

## Interdisciplinary College 1997 – 2023: Themes, Chairs, Courses

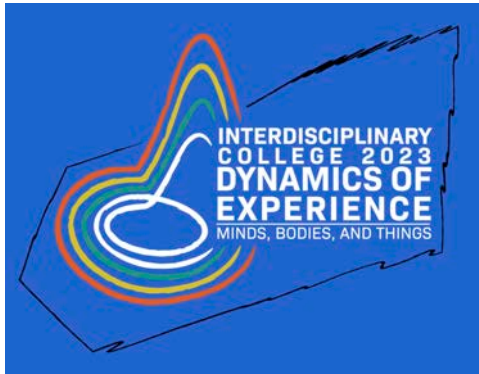
Editorial Note .....	2
IK 2023 .....	3
IK 2022 .....	6
IK 2021 .....	8
IK 2020 .....	10
IK 2019 .....	12
IK 2018 .....	14
IK 2017 .....	16
IK 2016 .....	18
IK 2015 .....	20
IK 2014 .....	22
IK 2013 .....	24
IK 2012 .....	26
IK 2011 .....	28
IK 2010 .....	30
IK 2009 .....	32
IK 2008 .....	34
IK 2007 .....	36
IK 2006 .....	38
IK 2005 .....	40
IK 2004 .....	42
IK 2003 .....	44
IK 2002 .....	46
IK 2001 .....	48
IK 2000 .....	50
IK 1998 .....	52
IK 1997 .....	54

## **Editorial Note**

This document documents all IKs from the very first one (1997) until the one in the year of writing this (2023), giving for each the Focus Theme, Chairs, and Courses with Lecturer Names. This overview has been compiled from several sources (printed flyers, old webpages saved by Ipke Wachsmuth and Herbert Jaeger, old webpages retrieved from the WayBackMachine at <http://web.archive.org>, historic emails shared by Thomas Christaller). Courses are listed as they were announced on printed flyers or the internet before the respective IK, thus some of the listed courses may have not been held due to illness of the lecturer or travel problems; in most cases such cancelled courses were replaced by courses spontaneously offered by present faculty – these are also not documented.

*Herbert Jaeger, March 21, 2023*

## **IK 2023**



**Focus Theme:** Minds, Bodies, and Things

**Chairs:** Elisabeth Zimmermann, Gregor Schöner

The IK 2023 explored how experience emerges from dynamic processes of bodies, minds, and things. The focus was on the role that physical interaction plays for cognition: How do sensorimotor capacities and the experience of one's own body develop and enable agents to engage with the world? How do cognitive competences and experience emerge in neural systems that are linked to the sensorimotor surfaces and are embedded in the world? How do humans actively structure their environment to enable particular forms of experience and processes of meaning-making, e.g. in educational and artistic settings, but also in the way technological artefacts are integrated into our world?

This was the first in-person “really real” IK after three years of pandemic break. We were super happy to meet again outside pixel windows and breathe the fresh air of early-spring Sauerland highlands.

### **Basic Courses**

- BC1: Philosophy & Ethics of Technology, Big Data & AI (Judith Simon)
- BC2: Basic Course Neuroscience (Till Bockemühl and Ronald Sladky)
- BC3: Introduction to Machine Learning (Benjamin Paaßen)
- BC4: Philosophy of Cognition (cancelled) (Sven Walter) (replaced on short notice by Philipp Wicke who offered BC5)
- BC5: Introduction to Computational Creativity (Philipp Wicke)

### **Method Courses**

- MC1: A Dynamical Systems Primer (Herbert Jaeger)
- MC2: Tracking the embodied dynamics of cognition using computer mouse tracking (Stefan Scherbaum and Martin Schoemann)

## Special Courses

### Movement & Bodily Experience

- SC1: Bodies that move like your own (Andreas Kalckert)
- SC2: Echolocation (Susan Wache, Julia Wache, and Stephan Drechsel)
- SC3: Investigating motor control circuits using neuromechanical simulations and robots (Auke J. Ijspeert)
- SC4: Bionic Prosthetics in Medicine and Technology (Cosima Prahm)
- SC5: An action-perception perspective on motor coordination and upper limb prosthetics (Raoul Bongers)

### Neural Dynamics & Grounded Cognition

- SC6: Predictive Coding: Between Enactivism and Representationalism (Krzysztof Dolega)
- SC7: The neural dynamics of visual working memory (John Spencer)
- SC8: Neurons and the Dynamics of Cognition: How Neurons Compute (Terry Stewart)
- SC9: Grounded Mental Representations (Gottfried Vosgerau)
- SC10: Grounding of meaning in living and artificial systems (Martin Takac)

### Experiencing Self & Others

- SC11: Cognition in the context of social engagements: A developmental perspective (Gabriela Markova)
- SC12: The Magic of Human Touch under Fighting Conditions. How to Reconcile in Stressful and Dangerous Situations. Experiences with the Japanese Martial Art Aikido (Thomas Christaller)
- SC13: Experiencing the Self through Touch: Neural and behavioral foundations of affiliative touch, tactile communication, and bodily self perception (Rebecca Böhme)

