Agnessa Karapetian, Ph.D.

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Profile

Interdisciplinary computational scientist with experience in modelling brain and climate data with computer vision, machine learning and deep learning techniques. Passionate about using machine and deep learning for real-world applications, such as for climate change mitigation.

Education

Freie Universität Berlin, BCCN Berlin — Berlin, Germany
Ph.D. in Computational Neuroscience — *Oct 2020 – Aug 2025*

- Thesis: *Empirical investigation and convolutional neural network modeling of scene processing in the human brain* (advisor: Prof. Dr. Radoslaw M. Cichy)

Freie Universität Berlin — Berlin, Germany
M.Sc. in Cognitive Neuroscience — *Oct 2017 – Oct 2019*

- Thesis: *Modality-dependent and -independent representation of categories in the visual and auditory cortices* (advisor: Prof. Dr. Radoslaw M. Cichy)

McGill University — Montréal, Canada
Honours B.Sc. in Psychology (First Class Honours) — *Sept 2014 – Jun 2017*

Dawson College — Montréal, Canada
Diploma of Collegial Studies in Environmental Science (Dean's List) — *Aug 2012 – Jun 2014*

Additional training

BIFOLD Berlin summer school on AI and society *(Berlin, September 2024)*

- Participated in a week-long summer school on the use of AI towards the goal of making Berlin a "smart-city", consisting of lectures on topics such as AI in the fields of public administration and urban planning
- Participated in a project on developing an idea for a use-case of AI to address the rental crisis in Berlin

Climatematch: Computational tools for climate science *(online, July 2023-April 2024)*

- Participated in an intensive two-week summer school followed by a fellowship program on climate data science, consisting of lectures and project work on topics such as climatology, reanalysis, remote sensing and climate modeling
- Conducted a project analyzing satellite (MODIS) and tabular (GWIS) wildfire data to investigate the relationship between wildfire intensity and vegetation index
- Was accepted to the Climatematch Impact Scholars program to continue working on the project and published the results of the project as a preprint on Zenodo

CIFAR deep learning and reinforcement learning summer school *(online, August 2020)*

- Participated in a week-long summer school on the theoretical and practical aspects of deep and reinforcement learning, which included lectures and poster presentations
- Presented a poster on a project investigating the representational similarity of deep neural networks trained on different tasks

Skills

Computer vision (convolutional neural networks, image classification), deep learning (PyTorch, Tensorflow), machine learning (classification, regression, clustering), Python (NumPy, Scikit, Sklearn), MATLAB (lib-SVM), neural data analysis (EEG, fMRI), climate data analysis (pandas, geopandas, xarray), statistical analysis (R), Bash, high-performance computing, github, Java, LaTeX.

Research and work experience

Visiting researcher — Montréal, Canada
McGill University, Mila (PI: Dr. Pouya Bashivan) — *March 2024 – Present*

- Conducting a collaborative inter-university project in computer vision, aiming to boost robustness in convolutional neural networks via joint-loss training with human neural data

Doctoral researcher — Berlin, Germany
Freie Universität Berlin (PI: Prof. Dr. Radoslaw M. Cichy) — *Oct 2020 – Aug 2025*

- Conducted three projects at the intersection of neuroscience and computer vision, aiming to understand how real-world scenes are processed in humans and deep neural networks
- Collected data from humans and deep neural networks performing object and scene recognition experiments
- Prepared and published 3 manuscripts
- Presented research results at 7 international neuroscience and AI conferences
- Supervised two Master's theses and one Master's internship

Pre-doctoral researcher — Berlin, Germany
Technische Universität Berlin (PI: Prof. Dr. Klaus Obermayer) — *Nov 2019 – Oct 2020*
Freie Universität Berlin (PI: Prof. Dr. Radoslaw M. Cichy)

- Was accepted to a competitive pre-doctoral computational neuroscience program (*SmartStart*)
- Conducted two collaborative projects at the intersection of neuroscience and computer vision
- Presented the results of one project at a conference

Research assistant — Berlin, Germany
Max-Planck-Institut für Bildungsforschung (PI: Dr. Bernhard Spitzer) — *April 2018 – July 2019*

- Programmed experiments for neuroscience
- Organized a brain-computer interface demonstration for the Long Night of the Sciences

Summer student — Toronto, Canada
Rotman Research Institute (PI: Dr. Brian Levine) — *June 2017 – August 2017*

- Analyzed EEG and fMRI data
- Translated a cognitive rehabilitation manual

Research assistant — Montréal, Canada
McGill University (PI: Dr. Anna Weinberg) — *Sept 2015 – May 2017*

- Assisted graduate students with neural (EEG) data collection and analysis

Publications

Karapetian, A.*, Lenders, A.*, Bawa, V., Pflaum, M., Leuner, R., Roig, G., Dwivedi, K.* , & Cichy, R. M.* (2025). Investigating the temporal dynamics and modelling of mid-level feature representations in humans. *BioRxiv*, 2025-03. doi.org/10.1101/2025.03.18.643889

