

# Curriculum vitae

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## PERSONAL INFORMATION

Butz, Martin V.

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Date of birth: August 4th 1975

Nationality: German

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## EDUCATION

- 2004 PhD in Computer Science  
University of Illinois at Urbana-Champaign, IL, USA
- 2001 Diploma in Computer Science, minor in psychology (equiv. MSc, with distinction)  
Faculty of Mathematics and Computer Science, University of Würzburg, Germany

## CURRENT POSITIONS

- 2011 – Full Professor (W3) in Cognitive Modeling, **Dep. of Computer Science & Dep. of Psychology, Faculty of Science, University of Tübingen**, Germany
- 2012 – Departmental coordinator of the cognitive science and computer science outgoing Erasmus programs, University of Tübingen
- 2016 – Dean of studies for the BSc and MSc programs in cognitive science, University of Tübingen
- 2017 – Faculty member of IMPRS-Intelligent Systems graduate school, Tübingen
- 2018 – PI in Cluster of Excellence on Machine Learning in the Sciences, University of Tübingen
- 2022 – Head of the Cognitive Science Center, University of Tübingen
- 2022 – Vice-president of German cognitive science society (GKev), Germany

## PREVIOUS POSITIONS

- 09/2017 – 03/2018 Visiting Professor, University of Otago, Dunedin, New Zealand
- 04/2016 – 10/2016 Paternity leave (50%)
- 09/2007-08/2011 Assistant Professor (Emmy-Noether Group Leader), Cognitive Psychology & Artificial Intelligence, University of Würzburg, Germany (Emmy-Noether project: Cognitive Bodyspaces: Learning and Behavior)
- 08/2005-12/2005 Visiting Assistant Professor, University of Missouri – St.Louis, MO, USA.
- 10/2004-08/2007 Post-doctoral researcher, Cognitive Psychology, University of Würzburg, Germany. (EU project: MindRACES: From Reactive to Anticipatory Cognitive Embodied Systems)

## FELLOWSHIPS AND AWARDS (2013-2023)

- 2023 Editor's Highlight of our 2022 article in the Water Resources Research journal with T. Praditia, M. Karlbauer, S. Otte, S. Oladyshkin, & W. Nowak
- 2022 ICDL 2022, SmartBot Challenge Winner, with C. Gumbsch, M. Adam, B. Elsner, & G. Martius

- 2019 Best paper award at ICANN 2019 with S. Otte & P. Rubisch
- 2017 Feodor Lynen Research Fellowship, Alexander von Humboldt Foundation, “Modeling normal and altered spatial memory and behavior with free energy-based formalizations of dynamic event predictive encodings”
- 2016 Best conference paper award at KogWis 2016 with J. Lohmann
- 2016 Best GKey young researcher paper award, German Cognitive Science Society, with F. Schrodte.
- 2015 People’s Choice Award at AAAI-15 Video Competition with Fabian Schrodte & Stephan Ehrenfeld. Video: Mario Lives!, 1.17M Views on YouTube in 2015.

## **ORGANIZATION OF SCIENTIFIC MEETINGS (2013-2023)**

- 2018 CONNECT Workshop (Computational Neuroscience of Event Cognition) in Dunedin, Otago University, New Zealand (co-organizer).
- 2016 CIN-Workshop on “Conscious Artificial Systems” in Tübingen, Germany (main organizer).
- 2016 VECTOR Workshop (Virtual environments: Current topics in psychological research) in Tübingen, Germany (co-organizer).
- 2014 12th Biannual Conference of the German Cognitive Science Society in Tübingen, Germany, 29.9.-2.10.2014 (KogWis 2014).
- 2013 – 2016 Student-Volunteer Chair for the International Cognitive Science conference (CogSci)

