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[Google Scholar](#)

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EDUCATION

PHD IN COMPUTATIONAL NEUROSCIENCE AND MACHINE LEARNING

UCL, Gatsby Unit

Supervisor: Peter Dayan

Thesis: Palimpsest Working Memory

MSC IN COMPUTER SCIENCE / BIOCOMPUTING

Ecole Polytechnique Federal de Lausanne (EPFL)

SKILLS

Python / Lua / C++ / Java / Scala / Matlab

Tensorflow / Jax / PyTorch / scikit-learn

Apache Beam

GPU / TPU accelerators

Distributed large scale training systems

Generative AI and models

Computer Vision

Unsupervised structure learning

Deep Reinforcement Learning

Embedded low-cost robotics

LOIC MATTHEY

STAFF RESEARCH SCIENTIST

I am an ex-Neuroscientist with 10 years experience in Machine Learning and Artificial Intelligence, currently at **Google DeepMind**.

I have led several high stake and high-impact research projects, opening up novel research areas in generative models and RL. I have a deep technical background, wearing both tech lead and research lead hats, managing and mentoring other scientists and engineers. I deeply care about details and fostering a healthy team environment.

EXPERIENCE

STAFF RESEARCH SCIENTIST

Google DeepMind

2020 - Present

- Research lead / Tech lead / Management (~10 Scientists / Engineers).
 - Topics: model-based RL with generative models and Transformer world models / Video generative models and diffusion models / VLMs scene understanding / Synthetic data augmentation
- Model building, training and optimization for large-scale distributed systems.
- Integration testing and debugging.
- Analysis, papers written and presentation to core stakeholders.

SENIOR RESEARCH SCIENTIST

Google DeepMind

2018 - 2020

- Research lead and core contributor (~3 Scientists/Engineers)
- Field defining research, environment development (Unity, Quake Engine), benchmarks and advanced data collection.
- Deep Reinforcement Learning research (model-free, model-based, planning, curiosity-based exploration), episodic object category learning

RESEARCH SCIENTIST

Google DeepMind

2014 - 2018

- Core research on concepts and generative models that led to boom in disentanglement representation research sub-field
 - Co-author of β -VAE (4400 citations), SCAN, MONet, IODINE & others
- Released community-standard datasets and evaluation designs: dSprites, Multi-Objects

R&D ENGINEER

EPFL

2008 - 2009

- Research on swarm robotics with low-cost components and low-quality sensors.
- C / C++ embedded systems framework

AWARDS

Annaheim Foundation Prize

EPFL Excellency Scholarship

Swiss Informatics Society Prize

REVIEWING

ICLR (outstanding reviewer awards)

NeurIPS (best reviewer awards)

ICML

AAAI

JMLR

TMLR

OTHER EXPERIENCE

Goodenough College societies

Music society (budgets, sound tech)

Members Council (community & welfare, student support, fund allocation)

Polymanga & Japan Impact conventions

Executive committee, led creation of first editions. Budgets: 30000 - 50000 CHF, 6000 visitors. Business contacts / Logistics / Volunteer team management

Portals festival & all-dayers

Organization, merch and sound tech for alternative/experimental rock music concerts

PATENTS

Training variational autoencoders to generate disentangled latent factors, *US US10643131B1*

Learning visual concepts using neural networks, *WO EP US US11769057B2*

Unsupervised learning of object representations from video sequences using attention over space and time, *WO CN KR WO2022248712A1*

SELECTED PUBLICATIONS

SODA: Bottleneck Diffusion Models for Representation Learning, D. Hudson, D. Zoran, M. Malinowski, A. Lampinen, A. Jaegle, J. McClelland, **L. Matthey**, F. Hill, A. Lerchner, *CVPR 2023*, *Under review*, 2023

Evaluating VLMs for Score-based, Multi-Probe Annotation of 3D objects, R. Kabra, **L. Matthey**, A. Lerchner, NJ Mitra, *NeurIPS 2023 Workshop on SyntheticData4ML*, 2023

Combining Behaviors with the Successor Features Keyboard, W. Carvalho, A. Saraiva, A. Filos, A. Lampinen, **L. Matthey**, R. Lewis, H. Lee, S. Singh, D. Rezende, D. Zoran, *37th Conference on Neural Information Processing Systems (NeurIPS 2023)*.