### Engaging with Technology & Things

- SC14: Human-Technology Interaction: Considering Minds, Bodies & Things (Jan Smeddinck)
- SC15: Novelty: knowledge creation and innovation as creative thinging and engaging with the future (Markus F. Peschl)
- SC16: Joint action, interpersonal coordination, and coordination devices such as work songs (Thomas Wolf)

## Practical Courses

- PC1: Hands-on tutorial on Dynamic Field Theory (Daniel Sabinasz, Raul Grieben and Gregor Schöner)
- PC2: The choreography of scientific writing (Birgit Peterson)

- PC3: Mind, Body, Things, Dreams – Dynamics of Self-Experience (Annekatriin Vetter, Katharina Krämer, and Sophia Reul)

### **Rainbow Courses**

- RC1: Mobile Brain/Body Imaging - the human brain in its natural habitat (Marius Klug)
- RC2: Developing digital environments for capturing and coping with phantom limb pain in amputees (Michael Bressler)
- RC3: Information Theory and the Mind (Moritz Kriegleder)
- RC4: Causality in Complex Systems – Implications of Dynamical Systems Theory for Theories of Cognition (Alexander Hölken)

### **Evening Talks**

- ET1: Eating with Artefacts (Charles Spence)
- ET2: Analog Utopia, a radical critique of the digital (Christian Faubel)

## IK 2022



**Focus Theme:** Flexibility

**Chairs:** Jutta Kretzberg, Marieke van Vugt, Alexandra Kirsch

The theme “Flexibility” was investigated from the perspectives of the nervous system, the mind, communication, and AI & robotics. Flexibility can be interpreted as mental flexibility, physical flexibility (including dance improvisation), neuroplasticity, and adaptive artificial systems. We had 28 lecturers from a wide range of backgrounds, ranging from clinical psychology to robotics to science communication or Tibetan monastic debate.

Due to the continued Covid pandemic, the IK 2022 was again forced to be held in an online-only format. We were fortunate that the beautiful virtual Günne infrastructure from the previous year was still available and the technical magic team (Benjamin Paassen, Stefan Riegl) just as motivated and helpful as in the years before.

### Lecture courses

- Visual Flexibility (Anna Stöckl)
- Flexible Decision-Making for Collaborative Robots (Karinne Ramirez-Amaro)
- Associations between autonomic and cognitive flexibility: from assessment to therapeutic interventions (Cristina Ottaviani)
- The malleability of perception in ancient Buddhist thought and practice (Andrea Sangiacomo)
- Network analysis in psychology (Laura Bringmann)
- Plasticity in neural networks (Fleur Zeldenrust)

### Practical courses

- Science Communication (Jens-Steffen Scherer, Valerie Vaquet, and Kayson Fahar)
- Improvisation in dance, and beyond (Bettina Bläsing)
- FlexVision – Flexibility in Vision: Dynamics, Mechanisms and Function (Udo Ernst, Maik Schünemann)
- Flexible Human-AI Interaction (Jan Smeddinck)
- Tibetan Debate (Losang Donyo)
- AI for Angry Birds (Diedrich Wolter)
- *Career Fishbowl* with Enrico Fucci, Lydia Nemeč, Janina Radny, Moritz Tenorth, and Bastian Epp

## **Rainbow courses**

- Why Computational Neurophenomenology? Questions for bridging First and Third Person Science (Jelena Rosic, Moritz Kriegleder)
- Speech decoding for brain-computer interfaces (Julia Berezutskaya)
- The Flexibility of fMRI Results (Nina Demšar)

## **Keynote lectures**

- Navigating Decision Environments and Adaptive Strategy Selection (Niklas Keller)
- Meditation as flexibility induction? Theory, findings and computational mechanisms (Fynn-Mathis Trautwein)
- Homeostatic regulation of neuronal networks (Astrid Prinz)
- Multiscale Predictive Representations & Human-like RL (Ida Momennejad)
- Flexible brains in social contexts (Suzanne Dikker)
- When Trust Meets Tech: Who has to be how flexible to make trustworthy AI happen? (Tarek Besold)

## IK 2021



**Focus Theme:** Connected in Cyberspace

**Chairs:** Emily King, Terry Stewart, Benjamin Paassen

The virtual IK 2021 took place under the motto 'Connected in Cyberspace', providing a virtual conference venue to connect in spite of the pandemic. Three aspects of the motto provided inspiration for scientific contributions: cyberspaces, i.e. spatial metaphors for things that are non-spatial; cybernetic organisms, i.e. system models of organisms and agents; and cybernetworks, i.e. models of interconnectedness, from graph theory over epidemiological models to the embedding of technology in society.

Many new online components were implemented and tried and found to work super in this innovative IK.

This IK proceeded in three phases:

1. an initial week of one-hour talks, covering all facets of the focus theme,
2. a two-week block with interdisciplinary projects and more in-depth courses guided by the IK faculty,
3. a final grand finale – a very long evening with stage acts and speeches.

This IK took place in a beautifully crafted virtual (almost-)reality copy of our accustomed and beloved conference site in Günne, realized with the Gather Town tool. All sorts of lectures, presentations, poster sessions, events, formal and social meetings happened there. It worked supremely well.