## **SUPERVISION OF GRADUATE STUDENTS AND POSTDOCTORAL FELLOWS (2013-2023)**

- 2016 – 2023 Sebastian Otte – Post-Doctoral Researcher, PhD in 12/2017. beginning 09/2023: Associate Professor (W2) in Robotics, University of Lübeck.
- 2019 – 2023 Asya Achimova – Post-Doctoral Researcher, Now: Emmy Noether research group leader (granted 04/2023).
- 2011 – 2019 Anna Belardinelli – Habilitation in Cognitive Science, 2019: “The objects of attention: from looking to acting”, University of Tübingen, Germany
- 2008 – 2014 Oliver Herbort – Habilitation in Psychology, 2014: “Antizipation in sequenziellen Bewegungen”, University of Würzburg, Germany.
- 2013 – Supervision of 15 PhD students under main supervision (8 finished); Another 18 PhD students as second supervisor (7 finished)
- 2013 – Successful supervision of 116 BSc and 51 MSc theses in cognitive science and computer science.

## **TEACHING ACTIVITIES (2013-2023, all University of Tübingen)**

- 2012 – 2023 Cognitive Architectures, BSc standard mandatory class, cognitive science, yearly
- 2012 – 2023 Laboratory research projects, MSc elective, cognitive science, on demand individually, ongoing
- 2020 & 2022 Seminar on “AI, Future, & Society”, BSc and MSc standard seminar, cross-disciplinary
- 2021 & 2022 Generative & Recurrent Artificial Neural Networks, MSc standard elective class, computer-, cognitive science, & machine learning
- 2016 & 2018 Advanced Artificial Neural Networks, MSc standard elective class, computer- and cognitive science

- 2013– 2023 Cognitive Modeling, MSc standard mandatory class, cognitive science, 2013, 2015, 2018, since 2020- yearly
- 2013 Machine Learning of Behavior, MSc standard elective class, computer- and cognitive science
- 2013 – 2023 Seminar series on “Selected Topics in Cognitive Science”, MSc and BSc standard/mandatory elective seminar, Cognitive Science, yearly
- 2014 – 2018 Computer Science II, BSc extended mandatory class, computer and cognitive science, 2014, 2017, & 2018
- 2013 Computer Science I, BSc extended mandatory class, computer and cognitive science

## REVIEWING ACTIVITIES

Reviewer for ERC starting and advanced grants; more than twenty further grant proposals (including DFG); more than ten stipend proposals (including Humboldt foundation, Studienstiftung).

Regular reviewer for major international journals and conferences in machine learning and cognitive science (including NeurIPS and CogSci as well as more than 20 different journals over the last 10 years)

## MAJOR COLLABORATIONS

- Prof. Birgit Elsner, developmental psychology, University of Potsdam, Germany
- Prof. Stefan Kiebel, cognitive computational neuroscience, University of Dresden, Germany
- Prof. Andrea Kiesel, general psychology, University of Freiburg, Germany
- Prof. Katharina von Kriegstein, cognitive and clinical neuroscience, University of Dresden, Germany
- Prof. Barbara Landau, cognitive science, Johns Hopkins University, USA
- Prof. Pablo Lanillos Pradas, artificial cognitive systems, Radboud University, Nijmegen, NL
- Prof. Georg Martius, machine learning and robotics, University of Tübingen, Germany
- Prof. Wolfgang Nowak, modelling hydraulic and environmental systems, University of Stuttgart, Germany
- Prof. Hans-Christoph Nürk, diagnostics and cognitive neuropsychology University of Tübingen, Germany
- Prof. Bettina Rolke, evolutionary cognition, University of Tübingen, Germany
- Prof. Greg Scontras, language science, University of California, Irvine, USA
- Prof. Volker Wulfmeyer, physics and meteorology, University of Hohenheim, Germany

