CRC/Transregio TRR 169
Crossmodal Learning: Adaptivity, Prediction and Interaction

CML Online Autumn School 2021
1st to 12th November 2021

- **Zoom Online Meeting**
  Meeting-ID: 658 4278 4028; Passcode: CML_BJ_HH
  https://uni-hamburg.zoom.us/j/65842784028?pwd=Z1NWV1ozRGZsWFNiL1R6aktyTXpEQT09

- **Time**
  01. Nov. - 12. Nov. 2021, one 2-hour slot per day,
  09-11 AM Germany Time, 16-18 PM China Time.

- **Overview**

CET	1. Nov.	2. Nov.	3. Nov.	4. Nov.	5. Nov.	CST
09:00–09:40	**Discussion**	**A6**	**B4**	**A1**	**A5**	16:00 –16.40
09:40–10:20	**Discussion**	**C7**	**B1**	**B5**	**B2**	16:40–17:20
10:20–11:00	**Discussion**	**B3**	**C4**	**A4**	**A3**	17:20–18:00

CET	8. Nov.	9. Nov.	10. Nov.	11. Nov.	12. Nov.	CST
09:00–09:40	**Shaoping Bai** 09:00–10:00	**C1**	**Z1+Z2**	**Igor Farkaš** 09:00–10:00	**Kazuhiro Kosuge** 09:00–10:00	16:00–16.40
09:40–10:20		**A2**	**Z3**			16:40–05:20
10:20–11:00	**C9** 10:00–11:00	**C8**	**General assembly**	**Zhaoping Li** 10:00–11:00	**Ren C. Luo** 10:00–11:00	17:20–18:00
15:00–17:00			~~Visit Informatics~~ *	~~Visit UKE~~ *	Zoom meeting **Hamburg PIs**	
18:00–20:00			~~Dinner Yu Garden~~ *			

* canceled on 09/Nov/2021 due to Covid concerns

Tuesday, November 2, 2021

Hamburg	Beijing	Project	Title
09:00–09:40	16:00–16:40	**A6**	**Deep learning for robust audio-visual processing** Xiaolin Hu, Simone Frintrop, Timo Gerkmann
09:40–10:20	16:40–17:20	**C7**	**Crossmodal learning for improving human reading** Xingshan Li, Qingqing Qu, Chris Biemann Jiayu Liu (CAS), Jianwen Wang (CAS, at UHH), Xintong Wang (UHH)
10:20–11:00	17:20–18:00	**B3**	**Neurocognitive mechanisms for transfer and generalization in implicit crossmodal learning** Qiufang Fu, Michael Rose Qiufang Fu: Multisensory Information Facilitates the Categorization of Untrained Stimuli Xunwei Sun: Multisensory transfer effects in rule-based and information integration category learning

Wednesday, November 3, 2021

Hamburg	Beijing	Project	Title
09:00–09:40	16:00–16:40	**B4**	**Brain dynamics of top-down control on crossmodal congruency** Xun Liu, Guido Nolte, Andreas Karl Engel Xun Liu: Overview Honghui Xu: Work for the PhD. Florian Göschl: The state of MEG experiment. Guido Nolte: Outlook: Methods development.
09:40–10:20	16:40–17:20	**B1**	**Modulation of neural mechanisms underlying crossmodal predictions** Andreas Karl Engel, Dan Zhang Andreas Engel: Overview of B1 progress Peng Wang: MEG studies of temporal prediction Rebecca Burke: Modulation of temporal predictions by tACS Alexander Maye: Modeling of temporal predictions
10:20–11:00	17:20–18:00	**C4**	**Neurocognitive models of crossmodal language learning** Cornelius Weber, Stefan Wermter, Zhiyuan Liu Zhiyuan Liu: C4 Introduction Ozan Özdemir: Embodied Language Learning with Paired Variational Autoencoders Jae Hee Lee: Compositional Generalization in Multimodal Language Learning Yuan Yao: Visual Distant Supervision for Scene Graph Generation Ao Zhang: Cross-modal Prompt Tuning for Pre-trained Vision-language Models