### Lectured courses and talks

- The spectral theory of geometric clustering (Dustin Mixon)
- The gendered nature of gamer stereotypes and what we can do about it (Thekla Morgenroth)
- A short introduction to Bayesian descriptions of information processing in the brain (Chris Mathys)
- Adversarial machine learning (Barbara Hammer)
- Exploring your own mind (Marieke van Vugt)
- Dynamical Systems: a Navigation Guide (Herbert Jaeger)
- Representing Time and Space in Neurons (Terry Stewart)
- Ethics of AI in Psychiatry (Wanja Wiese)
- Computational principles of gaze-stabilization during locomotion (Hans Straka)
- How to know (Celeste Kidd)



- Minimal neural encoding of space (Jutta Kretzberg)
- Your Wit Is My Command: Automating Humour with Computational Creativity (Tony Veale)
- Robot models of Insect Navigation (Barbara Webb)
- Personalizing instruction and recognizing student misunderstandings using reinforcement learning (Anna Rafferty)
- Why Intelligence Tests Are Still a Very Hard Problem for AI (Maithilee Kunda)
- How art creates meaning and what we can learn about this for human-centric AI (Luc Steels)
- Testing for Neural Correlates of Consciousness (Sascha Benjamin Fink)
- Small-World Networks: What Facebook and Roundworm Brains Have in Common (Emily J. King)
- Implicit coordination in Multi-Agent-Pathfinding (Bernhard Nebel)
- Spreading dynamics in neural networks - and of COVID-19 (Viola Priesemann)
- Computer modeling and responsibility (Christiane Floyd)
- Towards Learning Compositional Conceptual Structures from Sensorimotor Experiences (Martin Butz; Evening lecture sponsored by the German Society for Cognitive Science)
- Data-driven dynamical models for neuroscience and neuroengineering (Bing Brunton)
- Considering the human in developing AI systems in an anti-Black environment (Christopher L. Dancy)
- plus, an Industry Panel (Noa Tamir)

### **Practical Courses**

- Mindfulness as a method to explore your mind-wandering with curiosity (Marieke van Vugt)
- The AI Go Tournament (Benjamin Paaßen)
- Science Communication (Jens-Steffen Scherer)
- Bayesian information processing (Chris Mathys)
- Pimp my online course ... With neurodidactical thinking! (Nicole Flindt)
- Exploring inner space – Perceiving the world through introspection (Katharina Krämer & Annekatriin Vetter)
- NomVIK (Jutta Kretzberg)
- Neural Engineering: Building Cognitive Models with Neurons (Terry Stewart)

### **Rainbow Courses**

- Sort-it by Intuity (Alexandra Kirsch)
- Neurodidactics - Where neuroscience meets (online) education (Nicole Flindt)
- AI for Humanitarian Good (Thomas Chen)
- VR as Tool (Tobias Wüstefeld)

## IK 2020



**Focus Theme:** Curiosity, Risk and Reward: Shaping Autonomous Intelligence

**Chairs:** Katharina Rohlfing, Terry Stewart, Jan S. Smeddinck

This IK was planned as beautifully and with as much dedication as its predecessors. Then the Corona epidemic struck and the on-site physical event had to be cancelled. With a huge and fast re-design effort and the extraordinary engagement lecturers, an online version was created and took place. Here we document both the originally planned and the actually run IK 2020.

*The original program*

### Introductory Courses

- Introduction to Machine Learning (Benjamin Paassen)
- Introduction to Psychology (Katharina Krämer)
- Introduction to Neuroscience (Till Bockemühl and Ronald Sladky)
- Introduction to Ethics in AI (Heike Felzmann)

### Methods Courses

- Applications of Bayesian Inference and the Free Energy Principle (Christoph Mathys)
- Symbolic Reasoning within Connectionist Systems (Klaus Greff)
- Embodied Symbol Emergence (Malte Schilling and Michael Spranger)
- Low Complexity Modeling in Data Analysis and Image Processing (Emily King)

### Focus Courses

- Motifs for Neurocognitive Challenges from Individual to Evolutionary Time Scales (Wulf Haubensak)
- Your Wit Is My Command (Tony Veale)
- Arousal Interactions with Curiosity, Risk, and Reward from a Computational Cognitive Architecture Perspective (Christopher Dancy)
- Confidence and Overconfidence (Vivek Nityananda)
- A Series of Interesting Choices: Risk, Reward, and Curiosity in Video Games (Max Birk)
- The Motivational Power of Curiosity – Information as Reward (Lily FitzGibbon)
- Using Robot Models to Explore the Exploratory Behaviour of Insects (Barbara Webb)
- Mindfulness as a Method to Explore your Mind-Wandering with Curiosity (Marieke Van Vugt)

- Artificial curiosity for robot learning (Nguyen Sao Mai)
- The Development of Curiosity (Gert Westermann)
- Hominum-ex-Machina: About Artificial and Real Intelligence (Markus Krause)

### **Practical Courses**

- Perceiving the World through Introspection (Annekatriin Vetter and Sophia Reul)
- Seeking Shaky Ground (Claudia Muth and Elisabeth Zimmermann)
- Juggling - experience your brain at work (Susan Wache and Julia Wache)
- Curious Making, Taking Fabrication Risks and Crafting Rewards (Janis Meißner)

