Nathaniel Imel

email · website · linkedin · github

Education

New York University — New York, NY
Ph.D. in Psychology (Cognition and Perception) — 2024–now

University of California, Irvine — Irvine, CA
Ph.D. Program in Language Science — 2023–2024
Ph.D. Program in Logic and Philosophy of Science — 2022–2023

University of Washington — Seattle, WA
M.S. in Computational Linguistics — 2020–2022

University of California, San Diego — La Jolla, CA
B.A. in Philosophy — 2016–2020

Experience

Posh Technologies — Boston, MA
NLP Research Intern — Summer 2021

Peer reviewed journal publications

[1] N. Imel, Q. Guo, and S. Steinert-Threlkeld. An efficient communication analysis of modal typology. (under review). https://ling.auf.net/lingbuzz/007392.

[2] S. Steinert-Threlkeld, N. Imel, and Q. Guo. A semantic universal for modality. *Semantics and Pragmatics* (2023). https://doi.org/10.3765/sp.16.1.

Conference proceedings and workshop papers

[3] N. Imel and N. Zaslavsky. Culturally transmitted color categories in LLMs reflect a learning bias toward efficient compression. (under review). https://arxiv.org/abs/2509.08093.

[4] N. Imel, J. Culbertson, S. Kirby, and N. Zaslavsky. Iterated language learning is shaped by a drive for optimizing lossy compression. In: *Proceedings of the 46th Annual Meeting of the Cognitive Science Society*. 2025. https://escholarship.org/uc/item/63d7n4v0.

[5] M. Taliaferro, N. Imel, N. Zaslavsky, and E. Blanco-Elorrieta. Bilinguals exhibit semantic convergence while maintaining near-optimal efficiency. In: *Proceedings of the 46th Annual Meeting of the Cognitive Science Society*. 2025. https://escholarship.org/uc/item/4128j529.

[6] N. Imel, C. Haberland, and S. Steinert-Threlkeld. The Unnatural Language Toolkit (ULTK). In: *Proceedings of the Society for Computation in Linguistics*. 2025. https://doi.org/10.7275/scil.3144.

[7] N. Imel and N. Zaslavsky. Optimal compression in human concept learning. In: *Proceedings of the 46th Annual Meeting of the Cognitive Science Society*. 2024. https://escholarship.org/uc/item/7pc1g61d.

[8] N. Imel and Z. Hafen. Citation-similarity relationships in astrophysics. In: *AI for Scientific Discovery: From Theory to Practice Workshop (AI4Science @ NeurIPS)*. 2023. https://openreview.net/pdf?id=mISayy7DPI.

[9] N. Imel, R. Futrell, M. Franke, and N. Zaslavsky. Noisy population dynamics lead to efficiently compressed semantic systems. In: *NeurIPS Workshop on Information-Theoretic Principles in Cognitive Systems Workshop (InfoCog @ NeurIPS)*. 2023. https://openreview.net/pdf?id=9oEXdXmMNr.

[10] N. Imel. The evolution of efficient compression in signaling games. In: *Proceedings of the 45th Annual Meeting of the Cognitive Science Society*. 2023. https://escholarship.org/uc/item/5dr5h4q0.

[11] N. Imel and S. Steinert-Threlkeld. Modals in natural language optimize the simplicity/informativeness trade-off. In: *Proceedings of Semantics and Linguistic Theory (SALT 32)*. 2022. https://doi.org/10.3765/salt.v1i0.5346.

[12] Q. Guo, N. Imel, and S. Steinert-Threlkeld. A Database for Modal Semantic Typology. In: *Proceedings of the 4th Workshop on Research in Computational Linguistic Typology and Multilingual NLP*. Seattle, Washington: Association for Computational Linguistics, July 2022. https://aclanthology.org/2022.sigtyp-1.6/.

Works in progress

[13] N. Imel, R. Futrell, M. Franke, and N. Zaslavsky. Minimalistic agent-level dynamics may yield efficiently compressed population-level vocabularies. (2025). (in prep).

[14] N. Imel and Z. Hafen. Density, asymmetry and citation dynamics in scientific literature. (2025). https://arxiv.org/abs/2506.23366.

[15] W. Uegaki, A. Mucha, N. Imel, and S. Steinert-Threlkeld. Deontic priority in the lexicalization of impossibility modals. (2023). https://psyarxiv.com/h63y9/.

Talks and Presentations

Iterated learning is shaped by a drive for optimizing lossy compression
Cogsci 2025 (San Francisco, CA) 8/01/25
NYU C&P Miniconvention (New York, NY) 9/26/25

Optimal compression in human concept learning
Cogsci 2024 (Rotterdam, NL) 7/24/24
PhilLab at Dartmouth College (virtual) 11/12/24

Noisy population dynamics lead to efficiently compressed semantic systems
University of Tübingen Linguistics Colloquium (virtual) 7/04/23
MIT Computational Psycholinguistics Lab (Cambridge, MA) 10/17/23
Evolang 2024 (Madison, WI) 5/19/24

Citation-similarity relationships in astrophysics literature
Santa Fe Institute Workshop on Intelligence and Representation (Cambridge, UK) 8/18/23

Modals in natural language optimize the simplicity/informativeness trade-off
Semantics and Linguistic Theory (Mexico City, CDMX) 6/08/22
Experiments in Linguistic Meaning (Philadelphia, PA) 5/18/22

Awards

Santa Fe Institute Complexity GAINs Summer Fellowship 2023
North American Summer School for Logic, Language and Information Student Fellowship (USC) 2023
Merit Fellowships (UC Irvine School of Social Sciences) 2022

Accepted to Summer School in Logic and Formal Epistemology (CMU) 2021

Best paper "Desire Semantics", selected for UC San Diego undergraduate philosophy journal *Intuitions* 2020

Teaching

Grader

- ANOVA (NYU) – w. Ajua Duker Fall 2025

Teaching Assistant

- Lab in Cognition and Perception (NYU) – w. Noga Zaslavsky Spring 2025
- Introduction to Syntax (UCI) – w. Galia Bar-Sever Winter, Spring 2024
- Introduction to Linguistics (UCI) w. Ben Mis Fall 2023
- Basic Economics I (UCI) w. Jiawei Chen Spring 2023
- Introduction to Symbolic Logic – w. Toby Meadows (UCI) Winter 2023

Service

Organizing

- Co-organizer for InfoCog Workshop @ CogSci 2025
- Organizing Committee for Society for Computation in Linguistics Conference 2023
- Co-organizer for InfoCog Workshop @ Neurips 2023
- Department Colloquium Committee (UCI Language Science) 2023

Reviewing

- Journal reviewing: JML, Mind & Language 2024-2025
- Conferences/Workshops: CogSci, InfoCog Workshop @ NeurIPS, EvoLang, California Annual Meeting of Psycholinguistics 2023–2025

Skills

- **Programming Languages:** Python, Java, C++, MATLAB
- **Libraries & Frameworks:** NumPy, PyTorch, pandas, plotnine, matplotlib, huggingface, NLTK, Hydra
- **Cloud & Computing:** high-performance computing with Condor & Slurm, Google Cloud Platform, Lambda AI
- **DevOps & Tools:** GitHub Workflows/Actions, containerization (Singularity)