Thursday, November 4, 2021

Hamburg	Beijing	Project	Title
09:00–09:40	16:00–16:40	**A1**	**Adaptation of multisensory processing to changing priors and sensory evidence** Patrick Bruns, Brigitte Röder, Xiaolan Fu Patrick Bruns: Overview Alexander Kramer: Computational modeling of crossmodal spatial recalibration
09:40–10:20	16:40–17:20	**B5**	**Crossmodal transfer of dexterous manipulation skills** Jianwei Zhang, Fuchun Sun Chao Yang: In-hand Object Localization in Robotic Handover Task Yikai Wang: Vision-Lidar Object Localization in Robotic Scene Understanding Task Hongzhuo Liang: Multimodal reinforcement learning of multi-fingered grasping Michael: Playing Piano with Dexterous Robotic Hands
10:20–11:00	17:20–18:00	**A4**	**Crossmodal representation facilitating robust robot behaviour** Changshui Zhang, Yizhou Wang, Jianwei Zhang Prof. Yizhou Wang: Project updates & summary Philipp Ruppel: Direct Policy Optimization with Differentiable Physical Consistency for Dexterous Manipulation Haipeng Zhang: Sill-Net: Feature Augmentation with Separated Illumination Representation Niklas Fiedler: Deep Learning Based Classification of Clothes Kejuan Yang: Virtual reality environment for learning assistive dressing

Friday, November 5, 2021

Hamburg	Beijing	Project	Title
09:00–09:40	16:00–16:40	**A5**	**Neurorobotic models for crossmodal joint attention and social interaction** Stefan Wermter, Xun Liu Xun Liu and Stefan Wermter: Introduction/Overview: Neuro-robotic models for crossmodal joint attention and social interaction. Fares Abawi: Human attention and social cue integration Di Fu: Neurorobotic experiment for gaze-triggered crossmodal social attention using GASP model Hugo Carneiro: Detection of active speakers and their emotions

| 09:40–10:20 | 16:40–17:20 | B2 | **Crossmodal inference by conjoining probabilistic and symbolic models**
Jun Zhu, Jan Philipp Gläscher

Jun Zhu: Overview
Liyuan Wang: Continual learning. |
| 10:20–11:00 | 17:20–18:00 | A3 | **Crossmodal learning in health and neurological disease: neurocomputational representation and therapeutic application**
Christian Gerloff, Gui Xue |

Monday, November 8, 2021

Hamburg	Beijing	Project	Title
09:00–10:00	16:00–17:00		**Sensing and control of assistive exoskeleton systems** Shaoping Bai (Dept. of Materials and Production, Aalborg University, Denmark)
10:20–11:00	17:20–18:00	C9	**The role of mental models and sense of agency in learning crossmodal communicative acts** Jan Philipp Gläscher, Xiaolan Fu Speaker: Tatia Buidze, Ke Zhao

Tuesday, November 9, 2021

Hamburg	Beijing	Project	Title
09:00–09:40	16:00–16:40	C1	**Crossmodal active perception of human speech and its implication in social learning** Dan Zhang, Bo Hong, Guido Nolte Dan Zhang, Bo Hong, Guido Nolte: Overview Presentation: Crossmodal active perception of human speech and its implication in social learning Jiawei Li: Attention modulates the entrainment to the different features in speech in distinct ways Zhuoran Li: Speaker-Listener Neural Coupling Reveals an Adaptive Mechanism for Speech Comprehension in a Noisy Environment
09:40–10:20	16:40–17:20	A2	**Neural circuits for crossmodal memory** Ji-Song Guan, Claus C. Hilgetag Kaiyuan Liu: The engram-based laminar generative model for robust recognition Kaiyuan Liu: APP momentum adaptation facilitates memory-hybrid computation both in brain and in artificial neural network Dong Li: Dendrite connections govern activity patterns

