

*Curriculum Vitae*

**SJOERD VAN STEENKISTE**

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**EDUCATION**

PhD in Informatics (Artificial Intelligence), 2020  
Thesis: “Learning Structured Neural Representations for Visual Reasoning Tasks”  
Advisor: Jürgen Schmidhuber  
Internal Committee: Cesare Alippi, Natasha Sharygina  
External Committee: Leslie Kaelbling, Michael Mozer, Bernhard Schölkopf  
Dalle Molle Institute for Artificial Intelligence (IDSIA)  
(via Università della Svizzera italiana, USI, Switzerland)

MSc *summa cum laude* in Artificial Intelligence, 2016  
Maastricht University, Netherlands

MSc *summa cum laude* in Operations Research, 2015  
Maastricht University, Netherlands

BSc *cum laude* in Knowledge Engineering, 2013  
Maastricht University, Netherlands

**ACADEMIC POSITIONS**

Postdoctoral Researcher, Dalle Molle Institute for Artificial Intelligence (IDSIA), 2021

**INDUSTRIAL POSITIONS**

Research Scientist, Google Research, 2021–*present*  
Scientific Advisor (part-time), AtonRâ Partners, 2015–2021  
Student Researcher, Google Brain, 2020  
Research Intern, Google Brain, 2018  
Research Intern, NNAISENSE, 2016  
Research Intern, AtonRâ Partners, 2014

**HONORS**

NVAIL Pioneering Research Award, 2017.  
Maastricht University Student Prize, 2015.

## BEST PAPER AWARDS

- Outstanding paper award (with M. Chang, K. Greff, and J. Schmidhuber), NIPS Workshop on Cognitively Informed Artificial Intelligence, 2017.
- Best master thesis award in Operations Research, Department of Knowledge Engineering, Maastricht University, 2015.
- Best bachelor thesis award (2<sup>nd</sup>) in Knowledge Engineering, Department of Knowledge Engineering, Maastricht University, 2013.

## GRANTS

- Developed grant proposal “NEUSYM” (SNF project 200021\_192356) with two collaborators, which was awarded to Jürgen Schmidhuber by the Swiss National Science Foundation, funded to the tune of 670'000 CHF (about 700K USD), 2020

## PROFESSIONAL ACTIVITIES

### ORGANIZATION

- Workshop Co-organizer (with William Agnew, Rim Assouel, Michael Chang, Antonia Creswell, Eliza Kosoy, Aravind Rajeswaran), “Object Representations for Learning and Reasoning”, *Neural Information Processing Systems (NeurIPS)*, 2020
- Workshop Co-organizer (with Sungjin An, Adam Kosiosek, Jessica Hamrick, Yoshua Bengio), “Object-Oriented Learning: Perception, Representation, and Reasoning”, *International Conference on Machine Learning (ICML)*, 2020

### VOLUNTEERING

- “Newcomer’s Initiative”, *International Conference on Machine Learning (ICML)*, 2020

### REVIEWING

- Conference Reviewer: ICML 2019 (*top 5% reviewer*), NeurIPS 2019 (*top 400 reviewer*), ICML 2020 (*top 33% reviewer*), NeurIPS 2020 (*top 10% reviewer*), ICLR 2021 (*reviewer award*), ICML 2021 (*expert reviewer, top 10% reviewer*), NeurIPS 2021, ICLR 2022 (*highlighted reviewer*), ICML 2022, NeurIPS 2022, NeurIPS 2022 Workshop proposals, ICML 2023, NeurIPS 2023 (*top reviewer*)
- Conference Area Chair: ICLR 2024, ICML 2024
- Journal Reviewer: IEEE RA-L 2021, IJCV 2021, TMLR 2022–2023, IEEE TPAMI 2023
- Grant Expert Reviewer: NSC Poland PRELUDIUM 2021

## JOURNAL ARTICLES

- [3] Gopalakrishnan, A., Irie, K., Schmidhuber, J. & van Steenkiste, S. “Unsupervised Learning of Temporal Abstractions with Slot-based Transformers”. *Neural Computation* 35.4 (2023), pp. 593–626.

