

TOMASZ KORBAK

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INTERESTS

Machine learning: generative models, reinforcement learning, deep representation learning, natural language processing, reinforcement learning, Bayesian machine learning

Cognitive science: probabilistic models of cognition, compositionality, emergent communication

FEATURED WORK

1. Korbak, T., Zubek, J., Kuciński, Ł., Miłoś, P. & Rączaszek-Leonardi, J. (2019). Developmentally motivated emergence of compositional communication via template transfer. NeurIPS 2019 workshop “Emergent Communication: Towards Natural Language”.
2. Główka, K., Niklewski, M., Korbak, T., Zubek, J., Rączaszek-Leonardi, J. (2020). Emergence of Action-grounded Compositional Communication. 42nd Annual Virtual Meeting of the Cognitive Science Society.
3. Korbak, T., Zubek, J., Rączaszek-Leonardi, J. (2020). Measuring non-trivial compositionality in emergent communication. Submitted to NeurIPS 2020 workshop “Talking to Strangers: Zero-Shot Emergent Communication”.
4. Kuciński, Ł., Miłoś, P., Korbak, T., Kołodziej, P. (2020). Emergence of compositionality in communication over a noisy channel. Submitted to ICLR 2021.

RESEARCH EXPERIENCE

**Department of Informatics,
University of Sussex**

PhD researcher

September 2020 – September 2023

Working on biologically-inspired learning schemes for deep neural networks and probabilistic approaches to control with Dr. Christopher Buckley and Prof. Anil Seth.

**Human Interactivity and Language Lab,
Faculty of Psychology, University of Warsaw**

Research assistant

February 2019 – October 2020

Investigating compositional generalisation in neural networks models with Prof. Joanna Rączaszek-Leonardi.

**Institute of Philosophy and Sociology,
Polish Academy of Sciences**

Principal investigator

November 2016 – November 2020

Theoretical work on Bayesian approaches in computational neuroscience, representational learning in deep neural networks and enactive cognitive science under with Prof. Marcin Milkowski.

**Institute of Computer Science,
Polish Academy of Sciences**

Research intern

April 2017 — November 2017

Working on neural network-based tools for processing of Polish as part of Clarin-PL project, funded by the European Commission.

INDUSTRIAL EXPERIENCE

Sigmoidal, Machine Learning Engineer
Samsung R&D, Junior NLP Engineer
Intelclinic, Python Developer
Webinterpret, Junior Python Developer Intern

June 2018 — August 2020
April 2017 — December 2017
December 2015 — March 2017
July 2015 — September 2015

EDUCATION

PhD in Informatics, University of Sussex, UK *2020 – 2023*
MSc in Cognitive Science, University of Warsaw, Poland *2016 – 2019*
BSc in Cognitive Science, University of Warsaw, Poland *2013 – 2016*
BAs in Philosophy, University of Warsaw, Poland *2012 – 2015*

ADDITIONAL TRAINING

Diverse Intelligences Summer Institute, University of California, Los Angeles *2020*
Bayesian Methods in Deep Learning, National Research University (Moscow) *2018*
School of Pioneers (tech entrepreneurship workshops), University of Cambridge *2018*
Computational Psychiatry Course, ETH (Zurich) *2017*

PAPERS

1. Korbak, T., Zubek, J., Kuciński, Ł., Miłoś, P. & Rączaszek-Leonardi, J. (2019). Developmentally motivated emergence of compositional communication via template transfer. NeurIPS 2019 workshop “Emergent Communication: Towards Natural Language”.
2. Korbak, T. (2019). Computational enactivism under the free energy principle. *Synthese*.
3. Korbak, T. (2019). Unsupervised learning and the natural origins of content. *Avant*.
4. Korzeniowski, R., Rolczyński, R., Sadownik, P., Korbak, T. & Możejko, M. (2019). Exploiting Unsupervised Pre-training and Automated Feature Engineering for Low-resource Hate Speech Detection in Polish. *Proceedings of the PolEval 2019 Workshop*.
5. Korbak, T. & Żak, P. (2017). Fine-tuning Tree-LSTM for phrase-level sentiment classification on a Polish dependency treebank. *Proceedings of the 8th Language & Technology Conference (LTC 2017)*.
6. Korbak, T. (2015). Scaffolded Minds and the Evolution of Content in Signaling Pathways. *Studies in Logic, Grammar and Rhetoric*, 41 (54).
7. Korbak, T. (2015). Apercpcja transcendentalna w kantowskim modelu epigenezy czystego rozumu [Transcendental apperception in the Kantian model of the epigenesis of pure reason]. *Przegląd Filozoficzny – Nowa Seria*, 3 (95), p. 125-142.

CONFERENCE TALKS AND POSTERS

1. Główka, K., Niklewski, M., Korbak, T., Zubek, J., Rączaszek-Leonardi, J. (2020). Emergence of Action-grounded Compositional Communication. 42nd Annual Virtual Meeting of the Cognitive Science Society.
2. Korbak, T. (2019). A developmentally-inspired approach to compositional communication in signaling games. ML in PL conference, Warsaw, Poland
3. Korbak, T. (2019). Emergent compositional communication in generalized signaling games. 8th Peripatetic Conference on Modeling Cognitive Systems. Kiry, Poland.

4. Korbak, T. (2018). Evaluating the scalability of deep active inference. 7th Peripatetic Conference on Modeling Cognitive Systems. Mała Ciche, Poland.
5. Korbak, T. (2018). Po co nam zasada minimalizacji energii swobodnej? [Why do we need the Free Energy Principle?] Predictive processing: prospects and limitations. Warsaw, Poland (invited talk).
6. Korbak, T. (2017). Free energy principle as a model of biological and cognitive self-organization. 6th Peripatetic Conference on Modeling Cognitive Systems. Kiry, Poland.

SKILLS

Python (web frameworks and data science ecosystem), C++, PyTorch, tensorflow, git, Docker, Kubernetes, slurm, cloud computing, GNU/Linux, L^AT_EX

AWARDS AND FELLOWSHIPS

Leverhulme Doctoral Scholarship (Leverhulme Trust)	<i>2020-2023</i>
Diverse Intelligences Summer Institute Fellowship (Templeton Foundation)	<i>2020</i>
Collegium Invisibile Fellowship	<i>2017 – present</i>
Minister of Science and Higher Education (Poland) scholarship for exceptional students	<i>2016</i>
Diamond grant award (Ministry of Science and Higher Education, Poland) (168 000 PLN)	<i>2016 – 2020</i>

ACADEMIC SERVICE

Member of the organizing committee of International Association for Computing and Philosophy conference, Warsaw, 21–23 June 2018.

REFERENCES

Prof. Joanna Rączaszek-Leonardi
 Faculty of Psychology, University of Warsaw
 raczasze@psych.uw.edu.pl
 Role: MSc advisor

Prof. Piotr Miłoś
 Institute of Mathematics, Polish Academy of Science
 pmilos@mimuw.edu.pl
 Role: MSc advisor

Prof. Marcin Milkowski
 Institute of Philosophy and Sociology, Polish Academy of Science
 marcin.milkowski@gmail.com
 Role: BAs advisor, tutor, project supervisor