

Christian Tsvetkov

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Research experience (employment)

- 2023 – Present 📌 **Research Assistant** University of Warwick, Coventry, United Kingdom
Project: 'Sampling models of cognition'
Responsibility: Investigating probability matching using a sampling approach to cognition. Design of experiments related to probability matching, data collection and analysis, modelling work.
- 2017 – 2018 📌 **Research Assistant** New Bulgarian University, Sofia, Bulgaria
Project: 'Predicting future situations in analogy-making'
Responsibility: Developing computer simulations to test learning and generalization of relational categories in neural network models.

Teaching experience

- 2019 – 2021 📌 **Assistant Teacher (TA)** University of Bristol, Bristol, United Kingdom
Assistant teacher for 2nd year undergraduate students in course "Research methods in psychology", focus on statistical analyses and experimental method for behavioural research. Used to working in large and small group settings. Responsibilities also included project supervision.

Education

- 2019 – 📌 **PhD , University of Bristol, Bristol, United Kingdom** in Psychological Science
Thesis project: *Investigating the extent to which deep neural networks trained for visual tasks compare to human performance in generalising to novel tasks and stimuli. How to improve generalisation abilities of deep neural networks by modelling the human visual system.*
- 2015 – 2018 📌 **M.Sc. Cognitive Science, New Bulgarian University, Sofia, Bulgaria** in Cognitive Science.
Thesis title: *"How do deep neural networks represent faces?"* .
Thesis project: *Project description: The project involved designing and running aligned behavioral experiments and neural network simulations in order to compare representational qualities in humans and deep convolutional neural networks.*
- 2010 – 2013 📌 **B.A. in Art and Technology, Aalborg University, Aalborg, Denmark**
Dissertation project: *An interactive art installation was designed, assembled and exhibited as a final year project. The work was done in collaboration with co-student in a group-based education format. The work involved construction of a physical artefact, electronics and programming.*
This course combined theoretical subjects such as aesthetics and art history and practical classes like introductory programming and electronics.

Skills

Programming languages



- 📌 Highly experienced with **Python**, **R**. Familiarity and moderate experience with **Julia**. Limited experience with **MatLab/Octave**, **C#**, **Scala**.

Skills (continued)





Deep learning and machine learning	Excellent knowledge of keras , Tensorflow , good familiarity with PyTorch , scikit-learn .
Scientific computing	Great command of numpy , scipy , scikit-image , pandas .
Plotting	Matplotlib , seaborn (Python). ggplot (R).
Other coding expertise	Experience with bash scripting and general unix command line knowledge. Good familiarity with manuscript preparation with L^AT_EX (Overleaf). Basic version control with git .
Behavioural experiments	Expertise in designing experimental behavioural studies and collecting data using PsychoPy , E-Prime , OpenSesame . Good familiarity with online experiment hosting on Pavlovía , online data collection on Prolific .
Communication	Experience working in group and self-directed, managing and coordinating different projects with multiple collaborators. Published academic articles as lead author or part of larger research team. General interest in effective writing and communication practices. Teaching experience - instruction and supervision of over 100 undergraduate students as TA. Some experience PhD co-supervision. Delivered research presentations in conferences, seminars and reading groups.
Miscellaneous	Good command of image editing and graphical design software (Inkscape , Adobe InDesign , Adobe Photoshop).
Languages	Fluent in Bulgarian (native) and English (second language) Good reading and writing, and moderate speaking competencies in Spanish and Portuguese .

Awards and Further Experience

Awards and Achievements

- 2017  **BICA Society Outstanding Research Award**
- 2016  **CEEPUS Mobility grant**






Further qualifications and experience

- 2022  Co-organising the Generalisation in Mind and Machine seminar series in University of Bristol.
- 2020  **Neuromatch Academy** online summer school in computational neuroscience (observer track)
- 2016 – 2018  **Cognitive Science Summer school**, New Bulgarian University, Sofia, Bulgaria
- 2016  **Eötvös Loránd University (ELTE)**, **Budapest, Hungary**, under CEEPUS mobility grant.