## Current Grants

Project Title	Funding source	Period	Role	Relation to the PI	Relation to this proposal
DeepSelf: Emergence of Event-Predictive Agency in Robots	DFG (German Research Foundation)	2022–2025	Main PI	(2 PIs)	Event-predictive inference in robots
Modeling and understanding spatiotemporal environmental interactions (MUSTEIN)	ML CoE, Mini-graduate school, Tübingen University	2021–2024	Main PI	(joint funding with 9 PIs)	not related
Neural generative weather forecasting	Cyber Valley, Tübingen	2021–2015	Main PI	(2 PIs)	not related
Interplay of amodal and modal encodings underlying directional space-metric associations	DFG (German Research Foundation), direct own part of CRU 2718	2020–2023	Main PI	(2 PIs)	VR experiments, inference with fixed representations
Modal and amodal cognition: Functions and interactions	DFG (German Research Foundation), Collaborative research unit CRU 2718	2020–2023	Co-PI	(16 PIs)	normative modeling (mostly psychological experiment)
Short-to-Mid scale weather forecasting with DNNs	EXC 2064, Intramural project, Tübingen University	2019–2023	Main PI	(4 PIs)	not related
Machine learning. New perspectives for science.	DFG (German Research Foundation), Cluster of Excellence EXC 2064	2019–2025	Co-PI	(25 PIs)	machine learning

# 10 years track-record

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## Publication Record

Publications in international peer-reviewed journals: 46 (since 2013) / 82 (total).

Further publications including conference and workshops contributions as well as chapters in edited books (all peer-reviewed) since 2013: 73 (since 2013) / 166 (total).

Google Scholar: Citations overall: 6954; h-index: 46; i10-index: 141

Web of Science: Citations overall: 1124; h-index: 18;

## Monograph

- Butz, M.V. & Kutter, E.F. (2017, January). *How the mind comes into being: Introducing cognitive science from a functional and computational perspective*. Oxford, UK: Oxford University Press.

## Special Issues

- Martin V. Butz, David Bilkey, & Alistair Knott. Event-predictive cognition: From sensorimotor via conceptual to language-based structures and processes (2021). *TOPIC in Cognitive Science*, 13(1), 1-298.
- Anna Belardinelli & Martin V. Butz (2014). 12th Biannual Conference of the German Cognitive Science Society (Gesellschaft für Kognitionswissenschaft). *Cognitive Processing*, 15, supplement 1.
- Oliver Sigaud, Martin V. Butz, Giovanni Pezzulo, Oliver Herbort, & Robert Campbell (2013). Special issue on anticipatory behavior. *New Ideas in Psychology*, 31, 3, 217-350.

## Ten Representative Publications

1. Achimova, A., Scontras, G., Stegemann-Philipps, C., Lohmann, J., & Butz, M. V. (2022). Learning about others: Modeling social inference through ambiguity resolution. *Cognition*, 218, 104862. doi: 10.1016/j.cognition.2021.104862
2. Butz, M. V. (2021). Towards strong AI. *Künstliche Intelligenz*, 35, 91–101. doi: 10.1007/s13218-021-00705-x
3. Butz, M. V., Achimova, A., Bilkey, D., & Knott, A. (2021). Event-predictive cognition: A root for conceptual human thought. *Topics in Cognitive Science*, 13, 10–24. doi: 10.1111/tops.12522
4. Butz, M. V., Bilkey, D., Humaidan, D., Knott, A., & Otte, S. (2019). Learning, planning, and control in a monolithic neural event inference architecture. *Neural Networks*, 117, 135-144. doi: 10.1016/j.neunet.2019.05.001
5. Eppe, M., Gumbsch, C., Kerzel, M., Nguyen, P. D. H., Butz, M. V., & Wernter, S. (2022). Intelligent problem-solving as integrated hierarchical reinforcement learning. *Nature Machine Intelligence*, 4, 11–20. doi: 10.1038/s42256-021-00433-9
6. Fabi, S., Otte, S., Scholz, F., Wührer, J., Karlbauer, M., & Butz, M. V. (2022). Extending the Omniglot challenge: Imitating handwriting styles on a new sequential dataset. *IEEE Transactions on Cognitive and Developmental Systems*. doi: 10.1109/TCDS.2022.3196179
7. Gumbsch, C., Adam, M., Elsner, B., & Butz, M. V. (2021). Emergent goal-anticipatory gaze in infants via event-predictive learning and inference. *Cognitive Science*, 45, e13016. doi: 10.1111/cogs.13016

