Dr. Filip Melinscak - academic CV

● PERSONAL DETAILS

Family name, first name: Melinscak, Filip

Date of birth: 21/03/1990

Nationality: Croatian

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Address: Liebiggasse 5, 1010 Vienna, AT

ORCID ID: 0000-0001-8767-358X

● RESEARCH INTERESTS

Cognitive sciences (computational psychiatry, psychology of affect, learning and decision-making, artificial intelligence / machine learning, psychoinformatics, psychophysiology, brain decoding) and methodology (Bayesian statistics, experimental design and measurement, computational meta-science).

● RESEARCH POSITIONS AND MAIN RESULTS (net experience: 3y1m doctoral, 8y2m postdoctoral)

01/12/2020 –   **Senior post-doctoral researcher**.

Department of Cognition, Emotion, and Methods in Psychology; Faculty of Psychology; University of Vienna; Austria.

- Since March 2023 FWF ESPRIT postdoctoral fellow (PI) on the "AI Exposure Therapist" project
- Heading lab projects on 1) application of AI to the optimization of exposure therapy, 2) mapping mental representation of arachnophobia-related stimuli using multidimensional embedding and convolutional neural networks, 3) computational modeling of academic research, and 4) use of interpretable AI in joint human-computer combinatorial optimization

01/03/2017 – 31/07/2020   **Post-doctoral researcher**.

Department of Psychiatry, Psychotherapy, and Psychosomatics; Psychiatric Hospital; University of Zurich; Switzerland.

- Developed the first method for computationally optimizing associative learning experiments (code available at https://github.com/fmelinscak/coale-paper)
- Designed the CogniBench framework for validating cognitive models and contributed to its implementation (code available at: https://github.com/fmelinscak/cognibench)
- Contributed to the development of novel psychophysiological measurement methods and co-managed the development and maintenance of the PsPM Toolbox for psychophysiological modeling (https://bachlab.github.io/PsPM/).

01/09/2013 – 31/08/2016   **Marie Curie doctoral research fellow**.

R&D department; BitBrain Technologies S.L.; Spain.

- Developed a novel protocol to study attentional states during motor tasks, and an accompanying brain-computer interface (BCI), successfully completing the deliverables of the Marie Curie NETT project.
- Developed a comprehensive statistical framework for the analysis and planning of brain decoding and BCI studies (code available at https://www.github.com/fmelinscak/bayesian-bci-performance).

● EDUCATION

21/10/2013 – 23/11/2016   **PhD in Biomedical Engineering**

Biomedical Engineering Division; University of Zaragoza; Spain.

- Thesis: *Statistical analysis and planning of brain decoding studies: Insights from developing an attentional brain-computer interface*, advisors: L. Montesano, J. Minguez; defended with the highest grade and *cum laude* distinction.

01/10/2011 – 10/07/2013   **Master of Science in Information and Communication Technology**

Faculty of Electrical Engineering and Computing; University of Zagreb; Croatia.

- Thesis: *A P300-Based Brain-Computer Interface*, advisor: M. Cifrek.

Graduated *summa cum laude* (top 1% of students)

01/10/2008 – 05/07/2011   **Bachelor of Science in Computing**

Faculty of Electrical Engineering and Computing; University of Zagreb; Croatia.

- Thesis: *Realization of Audio Effects with Digital Filters*, advisor: A. Petošić.

Graduated *summa cum laude* (top 1% of students)

Description of previous research achievements

Selected 10 academic publications (full list available at Google Scholar profile**):**

Lor, C.S., Steyrl, D., Karner, A., Götzendorfer, S.J., Klimesch, A., Eder, S.J., Renz, F.M., Rother, J., Scharnowski, F., & Melinscak, F. (2025). SpiderPhy dataset: A multimodal dataset of Physiological, Psychometric and Behavioral Responses to fear stimuli. *Scientific Data*, *12*(1), 599. DOI:10.1038/s41597-025-04908-x

Pegler, D., Steyrl, D., Zhang, M., Karner, A., Arato, J., Scharnowski, F., & Melinscak, F. (2025). SpiderNets: Estimating Fear Ratings of Spider-Related Images with Vision Models. *arXiv preprint arXiv:2509.04889*. DOI:10.48550/arXiv.2509.04889

Zhang, M., Pegler, D., Karner, A., Scharnowski, F., & Melinscak, F. (2025). Mapping mental representations of arachnophobia stimuli through similarity modeling. *OSF Preprints*, DOI:10.31219/osf.io/j8epm_v1

Mancinelli, F., Sporrer, J. K., Myrov, V., Melinscak, F., Zimmermann, J., Liu, H., & Bach, D. R. (2024). Dimensionality and optimal combination of autonomic threat learning measures in humans. *Behavior research methods*, 1-11. DOI:10.3758/s13428-024-02341-3