- [2] Karel, J. M., **van Steenkiste**, S. & Peeters, R. L. “The Design of Matched Balanced Orthogonal Multiwavelets”. *Frontiers in Applied Mathematics and Statistics* (2022), p. 84.
- [1] **van Steenkiste**, S., Kurach, K., Schmidhuber, J. & Gelly, S. “Investigating object compositionality in generative adversarial networks”. *Neural Networks* 130 (2020), pp. 309–325.

## REFEREED CONFERENCE PROCEEDINGS

\* = equal (technical) contribution, † = equal advising

- [16] Jabri\*, A., **van Steenkiste\***, S., Hoogetboom, E., Sajjadi, M. S. & Kipf, T. “DORSal: Diffusion for Object-centric Representations of Scenes et al.” *International Conference on Learning Representations* (2024).
- [15] Seitzer, M., **van Steenkiste**, S., Kipf, T., Greff, K. & Sajjadi, M. S. “DyST: Towards Dynamic Neural Scene Representations on Real-World Videos”. *International Conference on Learning Representations* (2024). **Spotlight Presentation.**
- [14] Biza, O., **van Steenkiste**, S., Sajjadi, M. S., Elsayed†, G. F., Mahendran†, A. & Kipf†, T. “Invariant Slot Attention: Object Discovery with Slot-Centric Reference Frames”. *International Conference on Machine Learning (ICML)* (2023).
- [13] Prabhudesai, M., Goyal, A., Paul, S., **van Steenkiste**, S., Sajjadi, M. S., Aggarwal, G., Kipf, T., Pathak, D. & Fragkiadaki, K. “Test-time adaptation with slot-centric models”. *International Conference on Machine Learning (ICML)* (2023).
- [12] Dehghani\*, M., Djolonga\*, J., Mustafa\*, B., Padlewski\*, P., Heek\*, J., Gilmer, J., Steiner, A., Caron, M., Geirhos, R., Alabdulmohsin, I., Jenatton, R., Beyer, L., Tschannen, M., Arnab, A., Wang, X., Riquelme, C., Minderer, M., Puigcerver, J., Evci, U., Kumar, M., **van Steenkiste**, S., Elsayed, G. F., Mahendran, A., Yu, F., Oliver, A., Huot, F., Bastings, J., Collier, M. P., Gritsenko, A., Birodkar, V., Vasconcelos, C., Tay, Y., Mensink, T., Kolesnikov, A., Pavetić, F., Tran, D., Kipf, T., Lučić, M., Zhai, X., Keyser, D., Harmsen, J. & Houlsby\*, N. “Scaling Vision Transformers to 22 Billion Parameters”. *International Conference on Machine Learning (ICML)* (2023). **Oral Presentation.**
- [11] Elsayed\*, G., Mahendran\*, A., **van Steenkiste\***, S., Greff, K., Mozer, M. C. & Kipf\*, T. “Savi++: Towards end-to-end object-centric learning from real-world videos”. *Advances in Neural Information Processing Systems (NeurIPS)* 35 (2022), pp. 28940–28954.
- [10] Sajjadi, M. S., Duckworth\*, D., Mahendran\*, A., **van Steenkiste\***, S., Pavetić, F., Lučić, M., Guibas, L. J., Greff, K. & Kipf\*, T. “Object scene representation transformer”. *Advances in Neural Information Processing Systems (NeurIPS)* 35 (2022), pp. 9512–9524.
- [9] Ramesh, A., Kirsch, L., **van Steenkiste**, S. & Schmidhuber, J. “Exploring through Random Curiosity with General Value Functions”. *Advances in Neural Information Processing Systems (NeurIPS)* 35 (2022), pp. 18733–18748.
- [8] Gopalakrishnan, A., **van Steenkiste**, S. & Schmidhuber, J. “Unsupervised Object Keypoint Learning using Local Spatial Predictability”. *International Conference on Learning Representations (ICLR)* (2021). **Spotlight Presentation.**