Hamburg	Beijing	Project	Title
10:20–11:00	17:20–18:00	**C8**	**Crossmodal bindings and plasticity during visual-haptic interaction for novel forms of therapy** Lihan Chen, Simone Kühn, Frank Steinicke, Kunlin Wei Lihan Chen: Introduction of C8/Task 2 Xiao Lei: The Cognitive and Neural Mechanisms of the "Cutaneous Rabbit" Effect around Forearm Wenxiao Gong: The integration of Exter- and Inter-oception relieves acute pain Chunmiao Lou: Brain dynamics of attention engagement in tactile subitizing

Wednesday, November 10, 2021

Hamburg	Beijing	Project	Title
09:00–09:40	16:00–16:40	**Z1** **Z2**	**Management and coordination** Norman Hendrich **Integrated research training group** Alex Maye
09:40–10:20	16:40–17:20	**Z3**	**Integration initiatives for model software and robotic demonstrators** Matthias Kerzel: Social HRI Laboratory and Aiding Human Enhancement and Support Studies (Task 1. II-M) Philipp Ruppel: Physical Collaboration Laboratory and Aiding Human Enhancement and Support Studies (Task 2. II-R) Burhan Hafez: Robotic Platform for Social Communication (Task 3. II-M) Yannick Jonetzko & Shuang Li: Robotic Platform for Physical Collaboration (Task 4. II-R)
10:20–11:00	17:20–18:00		**General Assembly** Jianwei Zhang, Stefan Wermter, Andreas Engel, Brigitte Röder

Thursday, November 11, 2021

Hamburg	Beijing	Project	Title
09:00-10:00	16:00-17:00	Invited Talk: **Igor Farkas**	**Elements of intelligence in cognitive robotics via cross-modal learning** In order to interact intelligently with the world, the cognitive robots must acquire a number of abilities typically linking different modalities. The abilities include vision, motor skills, sense of touch or language understanding, to name a few. In the talk, I will present an overview of several examples of simple models based on artificial neural networks. The models are trained by supervised, unsupervised or reinforcement learning, all of which are relevant in human learning.Each model is inspired by a concrete neural or cognitive phenomenon and tested in a simulated humanoid robot iCub.

| 10:00-11:00 | 17:00-18:00 | Invited Talk:

Zhaoping Li | **Looking, Seeing, and the Central-Peripheral Dichotomy — a new framework to understand how vision works in our brain**
Abstract: Visual attention selects only a tiny fraction of visual input information for further processing. Selection starts in the primary visual cortex (V1), which creates a bottom-up saliency map (V1 Saliency Hypothesis, V1SH) to guide the fovea to selected visual locations via gaze shifts. This motivates a new framework that views vision as consisting of encoding, selection, and decoding stages, placing selection on center stage. It suggests a massive loss of non-selected information from V1 downstream along the visu-al pathway. Hence, feedback from downstream visual cortical areas to V1 for better decoding (recognition), through analysis-by- synthesis, should query for additional information and be mainly directed at the foveal region (Central-Pe-ripheral Dichotomy, PD). Accordingly, non-foveal vision is not only poorer in spatial resolution, but also more susceptible to many illusions. Some details are in http://www.lizhaoping.org/zhaoping/NewPathPaperEtc_2019.html I will also show the latest findings, including a peripheral illusion predicted by this framework and a stereo vision paradigm as an example to investigate the analysis-by-synthesis process in the top-down feedback for visual inference in central vision. |

Friday, November 12, 2021

Hamburg	Beijing	Speaker	Title
09:00-10:00	16:00-17:00	Invited Talk: **Kazuhiro Kosuge**	**Human-Robot Collaboration Design and Applications** Prof. Kazuhiro Kosuge Department of Electrical and Electronic Engineering The University of Hong Kong / Center for Transformative AI and Robotics, Tohoku University
10:00-11:00	17:00-18:00	Invited Talk: **Ren C. Luo**	**Autonomous Mobile Industrial Robot with Multi-Modal GAN Based Image Caption System for Intelligent Human-Robot Interactive Service** Prof. Dr.-Ing. Ren C. Luo Irving T. Ho Chair Professor, National Taiwan University
15:00-17:00			**Online meeting: Hamburg PIs**