8. Gumbsch, C., Butz, M. V., & Martius, G. (2021). Sparsely changing latent states for prediction and planning in partially observable domains. *Advances in Neural Information Processing System*, 34, 17518–17531. (NeurIPS - top-tier conference)
9. Karlbauer, M., Praditia, T., Otte, S., Oladyshkin, S., Nowak, W., & Butz, M. V. (2022). Composing partial differential equations with physics-aware neural networks. *Proceedings of the 39th International Conference on Machine Learning*, 162, 10773–10801. (ICML - top-tier conference)
10. Traub, M., Otte, S., Menge, T., Karlbauer, M., Thuemmel, J., & Butz, M. V. (2023). Learning what and where: Disentangling location and identity tracking without supervision. *The Eleventh International Conference on Learning Representations*. <https://openreview.net/forum?id=NeDc-Ak-H>. (ICRL - top-tier conference)

## Patent

- Andreas Alin, Martin V. Butz, Jannik Fritsch: EP 12150808. Vehicle with computing means for monitoring and predicting traffic participant objects.
- Sebastian Otte & Martin V. Butz: EP 3824412 A1 20210526 (EN). Method and apparatus for actively tuning a predictor to an input signal

## Invited Presentations

- April 2023: Cognitive science colloquium, Lund University, Sweden (online); Title: *Learning Interpretable Conceptual Structures from Sensorimotor Experiences*
- November 2022: ISIR colloquium Paris, UPMC, Sorbonne University, Paris; Title: *Learning and Exploiting Event-Predictive, Sensorimotor Grounded Structures*
- November 2022: Donders Institute, AI colloquium, Radboud University; Title: *Learning and Exploiting Event-Predictive, Sensorimotor Grounded Structures*
- June 2022: Colloquium Cognitive Systems, Ulm University (online); Title: *Potential Pathways to Strong AI*
- April 2022: MPI for Intelligent Systems, Tübingen; Intrinsically Motivated Open-Ended Learning, Invited Presentation; Title: *Developing Event-Predictive Gestalt Models for Perception and Behavior*
- November 2021: Fall School 2021, Bremen, Collaborative Research Center EASE: Everyday Activity in Science and Engineering (online); Title: *Event-Predictive Active Inference*
- 39 further invited presentations since 2013
- 73 further invited presentations at conferences and workshops (due to accepted, peer-reviewed contributions)

## Invited Participation

26-31.10.2014: Ernst Strüngman Forum on “Where’s the action? The pragmatic turn in cognitive science.” Frankfurt, Germany.

31.3.-04.04.2014: Dagstuhl Seminar 14142 on “Spatial references in the semantic web and in robotics.” Dagstuhl, Germany.

## Recent Public Outreach

- 17. January 2022: Podcast: AI and Us—What Artificial Intelligence Means for our Lives, [Alexander von Humboldt Foundation](#), C. Becker-Asano, **M. Butz**, M. Gašić, T. Matzner, D. Rückert, A. van Wynsberghe
- 4. May 2023: Public panel discussion: How our digital lives change our brains [Wie der digitale Alltag unser Gehirn verändert], Herrenhäuser Forum, Hannover, Germany, J. Brailovskaia, M. Butz, M. Korte, A. Schröder-Wrusch; Moderator: Vera Linss ([Report and Video online](#))

### **Recent advisory achievements**

- April 2023: Post-doctoral researcher (and previously PhD student) of my team Dr. Sebastian Otte accepts the offer as an Associate Professor (W2) in Robotics at the University of Lübeck.
- April 2023: Post-doctoral researcher Dr. Anna Achimova of my team has received an Emmy Noether research group funding (1.2M€, 6 years) from the German Research Foundation (DFG)