- [7] Csordás, R., **van Steenkiste**, S. & Schmidhuber, J. “Are Neural Nets Modular? Inspecting Functional Modularity Through Differentiable Weight Masks”. *International Conference on Learning Representations (ICLR)* (2021).
- [6] Stanić, A., **van Steenkiste**, S. & Schmidhuber, J. “Hierarchical relational inference”. *Proceedings of the AAAI Conference on Artificial Intelligence* 35.11 (2021), pp. 9730–9738.
- [5] Kirsch, L., **van Steenkiste**, S. & Schmidhuber, J. “Improving Generalization in Meta Reinforcement Learning using Learned Objectives”. *International Conference on Learning Representations (ICLR)* (2020). **Spotlight Presentation**.
- [4] **van Steenkiste**, S., Locatello, F., Schmidhuber, J. & Bachem, O. “Are disentangled representations helpful for abstract visual reasoning?” *Advances in Neural Information Processing Systems (NeurIPS)* 32 (2019).
- [3] **van Steenkiste**, S., Chang, M., Greff, K. & Schmidhuber, J. “Relational neural expectation maximization: Unsupervised discovery of objects and their interactions”. *International Conference on Learning Representations (ICLR)* (2018).
- [2] Greff\*, K., **van Steenkiste\***, S. & Schmidhuber, J. “Neural expectation maximization”. *Advances in Neural Information Processing Systems (NIPS)* 30 (2017).
- [1] **van Steenkiste**, S., Koutník, J., Driessens, K. & Schmidhuber, J. “A wavelet-based encoding for neuroevolution”. *Proceedings of the Genetic and Evolutionary Computation Conference (GECCO) 2016* (2016), pp. 517–524.

## REFEREED WORKSHOP PAPERS

\* = equal (technical) contribution, † = equal advising

- [13] Wu, Y.-F., Greff, K., Elsayed, G. F., Mozer, M. C., Kipf, T. & **van Steenkiste**, S. “Inverted-Attention Transformers can Learn Object Representations: Insights from Slot Attention”. *NeurIPS Workshop on Unifying Representations in Neural Models & NeurIPS Workshop on Causal Representation Learning* (2023).
- [12] Biza, O., **van Steenkiste**, S., Sajjadi, M. S., Elsayed, G. F., Mahendran†, A. & Kipf†, T. “Spatial Symmetry in Slot Attention”. *NeurIPS Workshop on Symmetry and Geometry in Neural Representations* (2022).
- [11] Prabhudesai, M., Paul, S., **van Steenkiste**, S., Sajjadi, M. S., Goyal, A., Pathak, D., Fragkiadaki, K., Aggarwal†, G. & Kipf†, T. “Test-time adaptation with slot-centric models”. *Sixth Workshop on Meta-Learning at the Conference on Neural Information Processing Systems & NeurIPS Workshop on Distribution Shifts: Connecting Methods and Applications* (2022).
- [10] Gopalakrishnan, A., Irie, K., Schmidhuber, J. & **van Steenkiste**, S. “Unsupervised Learning of Temporal Abstractions with Slot-based Transformers”. *NeurIPS workshop on Offline Reinforcement Learning & NeurIPS Workshop on Deep Reinforcement Learning* (2021).
- [9] Ramesh, A., Kirsch, L., **van Steenkiste**, S. & Schmidhuber, J. “Exploring through Random Curiosity with General Value Functions”. *NeurIPS Workshop on Deep Reinforcement Learning & 5th Multidisciplinary Conference on Reinforcement Learning and Decision Making (RLDM2022)* (2021).