TRR 169 Main Participants

Abawi, Fares (A5, Speaker)
Alaçam, Özge (C7, Speaker)
Bauer, Carina (B3, Speaker)
Biemann, Chris (C7, PI)
Bruns, Patrick (A1, PI)
Buidze, Tatia (C9, PI)
Burke, Rebecca (B1, Speaker)
Cai, Yiyang (C8, Speaker)
Chen, Lihan (C8, PI)
Duczek, Nicolas (A5, Speaker)
Engel, Andreas (B1, PI)
Frintrop, Simone (A6, PI)
Fu, Di (A5, Speaker)
Fu, Qiufang (B3, PI)
Fu, Xiaolan (C9, PI)
Ge, Gao (A6, Speaker)
Gerkmann, Timo (A6, PI)
Gerloff, Christian (A3)
Gläscher, Jan (C9, PI)
Gong Wenxiao (C8, Speaker)
Göschl, Florian (B4, Speaker)
Guan, Ji-Song (A2, PI)
Guo, Ning (C1, Speaker)
Hafez, Burhan (Z3, Speaker)
Hartfill Judith (C8, Speaker)
Hendrich, Norman (Z2, Speaker)
Hugo Cesar de Castro Carneiro (A5, Speaker)
Hilgetag, Claus (A2, PI)
Hong, Bo (C1, PI)
Hu, Xiaolin (A6, PI)
Jablonowsi, Julia (B3, Speaker)
Jing, Mingxuan (B5, Speaker)
Jonetzko, Yannick (Z3, Speaker)
Kerzel, Matthias (Z3, Speaker)
Kühn, Simone (C8, PI)
Lee, Jae Hee (C4, Speaker)
Lei Xiao (C8, Speaker)
Li, Dong (A2, Speaker)
Li, Mengdi (C4, Speaker)
Li, Shuang (Z3, Speaker)

Li, Xingshan (C7, PI)
Li, Zhenghan (B4, Speaker)
Liang, Hongzhuo (B5, Speaker)
Liu, Jiayu (C7, Speaker)
Liu, Xun (B4, PI)
Liu, Zhiyuan (C4, PI)
Lou Chunmiao (C8, Speaker)
Maye, Alexander (Z2, Speaker)
Nolte, Guido (B4, PI)
Taesler, Philipp (B3, PI)
Qu, Qingqing (C7, PI)
Richter, Julius (A6, Speaker)
Rose, Michael (B3, PI)
Röder, Brigitte (A1, PI)
Ruppel, Philipp (A4, Speaker)
Steinicke, Frank (C8, PI)
Sun, Fuchun (Coordinator)
Sun, Ke (B2, Speaker)
Sun, Xunwei (A5, Speaker)
Weber, Cornelius (C4, PI)
Wei, Kunlin (C8, PI)
Wang, Guangyu (A2, Speaker)
Wang, Peng (B1, Speaker)
Wang, Xintong (C7, Speaker)
Wang, Yikai (B5, Speaker)
Wang, Yizhou (A4, PI)
Wermter, Stefan (A5, PI)
Xiao, Changming (A4, Speaker)
Xue, Gui (A3, PI)
Yan, Yuxiang (C1, Speaker)
Yang , Chao (B5, Speaker)
Zeng, Zheni (C4, Speaker)
Zhang, Ao (C4, Speaker)
Zhang, Changshui (A4, PI)
Zhang, Dan (C1, PI)
Zhang, Jianwei (Coordinator)
Zhao, Ke (C9, Speaker)
Zhao, Shuning (A6, Speaker)
Zhong, Fangwei (A4, Speaker)
Zhu, Jun (B2, PI)