### **Professional Courses**

- Curiosity, Risk, and Reward in Teaching in Higher Education (Ingrid Scharlau)
- Ethics in Science and Good Scientific Practice (Hans-Joachim Pflüger)
- Curiosity, Risk, and Reward in the Academic Job Search (Emily King)

### **Evening Talks**

- How to Know (Celeste Kidd)
- Data-Driven Dynamical Models for Neuroscience and Neuroengineering (Bing W. Brunton)
- Information as a Resource: How Organisms Deal with Uncertainty (Alex Kacelnik)
- Biosignal Processing for Human-Machine Interaction (Tanja Schultz)

### **Rainbow Courses**

- Homeostatically-driven behavioral architectures: How to model biological organisms throughout their life-cycle (Panagiotis Sakagiannis)
- Can patterns of word usage tell us what lemon and moon have in common? Analyzing the semantic content of distributional semantic models (Pia Sommerauer)
- Representing Uncertainties in Artificial Neural Networks (Kai Standvoss)

### **Additional Events**

- Debate: Curiosity as a research field (Praveen Paritosh)
- Panel: Lived Curiosity in Industry and Academia (Becky Inkster)

*The courses that did take place online:*

- Introduction to Machine Learning (Benjamin Paassen)
- Confidence and Overconfidence (Vivek Nityananda)
- The Motivational Power of Curiosity – Information as Reward (Lily FitzGibbon)
- Mindfulness as a Method to Explore your Mind-Wandering with Curiosity (Marieke Van Vugt)
- Ethics in Science and Good Scientific Practice (Hans-Joachim Pflüger)
- Neural Engineering (Terry Stewart)

## **IK 2019**



**Focus Theme:** Out of Your Senses: From Data to Insight

**Chairs:** Barbara Hammer, Emily King, Andrew Straw

### **Introductory Courses**

- The Eye, the Sky and Compass Orientation (Marie Dacke)
- Introduction to Neuroscience (Till Bockemühl)
- Neural Population Dynamics during Learning (Aaron Batista)
- Minds, Matter, and Machines (Carlos Zednik)
- Sensor Systems and Cognitronics (Ulrich Rückert)

### **Methods Courses**

- Making Sense of Sensory Data with Generative Machine Learning (Jörg Lücke)
- Mixed Reality (Thies Pfeiffer and Patrick Renner)
- Mathematical Cognitive Modeling (Joseph Houghton)
- Metrics of Success in Signal Processing and Machine Learning (Rafael Reisenhofer)
- Introduction to Natural Language Processing 21 (Sina Zarrieß)

### **Technology and Senses**

- Neuromorphic Computing – Sensors and Deep Learning Networks (Shih-Chii Liu)
- Neurosensory Implants: Simulation and Perception (Thomas Haslwanter)
- Transcranial Magnetic Stimulation (Martin Tik)
- The Seventh Sense: Sensory Augmentation with Compass Belt (Julia Wache and Susan Wache)

### **Biological Senses**

- Why the brain needs a body (with emphasis on vision) (Dana Ballard)
- Temporal Sensory Integration in the Brain (Christoph Mathys)
- Multi-sensory Integration in Zebra Finch Courtship (Katharina Riebel)
- Researching Altered States of Consciousness: Perspectives from Neuropsychology and Philosophy (S. Benjamin Fink and Katrin Preller)

### **Sensing - Self - Society**

- Responsible Artificial Intelligence (Virginia Dignum)

- Personal Insight from Introspection (Sophia Reul and Annekatrin Vetter)
- Cybernetic Models of Mind-Wandering and Meditation (Marieke van Vugt)
- Psycholinguistics of Spoken and Signed Languages (Robin Thompson)

### **Practical Courses**

- Presence in Movement: Fundamentals of Mindful Ballet (Marieke van Vugt)
- Computer Graphics for Virtual Reality (Nicholas A. Del Grosso)
- Insights into your Robot - Seeing the World from their Perspective (Michael Görner and Jochen Sprickerhof)
- Hands on High Performance Computing (Felix Schmitt)
- Deep Reinforcement Learning (Andrew Melnik)

### **Professional Courses**

- How to become a Scientist (Birgit Peterson)
- Make Sense of your Senses (Jutta Kretzberg)
- IK Alumni / Industry Panel (Alex Ahle, Hana Boukricha, Nikita Mattar, Nhung Nguyen, and Maha Salem)

### **Evening Talks**

- Sound Bites & Sonic Seasoning (Charles Spence)
- The Politics of the Senses (Monica Degen)
- From Optimization to Autonomous Driving (Matthias Knauer)
- Does Explainability make Sense? (Katharina Rohlfing)

### **Rainbow Courses**

- How to Make Sense of a Problem While You Are Trying to Solve It (Benjamin Angerer)
- Wayfinding Through Orientation: Schematizing Landmark, Route and Survey Information in a Single Map (Wiebke Schick)
- Prenatal roots of cognition (Anna-Lisa Schuler)
- EEG beasts and where to find them – the Berlin Mobile Brain/Body Imaging Pipeline (Marius Klug)
- Understanding movement through moving (Jakob Schneider)
- From Data to insight, or: Do you even science? - An introduction into the philosophy of scientific reasoning (Tobias Heinz)

