

# Takateru Yamakoshi

## Contact Information

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## Education

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Stanford University, PhD in Computer Science	09/2025 -
University of Tokyo, Bachelor of Medicine	04/2018 - 03/2025
Princeton University, Exchange Student	09/2019 - 05/2020

## Awards

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2025. [JASSO Scholarship](#) (\$67,000/year for three years)  
2023. Clinical Clerkship Best Student Award  
2022. [UTokyo–Princeton Strategic Partnership Seed Grant](#) (\$10,000)  
2019. [Ito Foundation USA, FUTI Scholarship](#)

## Journal Papers (\*: equal contributions)

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- [1] Kumar, S.\*, Sumers, T.R.\*, **Yamakoshi, T.**, Goldstein, A., Hasson, U., Norman, K.A., Griffiths, T.L., Hawkins, R.D., Nastase, S.A. (2024). [Shared functional specialization in transformer-based language models and the human brain](#). *Nature Communications*.

## Proceedings Papers (\*: equal contributions)

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- [2] **Yamakoshi, T.**, McClelland, J.L., Goldberg A.E., Hawkins, R.D. (2023). [Causal interventions expose implicit situation models for commonsense language understanding](#). *Findings of the Association for Computational Linguistics (ACL)*.  
[3] **Yamakoshi, T.**, Griffiths, T.L., Hawkins, R.D. (2022). [Probing BERT’s priors with serial reproduction chains](#). *Findings of the Association for Computational Linguistics (ACL)*.  
[4] Hawkins, R.D.\*, **Yamakoshi, T.\***, Griffiths, T.L., Goldberg, A.E. (2020). [Investigating representations of verb bias in neural language models](#). *Proceedings of the Conference on Empirical Methods in Natural Language Processing (EMNLP)*. (\*co-first authors)

## Presentations

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2023. Invited talk at Princeton Computational Cognitive Science Lab  
2023. The 61st Annual Meeting of the Association for Computational Linguistics [2]  
2022. The 60th Annual Meeting of the Association for Computational Linguistics [3]  
2021. Go Global Meeting  
- Information session for exchange programs at UTokyo.  
2020. Conference on Empirical Methods in Natural Language Processing (EMNLP) [4]  
2020. Final project presentation at the Neuromatch Academy (<https://academy.neuromatch.io/>)  
- Developed a method to identify functional connectivity using Neuropixels data.  
- Selected as one of the highlighted projects.

## Research Experiences

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### 1. Natural Language Processing & Cognitive Science (with [Prof. Tom Griffiths](#))

#### 1-1. Efficient Training by Imposing Bias on Attention Matrix (in prep.) 09/2022 - 05/2024

- Trained a model with an inductive bias imposed on attention matrices to improve data efficiency.
- Achieved 3% improvement on syntactic benchmarks when training data is limited to 1M words.

## 1-2. Situation Models in Language Models (Findings of ACL 2023 [2]) 09/2021 - 05/2022

- Investigated how language models construct “situation models” to perform commonsense reasoning.
- Revealed circuits inside language models via causal interventions.

## 1-3. Sampling from Masked Language Models (Findings of ACL 2022 [3]) 09/2020 - 05/2021

- Derived a mathematically rigorous way to sample from masked language models.
- Identified model biases by comparing samples from BERT and those from Wikipedia.

## 1-4. Grammatical Constructions in Language Models (EMNLP 2020 [4]) 01/2020 - 05/2020

- Investigated whether language models learn grammatical constructions.
- Uncovered the process in which the models build up grammatical constructions.

## 2. Natural Language Processing & Neuroscience

### 2-1. Aligning Neuropixels with Speech Models (with Prof. Edward Chang) 09/2024 - 12/2024

- Extended [1] to target speech processing in the brain using Neuropixels data and Whisper.
- Identified hierarchical neural computations in speech processing.

### 2-2. Aligning fMRI with Language Models (Nat. Commun. [1]) 09/2020 - 05/2022

- Proposed a representation that captures how words get contextualized better than embeddings.
- Revealed a shared trend of functional specialization in BERT and the brain.

## 3. Natural Language Processing & Aphasia (with Prof. Eiji Aramaki)

### 3-1. Modeling Aphasia Symptoms using Language Models (in prep.) 09/2024 - 12/2024

- Reverse-engineered aphasia symptoms by perturbing vision-language models.
- Revealed how changes in sampling methods can partially account for aphasia symptoms.

## 4. Computational Neuroscience

### 4-1. Grid Cell Disruption in Alzheimer’s Disease (with Dr. Louis Kang) 04/2024 - 05/2024

- Analyzed how grid cells are affected in the Alzheimer’s disease using a computational model.

### 4-2. $\text{Ca}^{2+}$ Oscillation Frequency Encoding in Sleep (with Prof. Hiroki Ueda) 11/2021 - 03/2023

- Developed a computational model on how neurons encode the frequency of  $\text{Ca}^{2+}$  oscillations.

### 4-3. Motor Learning in Marmosets (with Prof. Masanori Matsuzaki) 11/2020 - 03/2021

- Identified the anatomical layout of motion patterns using  $\text{Ca}^{2+}$  imaging data.

## Professional Service

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Ad Hoc Reviewer

- Workshop on Representation Learning for NLP (RepL4NLP) (@ ACL 2024)

Treasurer for the students & alumni association of UTokyo Medical School, 2023–2024

## Skills

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Natural Languages:	Japanese (native), English (fluent), Spanish, Italian (beginner)
Programming Languages:	Python, R, MATLAB, JavaScript, Prolog
Technologies:	PyTorch, Git, Docker, L <sup>A</sup> T <sub>E</sub> X