

Melih Barsbey

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SUMMARY

Computer science PhD student with a research focus on generalization and model selection in deep learning and probabilistic latent variable models. Specific applications include compressibility in neural networks, causal discovery, human-AI complementarity, and robust drug-target affinity predictions. Industry experience on research and deployment of machine learning systems, both as a team lead and freelance consultant. Background in psycholinguistics research: embodied language processing, causal explanations.

EDUCATION

Boğaziçi University, Istanbul, Turkey

- Ph.D. in Computer Engineering Sep 2016 – Present
 - Focus: Machine learning, Bayesian statistics
 - Advisor: Prof. A. Taylan Cemgil
 - Cumulative GPA: 4.00 / 4.00
- M.A. in Psychology Sep 2011 – Aug 2014
 - Focus: Embodied language processing, causal explanations
 - Thesis: Perceptual simulations beyond the sentence: the effect of narrative shifts on perceptual simulations
 - Cumulative GPA: 4.00 / 4.00
- B.A. in Psychology Sep 2007 – Jun 2011
 - Cumulative GPA: 3.79 / 4.00

ACADEMIC AND INDUSTRY EXPERIENCE

Research Scientist Intern, London, United Kingdom

- Research with Robust and Verified Artificial Intelligence (RVAI) team. Jun 2022 – Oct 2022
 - Contributing to the development, implementation, and write-up of a confidence-based deferral system that demonstrates consistently high performance under sparse medical data.
 - Development and implementation of a framework for training under noisy annotations.
 - Implementation of computational tools for performance evaluation and expert reliability analysis with multiple expert opinions.

Machine Learning Consultant, Istanbul, Turkey

- Freelance consultancy for multiple software companies on the research, development, and deployment of machine learning systems. Jul 2019 – Jun 2022
 - Development and deployment of a complete AutoML pipeline for demand forecasting.
 - Prediction of lifetime value for online gaming customers.
 - System design for automatic segmentation of e-commerce customers.

Arute Solutions Software Consulting Inc., Istanbul, Turkey

- Senior Data Scientist Sep 2017 – Jun 2019
 - Algorithm development, software design and implementation of the flagship data science product, conducting cash transaction forecasting in over 8000 ATMs.
 - Leading the data science team in the development of a new product in bank branch forecasting and what-if simulation of cash management

Acibadem University, Istanbul, Turkey

- Instructor, Department of Psychology Nov 2014 – Sep 2017
 - Courses Taught: Descriptive and Inferential Statistics, Psycholinguistics

Boğaziçi University, Istanbul, Turkey

- Research Assistant, Department of Psychology Nov 2012 – Sep 2014
 - Courses Assisted: Statistics for Behavioral Sciences

University of California, Berkeley, California, U.S.A.

- Visiting Researcher, Department of Psychology, with Dr. Tania Lombrozo Aug 2012 – Oct 2012
 - Research on how causal explanations change according to linguistic cues

PUBLICATIONS AND PREPRINTS

MANUSCRIPTS UNDER REVIEW

- [14] Dvijotham, K. *, Winkens, J. *, **Barsbey, M. ***, Ghaisas, S. *, Pawlowski, N. et al. Enhancing the reliability and accuracy of AI-enabled diagnosis via complementarity-driven deferral to clinicians (CoDoC). *Manuscript under review*, 2022. *Equal contribution.
- [13] Raj, A., **Barsbey, M.**, Gürbüzbalaban, M., Zhu, L., & Şimşekli, U. Algorithmic Stability of Heavy-Tailed Stochastic Gradient Descent on Least Squares. *Manuscript under review*, 2022.