## IK 2018



**Focus Theme:** Me, my Self, and I

**Chairs:** Katharina Krämer, Ronald Sladky, Ipke Wachsmuth

### Basic Courses

- Neurobiology (Till Bockemühl)
- Modeling dynamical systems (Herbert Jaeger)
- Fun with Machine Learning (Barbara Hammer)
- Cognitive AI (Tarek Besold)
- Philosophy of Mind (Wanja Wiese)

### Advanced Courses

- Neurobiology of Self and Embodiment (Marlene Bartos)
- Modelling in Neuroscience and Psychiatry (Christoph Mathys)
- Neural Networks for Cognition (Terry Stewart)
- Developmental Robotics (Verena Hafner)
- Philosophy of the Internal Body (Mog Stapleton)

### Self-models: Theory

- Evolution and Individuality (Tobias Uller)
- Cognition, Embodiment, and Robots (Serge Thill)
- Animal Sociality: Finding the Me in Team (Jennifer Fewell, Ted Pavlic)
- Computation in Neural Circuits vJulijana Gjorgijeva)

### Self-models: Applications

- Self-Consciousness and Intersubjectivity (Kai Vogeley)
- Self and Others in Communication (Alexandra Georgescu)
- Optimism bias (Bojana Kuzmanovic)
- Me and my Brain: How Brain Stimulation Changes your Brain (Christian Windischberger, Caroline Di Bernardi Luft)
- Me, My Self and AI: "Self" in Social-Media (Tony Veale)
- Digital empathy (Paul Mc Kevitt)

### **Altered and Disturbed States of Selfhood**

- Egopharmacology: Drug use and Neuroenhancement (Boris Quednow)
- Das Selbst und das Ich: Psychoanalytische Reflexionen (Bernd Deininger)
- Altered states of embodiment (Bigna Lenggenhager)

### **Practical Courses**

- Self awareness group (Annekatriin Vetter, Sophie Reul)
- The moving self - moving the self (Elisabeth Zimmermann)
- Myo, Myself and I: Utilizing myoelectric data for Hand Protheses (Alexander Schulz, Cosima Prahm, Benjamin Paaßen)

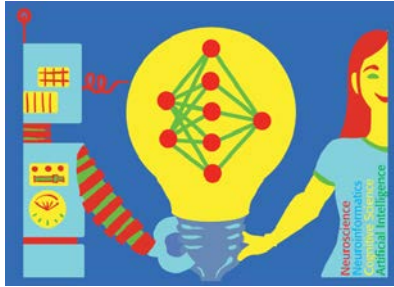
### **Evening Talks**

- Virtual Reality and Artificial Intelligence – New Questions for Legislation and Applied Ethics (Thomas Metzinger)
- She – He – Me – BeHave: Biological Sex and Human Behavior (Elisabeth Oberzaucher)
- The Golden Age of Psychology on Television – An Introduction to Psychopathology in Movies and TV Series (Niklas Gebele)
- Modeling Animal Minds Using Virtual Reality, Neurogenetics, and Computation (Andrew Straw)

### **Rainbow Courses**

- Disorders of Consciousness: Is There Anybody In There? (Amelie Haugg)
- Moral Cognition between Classic Cognitivism and Situated Cognition (Lasse Bergmann)
- The vestibular system: bringing balance to the self (Estelle Nakul)

## IK 2017



**Focus Theme:** Creativity and Intelligence in Brains and Machines

**Chairs:** Tarek Besold, Dieter Jaeger, Luc Steels

### Basic Courses

- From Neurons to behavior – Thinking like a neuroscientist (Jutta Kretzberg)
- Evolution and Genetic Engineering – Thinking like a Biologist (Nuria Conde-Pueyo)
- From Brains to Robots – Thinking like an Engineer (Florian Röhrbein)
- Computational Cognitive Modelling – Thinking like a Computer Scientist (Ute Schmid)
- Analysing Language Data: Thinking like a Quantitative Linguist (Harald Baayen)

### Methods Courses

- Machine Learning and Deep Learning (Razvan Pascanu)
- Society as a Complex Network (Jeroen Bruggeman)
- Coping with Data: Dimensionality Reduction (Michel Verleysen)
- Adaptive Language Grounding in Robots: Processing, Learning and Evolution (Michael Spranger)
- Computational Creativity: Evolving Artistic Creativity (Amilcar Cardoso)

### Special Courses: Creativity

- Cooperative Music-Making and Musical Virtuosity (Justin London)
- Computational Models of How People Make Stories (Pablo Gervas)
- A.I. at the Movies: The Science and Fiction of Artificial Intelligence (Tony Veale)
- Neural and Behavioural Correlates of Creativity (Joydeep Bhattacharya)

### Special Courses: Neuroscience - From Theories to Data

- Neural Engineering with Nengo (Terry Stewart)
- Modeling Neural Plasticity in Spiking Networks (Julijana Gjorgjieva)
- Brain-Machine Interfaces aka Brain-Computer-Interfaces (Aaron Batista)
- Neural Biophysical Properties and Neural Computation (Dieter Jaeger)