Research Publications

- 1 Sanborn, A. N., Yan, H., & **Tsvetkov, C.** (2024). Combining meta-learned models with process models of cognition. *Behavioral and Brain Sciences*. Publisher: Cambridge University Press. Retrieved August 28, 2024, from <https://wrap.warwick.ac.uk/id/eprint/183914/>
- 2 **Tsvetkov, C.**, Yan, H., & Sanborn, A. (2024). Modelling probability matching as a Bayesian sampling process. *Proceedings of the Annual Meeting of the Cognitive Science Society*, 46(o). Retrieved August 28, 2024, from <https://escholarship.org/uc/item/9tg5m3xh>
- 3 Yan, H., Chater, N., **Tsvetkov, C.**, & Sanborn, A. (2024). Recovering individual mental representations of facial affect using Variational Auto-Encoder Guided Markov Chain Monte Carlo with People. *Proceedings of the Annual Meeting of the Cognitive Science Society*, 46(o). Retrieved August 28, 2024, from <https://escholarship.org/uc/item/96c7b4x9>
- 4 Biscione, V., Yin, D., Malhotra, G., Dujmović, M., Montero, M., Puebla, G., ... Bowers, J. S. (2023). Introducing the MindSet benchmark for comparing DNNs to human vision. [doi:10.31234/osf.io/cneyy](https://doi.org/10.31234/osf.io/cneyy)
- 5 **Tsvetkov, C.**, Malhotra, G., Evans, B. D., & Bowers, J. S. (2023). The role of capacity constraints in Convolutional Neural Networks for learning random versus natural data. *Neural Networks*. [doi:10.1016/j.neunet.2023.01.011](https://doi.org/10.1016/j.neunet.2023.01.011)
- 6 Bowers, J. S., Malhotra, G., Dujmović, M., Montero, M. L., **Tsvetkov, C.**, Biscione, V., ... Blything, R. (2022). Deep Problems with Neural Network Models of Human Vision. *Behavioral and Brain Sciences*, 1–74. Publisher: Cambridge University Press. [doi:10.1017/S0140525X22002813](https://doi.org/10.1017/S0140525X22002813)
- 7 **Tsvetkov, C.**, Malhotra, G., Evans, B. D., & Bowers, J. S. (2022). The role of capacity constraints in Convolutional Neural Networks for learning random versus natural data. *bioRxiv : the preprint server for biology*. Publisher: Cold Spring Harbor Laboratory tex.elocation-id: 2022.03.31.486580 tex.eprint: <https://www.biorxiv.org/content/early/2022/12/26/2022.03.31.486580.full.pdf>. [doi:10.1101/2022.03.31.486580](https://doi.org/10.1101/2022.03.31.486580)
- 8 **Tsvetkov, C.**, Malhotra, G., Evans, B. D., & Bowers, J. S. (2020). Adding biological constraints to deep neural networks reduces their capacity to learn unstructured data. In *Proceedings of the 42nd Annual Conference of the Cognitive Science Society 2020* (Vol. 42, pp. 2358–2364). Retrieved from <https://www.cognitivesciencesociety.org/cogsci20/papers/0559/0559.pdf>
- 9 **Tsvetkov, C.** (2018). *How Do Deep Neural Networks Represent Faces?* (Master's thesis, New Bulgarian University, Sofia, Bulgaria).

Talks and posters

- 2024  **46th Annual Meeting of the Cognitive Science Society (CogSci)** - "Modelling probability matching as a Bayesian sampling process", poster presentation
- 2020  **42nd Annual Virtual Meeting of the Cognitive Science Society (CogSci)** - "Adding biological constraints to deep neural networks reduces their capacity to learn unstructured data", poster presentation
-  **Postgraduate researcher conference, School of Psychological Sciences, University of Bristol** Online presentation: "Adding biological constraints to deep neural networks reduces their capacity to learn unstructured data"
-  **NAISys (From Neuroscience to Artificially Intelligent Systems)** - "Diminishing learning of non-naturalistic data in deep neural networks using biological constraints" - abstract accepted for poster presentation. **Event cancelled due to Covid-19.**
- 2019  **Postgraduate researcher conference, School of Psychological Sciences, University of Bristol** Presentation: "Does structure prevent (over)memorization in convolutional neural networks?"

Talks and posters (continued)

- 2018  **Summer school in cognitive science, New Bulgarian University.** Presentation: "How do deep neural networks represent faces?"
-  **Winter school in cognitive science, New Bulgarian University.** Presentation: "Learning relational categories with neural networks"
- 2017  **BICA (Biologically Inspired Cognitive Architectures)** - "How do deep neural networks represent faces?", Poster presentation.

References

Available on Request