CONFERENCES

- [12] Özçelik, R., Bağ, A., Atıl, B., **Barsbey, M.**, Özgür, A., & Özkırmı, E. DebiasedDTA: A Framework for Improving the Generalizability of Drug-Target Affinity Prediction Models. To be presented in *27th Annual International Conference on Research in Computational Molecular Biology*, 2023.
- [11] **Barsbey, M.***, Sefidgaran, M.*, Erdogdu, M. A., Richard, G., & Şimşekli, U. Heavy Tails in SGD and Compressibility of Overparametrized Neural Networks. Accepted to *Advances in Neural Information Processing Systems Conference (NeurIPS)*, 2021. *Equal contribution
- [10] Yıldırım, S., Kurutmaz, M. B., **Barsbey, M.**, Şimşekli, U., & Cemgil, A. T. Bayesian Allocation Model: Marginal Likelihood-based Model Selection for Count Tensors. Accepted for publication in *IEEE Journal of Selected Topics in Signal Processing*, 2021.
- [9] Kurutmaz, M. B.*, **Barsbey, M.***, Cemgil, A. T., Yıldırım, S., & Şimşekli, U. Bayesian Model Selection for Identifying Markov Equivalent Causal Graphs. Paper presented at *Symposium on Advances in Approximate Bayesian Inference (AABI)*, 2019. *Equal contribution
- [8] Kurutmaz, M. B., Cemgil, A. T., Şimşekli, U., **Barsbey, M.**, & Yıldırım, S. Bayesian Learning of Non-Negative Matrix/Tensor Factorizations by Simulating Pólya Urns. Paper presented at *Symposium on Advances in Approximate Bayesian Inference (AABI)*, Montréal, Canada, 2018.
- [7] **Barsbey, M.**, Sarıbay, S. A., Boduroğlu, A., & Zwaan, R. A. Perceptual simulations beyond the sentence: the effect of narrative shifts on perceptual simulations. Poster presented at the *Annual Conference on Embodied and Situated Language Processing*, Rotterdam, The Netherlands, 2014.
- [6] **Barsbey, M.**, & Lombrozo, T., Linguistic differences in explanation requests and their effects on the evaluation of explanations: the case of English and Turkish. Poster presented at the annual meeting of the *Cognitive Science Society*, Berlin, Germany, 2013.
- [5] **Barsbey, M.**, Coşkun, T., Selçuk, Ş., & Ülkümen, A. D., Mortality Salience and Self-Defining Memories. Poster presented at the annual meeting of *Center on Autobiographical Memory Research*, Aarhus, Denmark. 2013.

THESES, PREPRINTS, NONARCHIVAL PRESENTATIONS

- [4] Cemgil, A. T., Kurutmaz, M. B., Yıldırım, S., **Barsbey, M.**, & Şimşekli, U. Bayesian Allocation Model: Inference by Sequential Monte Carlo for Nonnegative Tensor Factorizations and Topic Models using Polya Urns. *arXiv preprint arXiv:1903.04478*. Mar 2019.
- [3] **Barsbey, M.** Heuristics in an agent-based simulation: Investigating the effect of model complexity on learning performance. Poster presented at *Summer Institute on Bounded Rationality by Max Planck Institute on Human Development*, Berlin, Germany, Jul 2017.
- [2] **Barsbey, M.** *Perceptual simulations beyond the sentence: the effect of narrative shifts on perceptual simulations*. Unpublished master's thesis. Boğaziçi University, Istanbul, Turkey, Aug 2014.
- [1] **Barsbey, M.**, Aktan, D. N., & Bayram, O., The effect of ambient temperature on decision making processes. Poster presented at the biennial meeting of the *Turkish Psychology Society*, Istanbul, Turkey, Apr 2012.

SCIENTIFIC SERVICE

Reviewer

- Neural Information Processing Systems (NeurIPS) 2019 – Present
- International Conference on Learning Representations (ICLR) 2021 – Present
- International Conference on Machine Learning (ICML) 2021 – Present
- Conference on Causal Learning and Reasoning (CLear) 2022 – Present

AWARDS & SCHOLARSHIPS

- University Entrance Exam; Science and Mathematics National Placement: 50th. *Among 1,615,534 participants*. 2007
- PhD Scholarship from The Scientific and Technological Research Council of Turkey (TÜBİTAK) 2016 – Present
- GRE Score – Verbal Reasoning: 170 / 170. Quantitative Reasoning: 170 / 170. Analytical Writing: 5.0 / 6.0 2014
- TOEFL Score – Overall: 119/120. 2020

PROGRAMMING AND SOFTWARE SKILLS

- Python, Julia, C/C++
- SQL, L^AT_EX, SPSS