- [8] Csordás, R., **van Steenkiste**, S. & Schmidhuber, J. “Are Neural Nets Modular? Inspecting Their Functionality Through Differentiable Weight Masks”. *ICML Workshop on Human Interpretability in Machine Learning (WHI)* (2020). **Spotlight Presentation.**
- [7] Gopalakrishnan, A., **van Steenkiste**, S. & Schmidhuber, J. “Unsupervised Object Keypoint Learning using Local Spatial Predictability”. *ICML Workshop on Object-Oriented Learning: Perception, Representation, and Reasoning* (2020). **Spotlight Presentation.**
- [6] Stanić, A., **van Steenkiste**, S. & Schmidhuber, J. “Hierarchical relational inference”. *ICML Workshop on Object-Oriented Learning: Perception, Representation, and Reasoning & ICML Workshop on Bridge Between Perception and Reasoning: Graph Neural Networks & Beyond* (2020).
- [5] **van Steenkiste\***, S., Greff\*, K. & Schmidhuber, J. “A perspective on objects and systematic generalization in model-based RL”. *ICML Workshop on Generative Modeling and Model-Based Reasoning for Robotics and AI.* (2019). **Oral Presentation.**
- [4] Unterthiner\*, T., **van Steenkiste\***, S., Kurach, K., Marinier, R., Michalski, M. & Gelly, S. “FVD: A new metric for video generation”. *ICLR Workshop on Deep Generative Models for Highly Structured Data* (2019).
- [3] **van Steenkiste**, S., Kurach, K. & Gelly, S. “A case for object compositionality in deep generative models of images”. *NeurIPS workshop on Modeling the Physical World: Learning, Perception, and Control & NeurIPS workshop on Relational Representation Learning* (2018).
- [2] **van Steenkiste**, S., Chang, M., Greff, K. & Schmidhuber, J. “Relational Neural Expectation Maximization”. *NIPS workshop on Cognitively Informed Artificial Intelligence* (2017). **Oral Presentation.**
- [1] Greff\*, K., **van Steenkiste\***, S. & Schmidhuber, J. “Neural Expectation Maximization”. *ICLR Workshop* (2017).

## TECHNICAL REPORTS

\* = equal (technical) contribution, † = equal advising

- [5] Sun\*, J., Fu\*, D., Hu\*, Y., Wang, S., Rassin, R., Juan, D.-C., Alon, D., Herrmann, C., **van Steenkiste**, S., Krishna, R. & Rashtchian, C. “Dreamsync: Aligning text-to-image generation with image understanding feedback”. *arXiv preprint arXiv:2311.17946* (2023).
- [4] Eisape, T., Tessler, M., Dasgupta, I., Sha, F., **van Steenkiste**†, S. & Linzen†, T. “A systematic comparison of syllogistic reasoning in humans and language models”. *arXiv preprint arXiv:2311.00445* (2023).
- [3] Petty, J., **van Steenkiste**, S., Dasgupta, I., Sha, F., Garrette, D. & Linzen, T. “The Impact of Depth and Width on Transformer Language Model Generalization”. *arXiv preprint arXiv:2310.19956* (2023).
- [2] Greff, K., **van Steenkiste**, S. & Schmidhuber, J. “On the binding problem in artificial neural networks”. *arXiv preprint arXiv:2012.05208* (2020).
- [1] Unterthiner\*, T., **van Steenkiste\***, S., Kurach, K., Marinier, R., Michalski, M. & Gelly, S. “Towards accurate generative models of video: A new metric & challenges”. *arXiv preprint arXiv:1812.01717* (2018).

## PRESENTATIONS

- “DORSal: Diffusion for Object-Centric Representations of Scenes et al.” (2023), BayLearn - Machine Learning Symposium
- “Representation Learning for Relational Reasoning” (2020), Stanford Neuroscience and Artificial Intelligence Laboratory (NeuroAILab)
- “Incorporating Objects in Neural Networks” (2019), Max Planck Institute for Intelligent Systems (Tübingen)
- “A Perspective on Objects and Systematic Generalization in Model-Based RL” (2019), ICML Workshop on Generative Modeling and Model-Based Reasoning for Robotics and AI
- “Relational Neural Expectation Maximization” (2017), NIPS Workshop on Cognitively Informed Artificial Intelligence
- “Symbol-like Representation Learning with Neural Expectation Maximization” (2017), Google Brain (Zürich office)