SIMONE: View-Invariant, Temporally-Abstracted Object Representations via Unsupervised Video Decomposition, R. Kabra, D. Zoran, G. Erdogan, **L. Matthey**, A. Creswell, M. Botvinick, A. Lerchner, C. Burgess, *35th Conference on Neural Information Processing Systems (NeurIPS 2021)*.

COBRA: Data-efficient Model-Based RL through unsupervised object discovery and curiosity-driven exploration, N. Watters, **L. Matthey**, M. Bosnjak, C. Burgess, A. Lerchner, *arXiv*, 2019

Multi-Object Representation Learning with Iterative Variational Inference, K. Greff, R. Kaufmann, R. Kabra, N. Watters, C. Burgess, Z. Daniel, **L. Matthey**, M. Botvinick, A. Lerchner, *Proceedings of the 36th International Conference on Machine Learning (ICML 2019)*, 2019

MONet: Unsupervised Scene Decomposition and Representation, C. Burgess, **L. Matthey**, N. Watters, R. Kabra, I. Higgins, M. Botvinick, A. Lerchner, *arXiv*, 2019

Spatial Broadcast Decoder: A simple architecture for learning disentangled representations in VAEs, N. Watters, **L. Matthey**, C. Burgess, A. Lerchner, *ICLR 2019 Workshop on Learning from Limited Labeled Data*, 2019

Towards a definition of disentangled representations, I. Higgins, D. Amos, D. Pfau, S. Racaniere, **L. Matthey**, D. Rezende, A. Lerchner, *arXiv*, 2018

Life-long disentangled representation learning with cross-domain latent homologies, A. Achille, T. Eccles, **L. Matthey**, C. Burgess, N. Watters, A. Lerchner, I. Higgins, *Advances in Neural Information Processing Systems (NeurIPS 2018)*

Understanding disentangling in β -VAE, C. Burgess, I. Higgins, A. Pal, **L. Matthey**, N. Watters, G. Desjardins, A. Lerchner, *2017 NIPS Workshop on Learning Disentangled Representations*, 2018

DARLA: Improving zero-shot transfer in reinforcement learning, I. Higgins, A. Pal, A. Rusu, **L. Matthey**, C. Burgess, A. Pritzel, M. Botvinick, C. Blundell, A. Lerchner, *Proceedings of the 34th International Conference on Machine Learning (ICML 2017)*

SCAN: Learning hierarchical compositional visual concepts, I. Higgins, N. Sonnerat, **L. Matthey**, A. Pal, C. Burgess, M. Bosnjak, M. Shanahan, M. Botvinick, D. Hassabis, A. Lerchner, *arXiv*, 2017

beta-vae: Learning basic visual concepts with a constrained variational framework, I. Higgins, **L. Matthey**, A. Pal, C. Burgess, X. Glorot, M. Botvinick, S. Mohamed, A. Lerchner, *International conference on learning representations (ICLR 2017)*, 2017

dSprites: Disentanglement testing Sprites dataset, **L. Matthey**, I Higgins, D Hassabis, A Lerchner, <https://github.com/deepmind/dsprites-dataset>

A probabilistic palimpsest model of visual short-term memory, **L. Matthey**, P. Bays, P. Dayan, *PLoS computational biology*, 2015

Aggregation-mediated collective perception and action in a group of miniature robots, G. Mermoud, **L. Matthey**, W. Evans, A. Martinoli, *Proceedings of the 9th International Conference on Autonomous Agents and Multiagent Systems (AAMAS-2010)*, 2010

Stochastic strategies for a swarm robotic assembly system, **L. Matthey**, S. Berman, V. Kumar, *2009 IEEE International Conference on Robotics and Automation*, 2009

Experimental study of limit cycle and chaotic controllers for the locomotion of centipede robots, **L. Matthey**, L. Righetti, A. Ijspeert, *2008 IEEE/RSJ International Conference on Intelligent Robots and Systems*, 2008

A comparison of casting and spiraling algorithms for odor source localization in laminar flow, T. Lochmatter, X. Raemy, **L. Matthey**, S. Indra, A. Martinoli, *2008 IEEE International Conference on Robotics and Automation*, 2008