts Institute of Technology.

‘Using language models to understand the N400 (and vice-versa)’ (2023). Language Processing Group, University of California, Irvine.

‘Can Peanuts Fall in Love with Distributional Semantics?’ (2023). Lupyran Lab, University of Wisconsin-Madison.

‘Can Peanuts Fall in Love with Distributional Semantics?’ (2023). *Cognition at the Shore*, University of California San Diego.

‘Academic Panel: Postgraduate Studies’ (2018). *The 8th Undergraduate Linguistics Association of Britain Conference (ULAB 2018)*. University of Edinburgh, Edinburgh, U.K.

Awards

Cognitive Science Diversity Award: for promoting accessibility, diversity of perspective, and an inclusive culture as a Teaching Assistant in the UCSD Cognitive Science Department. 2023

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: <i>Honors Program Graduate Student Advisor</i>	2024
Reeka Estacio: <i>Undergraduate Research Assistant Mentor</i>	2023-2024
Zhien Zhang: <i>Undergraduate Research Assistant Mentor</i>	2023-2024
Norah Kerendian: <i>Undergraduate Research Assistant Mentor</i>	2023
Srija Sankavaram: <i>Undergraduate Research Assistant Mentor</i>	2023

Teaching Experience

University of California San Diego

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

University of Edinburgh

Tutor (TA role): <i>Logic 1</i>	2018 (Semester 2)
Tutor (TA role): <i>Informatics 1: Computation and Logic</i>	2017 (Semester 1)

Tools Developed

PsychFormers (7 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 (4k stars, 1.1k 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).

Contribution: Edited code to fix evaluation of the Belebele task (commit 9b0b15b).

Peer Review Experience

Journals:

Language, Cognition and Neuroscience

Northern European Journal of Language Technology

Lifespans and Styles

Conferences:

Annual Meeting of the Cognitive Science Society

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
L ^A T _E X	Proficient	general	
Linux	Working Knowledge	general	Scientific Linux, Ubuntu/Mint/Pop!_OS
SQL	Working Knowledge	general	
MATLAB	Working knowledge	general	
Praat	Working knowledge	general	