### Special Courses: Language

- Construction Grammar and Usage-based Linguistics: Studying Language with Large Corpora (Martin Hilpert)



- Evolution of Interaction and Meaning on the Web (Michael Rovatsos)
- Language dynamics: Models, Data and Experiments (Andrea Baronchelli)
- Combinatory Categorical Grammar (Mark Steedman)

#### **Special Courses IV: The Social**

- Animal Social Dynamics, an Evolutionary Perspective (Jennifer Fewell)
- Social Simulation Research: Modeling and Visualization of Opinion Dynamics (Sven Banisch)
- Digital Universities (Sandra Hofhues)
- Online Participative Systems for Sustainability (Peter Hanappe)

#### **Practical Courses**

- Scientific Methods: Hands-on Research from Conceptualizing to Data Analysis (Jan Smeddinck)
- Deep Language Processing using Construction Grammars (Remi van Trijp, Paul Van Eecke)
- Communicating science to non-expert audiences (Tobias Maier)

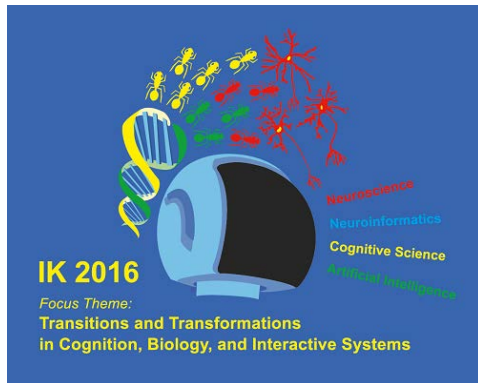
#### **Evening Talks**

- Perception, Knowledge and the Brain: Neurobiological Aspects of Epistemology (Gerhard Roth)
- How stress gets under the Skin - Molecular Mechanisms of Lasting Effects of Adverse Life Events (Elisabeth Binder)
- Digital Humanities: Challenges and Chances (Jonas Kuhn)

#### **Rainbow Courses**

- Really bad science (Alexandra Kirsch)
- The right words to find the right route: interactions between spatial perception and language (Wiebke Schick)
- Conceptual spaces - a geometric framework for representing concepts (Lucas Bechberger)
- Of Possible Worlds and Multiple Agents: Using Simulation to Model Narratives (Leonid Berov)

## **IK 2016**



**Focus Theme:** Transitions and Transformations in Cognition, Biology, and Interactive Systems

**Chairs:** Rainer Malaka, Jennifer Fewell

### **Basic Courses**

- Artificial Intelligence (Alexandra Kirsch)
- Machine Learning (Barbara Hammer)
- Cognitive Science (Frank Jäkel)
- Neuroscience (Hans Straka)
- Behavioral Biology (Judith Korb)

### **Method Courses**

- Modeling Dynamical Systems (Herbert Jaeger)
- Hands-On Mobile Robotics (Jochen Sprickerhof)
- Mathematical Transforms and Sparsity: Harmonic Analysis and its Applications (Emily J. King, Rafael Reisenhofer)
- Science Jam: A Crash Course in Human Subject Research (Jan Smeddinck, Susan Wache)

### **Special Courses I: Transitions in Organization I: From Individuals to Groups, to Superorganisms**

- Cooperation across systems (C. Athena Aktipis)
- Emergent Behavior (Stephen Pratt)
- Evolution of Sensory Systems and Cognition: Bees as a Model (Lars Chittka)

### **Special Courses II: Transitions in Organization II: From Neurons to Mind**

- Transformations of Knowledge (Thiemo Breyer)
- Turning Memory into Action (Bertram Gerber)
- Neural Mechanisms of Intersubjectivity - From “Detached” Cognitive to “Truly” Social Neuroscience (Kai Vogeley)

### **Special Courses III: Dynamics, Organization, and Reorganization of the Brain**

- Evolution of Emotions and the Brain (Sebastian Ocklenburg)

- Brain and Aging (Katja Franke)
- Free Energy Models and Neuroimaging (Ronald Sladky)

#### **Special Courses IV: Transformation and Change in Human Life and Culture**

- Ephemeral User Interfaces (Tanja Döring)
- Games for Behaviour Change (Regan Mandryk)
- "The shortest path is dead" - Navigation in Navigation-Free Environments (Johannes Schöning)
- Research in the Wild (Yvonne Rogers)

#### **Special Courses V: Artificial Cognitive Systems for Creativity and Intelligent Behavior**

- Computational Creativity (Tony Veale)
- Robots for Everyday Activities (Michael Beetz)
- Building Large-scale Neural Models: Cognitive Control with Nengo (Terrence C. Stewart)
- Logic-based Approaches to the Semantics of Natural Language (Michael Kohlhase)
- Computational Models and Cognition (Tomer Ullman)

#### **Practical Course**

- Aikido and Contact Improvisation (Thomas Christaller, Elisabeth Zimmermann)