Karner, A., Zhang, M., Lor, C. S., Steyrl, D., Götzendorfer, S. J., Weidt, S., Melinscak, F., & Scharnowski, F. (2024). The "SpiDa" dataset: self-report questionnaires and ratings of spider images from spider-fearful individuals. *Frontiers in Psychology*, 15, 1327367. DOI:10.3389/fpsyg.2024.1327367

Bißantz, S., Frick, S., Melinscak, F., Iliescu, D., & Wetzel, E. (2024). The Potential of Machine Learning Methods in Psychological Assessment and Test Construction. *European Journal of Psychological Assessment*. DOI:10.1027/1015-5759/a000817

Melinscak, F., & Bach, D. R. (2020). Computational optimization of associative learning experiments. *PLoS computational biology*, *16*(1), e1007593. DOI:10.1371/journal.pcbi.1007593

Bach, D., Melinscak, F., Fleming, S., & Voelkle, M. (2020). Calibrating the experimental measurement of psychological attributes. *Nature human behaviour 4*, 1229–1235. DOI:10.1038/s41562-020-00976-8

Castegnetti, G., Tzovara, A., Khemka, S., Melinscak, F., Barnes, G. R., Dolan, R. J., & Bach, D. R. (2020). Representation of probabilistic outcomes during risky decision-making. *Nature communications*, *11*, 2419. DOI:10.1038/s41467-020-16202-y

Bach, D. R., & Melinscak, F. (2020). Psychophysiological modelling and the measurement of fear conditioning. *Behaviour Research and Therapy*, *127*, 103576. DOI:10.1016/j.brat.2020.103576

Selected 10 additional achievements:

- **Award / funding**: Postdoctoral PI fellowship project "AI exposure therapist for anxiety disorders" (collaboration with Profs. Frank Scharnowski, Sebastian Tschiatschek, and Peter Dayan) has been selected for funding by both the EU Marie Sklodowska Curie Action (230k EUR; declined) and by the Austrian FWF ESPRIT scheme (288k EUR) (Fellow since 03/2023)

- **Funding:** Partner on the META-REP initiative project "Analyzing reform proposals in an agent-based modeling approach" funded by the German Research Foundation (DFG) with 235k EUR (09/2021) and renewed with 266k EUR (09/2024)

- **Funding**: Co-applicant on the R&I project "Jointly Optimized Allocation of Functionality in Systems of Systems" funded by the Austrian Research Promotion Agency (FFG) with 700k EUR (11/2021);

- **Award / funding**: Postdoc Award (5,000 EUR) for initiating the project "Probing mental representations of arachnophobia-relevant stimuli: a spider is a spider is a spider?"; Faculty of Psychology; University of Vienna; Austria (06/2021)

- **Scientific service**: Co-organizer of the symposium "Enhancing replicability: standardising and optimising measurement in behavioural research" at the 2021 European Society for Cognitive and Affective Neuroscience (ESCAN) conference (held online, 06/2021).

- **Scientific service**: Lead organizer of the symposium "Optimal experimental design: developments and applications" at the 53rd Annual Meeting of the Society for Mathematical Psychology (held online, 07/2020). Co-organized with lead OED experts - J. Myung and M. Pitt. Symposium website (with talk recordings): https://sites.google.com/view/oed-symposium-mathpsych-2020/

- **Knowledge transfer**: Currently co-supervising 3 PhD students. Previously, co-supervised 11 MSc students during their master theses, semester projects, and internships.

- **Knowledge transfer**: Head lecturer for the new courses on "Meta-psychology" and "Emerging technologies in psychology" at the Faculty of Psychology; University of Vienna; Austria. Previously, teaching assistant for the in-person course (at the University of Zurich) and for the online courses in psychophysiology (https://bachlab.github.io/PsPM/courses/).

- **PhD fellowship**: Marie Curie early stage researchers realized within the NETT (Neural Engineering Transformative Technologies) ITN (01/09/2013 – 31/08/2016).

- **Invited talks**: "Optimizing experimental designs in cognitive sciences" (03/2022), Brain Meeting at the UCL Wellcome Centre for Human Neuroimaging (London, UK); "The role of replication studies in navigating epistemic landscapes" (01/2020), Workshop on the "Design and Analysis of Replication Studies" by the Center for Reproducible Science (Zurich , Switzerland); "Improving computational psychiatry through optimized experiments: Cutting edge ideas from the 1950s" (11/2019), Computational psychiatry seminar at the Max Planck UCL Centre for Computational Psychiatry and Ageing Research (London, UK).