Singer, J. J., **Karapetian, A.**, Hebart, M. N., & Cichy, R. M. (2025). Identifying and characterizing scene representations relevant for categorization behavior. *Imaging Neuroscience*, 3, `imag_a_00449`. 10.1162/imag_a_00449

Karapetian, A., Vlcek, K., Temporão, C., Busra Gokbunar, H., Buabassah, S., & Engle, B. (2024). Largest wildfires in Angola: Correlation of vegetation and meteorological variables with wildfire intensity (1.1). Climatematch Impact Scholars Program 2023-2024 (CISP), Virtual. Zenodo.
10.5281/zenodo.11073189

Karapetian, A., Boyanova, A., Pandaram, M., Obermayer, K., Kietzmann, T. C., & Cichy, R. M. (2023). Empirically identifying and computationally modeling the brain–behavior relationship for human scene categorization. *Journal of Cognitive Neuroscience*, 35(11), 1879-1897. doi.org/10.1162/jocn_a_02043

Iamshchinina, P., **Karapetian, A.**, Kaiser, D., & Cichy, R. M. (2022). Resolving the time course of visual and auditory object categorization. *Journal of Neurophysiology*, 127(6), 1622-1628. doi.org/10.1152/jn.00515.2021

Conference talks

Karapetian, A., Boyanova, A., Pandaram, M., Obermayer, K., Kietzmann, T.C., Cichy, R.M. (2022, December). *Linking scene representations and behaviour: an empirical and a modelling perspective.* Lightning talk presented at the Montréal Artificial Intelligence and Neuroscience (MAIN) conference, Montréal, Canada.

Karapetian, A., Boyanova, A., Pandaram, M., Obermayer, K., Kietzmann, T.C., Cichy, R.M. (2022, August). *Scene representations and categorization reaction times correlate in a time-window between 100 and 200 ms.* Talk presented at the European Conference on Visual Perception (ECVP), Nijmegen, Netherlands.

Selected conference poster presentations

Karapetian, A.*, Lenders, A.*, Bawa, V., Pflaum, M., Leuner, R., Roig, G., Dwivedi, K.*, Cichy, R. M.* (2024, September). *Revealing the time-course of mid-level feature representations in scenes using rendered stimuli and ground-truth annotations.* Poster presented at the Neuro-AI Talks (NEAT), Osnabrück, Germany.

Karapetian, A.*, Lenders, A.*, Bawa, V., Pflaum, M., Leuner, R., Roig, G., Dwivedi, K.*, Cichy, R. M.* (2024, August). *Revealing the time-course of mid-level feature representations in scenes using rendered stimuli and ground-truth annotations.* Poster presented at the Conference on Cognitive Computational Neuroscience (CCN), Boston, USA.

Karapetian, A., Boyanova, A., Pandaram, M., Obermayer, K., Kietzmann, T. C.*, Cichy, R. M.* (2023, September). *Empirically identifying and computationally modelling the brain-behaviour relationship for human scene categorization.* Poster presented at the Neuro-AI Talks (NEAT), Osnabrück, Germany.

Karapetian, A., Boyanova, A., Pandaram, M., Obermayer, K., Kietzmann, T. C.*, Cichy, R. M.* (2023, August). *Empirically identifying and computationally modelling the brain-behaviour relationship for human scene categorization.* Poster presented at the Cognitive Computational Neuroscience (CCN), Oxford, UK.

Karapetian, A., Boyanova, A., Pandaram, M., Obermayer, K., Kietzmann, T.C., Cichy, R.M. (2023, May). *Scene representations and categorization reaction times correlate in a time-window between 100 and 200 ms.* Poster presented at the Vision Sciences Society meeting (VSS), St. Pete Beach, USA.

Karapetian, A., Boyanova, A., Pandaram, M., Obermayer, K., Kietzmann, T.C., Cichy, R.M. (2022, December). *Linking scene representations and behaviour: an empirical and a modelling perspective.* Poster presented at the Montréal Artificial Intelligence and Neuroscience (MAIN) conference, Montréal, Canada.

Karapetian, A., Kashef, Y., Dechet, F., Obermayer, K. (2020, September). *Representational similarity analysis of deep neural networks trained on visual tasks.* Poster presented at the Bernstein Conference (virtual), Berlin, Germany.

Karapetian, A., Kashef, Y., Dechet, F., Obermayer, K. (2020, September). *Representational similarity analysis of deep neural networks trained on visual tasks.* Poster presented at the CIFAR Deep Learning and Reinforcement Learning Summer School (virtual), Montréal, Canada.

Awards

Einstein Center for Neurosciences Graduation Scholarship (10 800€)	*Oct 2024 – March 2025*
Bernstein Center for Computational Neuroscience: Lab Visit Add-On (3600€)	*March 2024 – June 2024*
DAAD-STIBET Scholarship (1230€)	*Jan 2022 – March 2022*
Einstein Center for Neurosciences Scholarship (64 800€)	*Oct 2020 – Sept 2023*
DAAD Graduate School Scholarship (10 200€)	*Oct 2018 – Sept 2019*
DAAD RISE Scholarship (1700€)	*June 2016 – August 2016*

Languages

English (Native), French (Native), Russian (Native), German (Fluent).