#### **Evening Lectures**

- Levels of Cognition in a Miniature Brain: The Honeybee (Randolf Menzel)
- Social Robots (Luc Steels)
- Using Virtual Reality and Genetics to Link Neural Circuits With Cognition in Drosophila (Andrew Straw)
- Making Symmetric Organisms Move: Transition and Transformation in Neural Control (Ansgar Büschges)

## **IK 2015**



**Focus Theme:** Integration of Behavior and Cognition,

**Chairs:** Ansgar Büschges, Herbert Jaeger

### **Basic Courses**

- A basic course of Cognitive Science (Frank Jäkel)
- From neurons to brain systems: An introduction to biological principles and biophysical modeling approaches (Dieter Jaeger)
- Machine learning (Madalina Olteanu)
- Introduction to mobile robots (Stefano Carpin)
- Sensory and motor physiology (Joachim Schmidt, Carmen Wellmann)

### **Method Courses**

- Neurogenetics: Building a remote control fruit-fly (Salil S. Bidaye)
- Nonlinear Dynamics Modelling in Neurosciences (Victor Jirsa)

### **Modeling Cognitive Architectures**

- Modeling cognition with neurons: Spaun and the Neural Engineering Framework (Terry Stewart)
- Cognitive modeling with ACT-R and PRIMs (Niels Taatgen)
- The Free Energy Principle for Perception: An Introduction (Dirk Ostwald)

### **Person, Identity, Dignity**

- Autobiographical memory and identity: Cognitive models, psychological functions, lifespan retrieval, and impairment in brain damage (Helen Williams)
- Disentangling human personality: the role of nature and nurture (Christian Montag)
- Animal ethics (Arianna Ferrari)
- The Cognitive-Emotional Brain (Luiz Pessoa)

### **Engineering Agents**

- Logics for agents (John-Jules Meyer)
- How to build a virtual human (Ipke Wachsmuth)
- Autonomous agents for automated driving (Dirk Reichardt, Stefan Gehrig)
- Compositionality and self-organization in cognitive brains: neuro-robotics study (Jun Tani)

- Engineering humanoid robots (Tamim Asfour)

### **Neurons, Muscles, Bodies**

- Active sensing (Jacob Engelmann)
- Insights into neural computation and physiology from quantitative behavioral experiments (Andrew Straw)
- Control of Gaze, Posture, and Movement (Hans Straka, Stefan Glasauer)
- Human walking (Michael J. Grey)
- The sense of the bodily self and its disturbances (Bigna Lenggenhager)

### **Language and Thought**

- Culture, language and cognition (Andrea Bender)
- How can robots invent their own language (Luc Steels, Michael Spranger)

### **Practical Courses**

- Being an agent – experiencing and exploring ourselves in movement and interaction (Elisabeth Zimmermann)

### **Professional Skills**

- Introduction into aspects of good scientific practice (for newbies only) (Isabell Witt)

### **Evening Talks**

- Embodied cognition, game characters and game design (Petri Lankoski)
- Transitions in sociality: ant societies and cooperative queens (Jennifer Fewell)
- Finding the soul of the machine: The Distributed Adaptive Control theory of Mind and Brain (Paul Verschure)

## **IK 2014**



**Focus Theme:** Cognition 3.0 - the social mind in the connected world

**Chairs:** Nicole Krämer, Stefan Kopp

### **Basic Courses**

- Artificial Intelligence (Ipke Wachsmuth)
- Cognitive Science/Psychology (Matthias Brand)
- Neurobiology (Ansgar Büschges and Carmen Wellmann)
- Computational Neuroscience (Alberto Bernacchia)

### **Method Courses**

- Computational Models of Human Communication Dynamics (Louis-Philippe Morency)
- Bayesian Machine Learning (David Barber)
- Neuroimaging (Kai Vogetley)
- Augmenting Social Interactions: Social Presence, Social Connectedness, and Beyond (W. Ijsselstein)

### **Social minds**

- Philosophy of Mind, Situated Affectivity (Achim Stephan)
- Theory of Mind: Concepts, Tests, Dysfunctions (Elke Kalbe and Jan Rosen)
- Cognition, Social Interaction and Cognitive Robots (Toni Belpaeme)
- Learning in social settings (Nikol Rummel, Ingo Kollar)

### **Interaction**

- Joint Action Coordination (Cordula Vesper)
- Social Action Recognition (Stephan de la Rosa)
- Partner-specific Adaptions in Communication (Anna Kuhlen, Kai Görden)
- Embodied Interaction in Virtual Humans (Stacy Marsella)
- Empathy, Emotion Loops and the Illusion of Empathy (Arvid Kappas)
- Social robotics and Human-Robot-Interaction (Maha Salem, Astrid Rosenthal-von der Pütten)

### **Groups and social systems**

- Social Insects as Models of Collective Behavior and Cooperation (Jennifer Fewell)
- Sentiment Analysis for the Social Web (Michael Thelwall)

- Social Media: Effects on Social Interaction and Social Cognition (Sonja Utz)

### **General**

- Internet of Things - Ambient Intelligence (Emile Aarts)
- Evolution of Cooperation (Josep Call)
- Rhythmic Coordination and Tempo Judgements (Justin London)
- Deep Learning in Neural Networks (Ilya Sutskever)
- Cognitive Systems: From Behavior-based Robotics towards Cognitive Control (Malte Schilling)

### **Practical Courses**

- Contact/Dance Improvisation (Elisabeth Zimmermann)
- Hands-on Multi-agent Systems (Hana Boukricha, Nguyen Nhung, Patrick Renner, Nikita Mattar)

### **Evening Talks**

- Social Cognition, Action Understanding, Autism (Karl Friston)
- Evolution of Sociality and Evolutionary Processes within Social Systems (Robin Moritz)
- Cognition 3.0: Cyberspace - The Final Frontier? Arvid Kappas (Mike Thelwall)

## IK 2013



**Focus Theme:** Wicked Problems, Complexity and Wisdom

**Chairs:** Bettina Bläsing, Thomas Christaller, Gert Scobel

### Basic Courses

- Artificial Intelligence (Alexandra Kirsch)
- Cognitive Science (Brigitte Römmner-Nossek, Elisabeth Zimmermann)
- Neurobiology (Ansgar Büschges)
- Philosophy of Mind (Gottfried Vosgerau)

### Methods Courses

- Nonlinear Analysis and Human Movement Variability (Nick Stergiou)
- Transitions by escape are optimal for independent phase modulation in half-center central pattern generators (CPGs): a mechanistic analysis and its application to 6-legged locomotion (Silvia Gruhn)
- Bayesian Modeling of Perception (Konrad Körding)
- Cognition and Complexity - A Bayesian Perspective (Johan Kwisthout)

### Special Courses I: Complexity in Finding Models for Wicked Problems

- Minds as Machine: Cognitive Systems and Artificial Intelligence (Joscha Bach)
- Quantum Probability Models of Cognition and Decision-Making (Jennifer Trueblood)
- Neuroimaging Techniques (Jessica Grahn)
- Looping Complexity: Simulating Stimulating Worlds (Marc-Erich Latoschik)
- Our Brain Plays Jazz: Self-organized Information Processing with Complex Dynamics (Gordon Pipa)

### Special Courses II: Exploring Problems and Taking Decisions

- Complex Problem-Solving, Decision-Making, and Motivation in the Context of Multiple Goals (Christine Blech)
- Inductive Programming and Knowledge-level Learning (Ute Schmid)
- It's Not What You Think: Everyday Decision-Making and How to Improve It (Anthony Jameson)
- Analogy and Conceptual Blending in Problem- Solving and Creativity (Kai-Uwe Kühnberger)



### **Special Courses III: Embodied Decision Making**

- Models in Perception and Action: Understanding Human Sequential Behaviour in Naturalistic Tasks (Constantin Rothkopf)
- Digital Dementia: Media Consumption, Brain Development, and Cognitive Decline (Manfred Spitzer)
- Cognitive Systems: From Behaviour-Based Robotics Towards Cognitive Control (Malte Schilling)
- Wisdom Therapy (Michael Linden)
- Personal Wisdom: Its Nature, Antecedents, and Effects (Monika Ardelt)
- Affective Wisdom (Achim Stephan, Wendy Wilutzky)
- Meditation (and Buddhist Psychology) (Henk Barendregt)

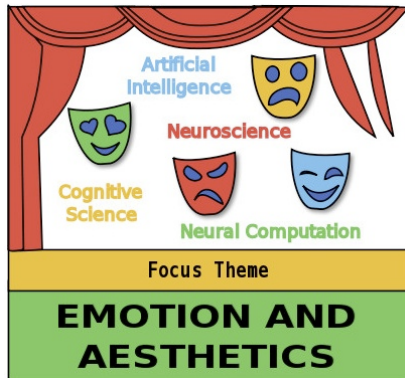
### **Practical Course**

- Advanced Neuro-Evolution on Animats (Christian Rempis)

### **Evening Lectures**

- Will We Ever Reverse Engineer Animal Cognition? (Alex Kacelnik)
- Intuition and Neurobiological Evidence: An Ambiguous Relationship (Wolf Singer)
- Artificial Systems with Consciousness? (Holk Cruse)

## IK 2012



**Focus Theme:** Emotion and Aesthetics

**Chairs:** Fred Hamker, Justin London

### Basic Courses

- Computational Neuroscience (Julien Vitay)
- Neurobiology (Ansgar Büschges)
- Artificial Intelligence (Alexandra Kirsch)
- Philosophical issues in human affectivity (Achim Stephan, Wendy Wilutzky)

### Method Courses

- Neuroimaging (Jessica Grahn)
- Aesthetics (Kathleen Stock)
- Statistics: Significance and beyond (Peter Sedlmeier)
- Machine Learning and neural networks (Herbert Jaeger)

### Special Courses: Emotional Neuroscience

- Neural Substrates for Action Selection: The Basal Ganglia (Mark Humphries)
- Neuroeconomics and pleasure (Oliver Hulme)
- Emotion and Neurorobotics (Paul Verschure)
- Neural Mechanisms of Emotional Attention (Tobias Brosch)

### Special Courses: Psychology and Philosophy of Emotions and Aesthetics

- Music and the Brain (Manfred Spitzer)
- Emotion in Music (Alexandra Lamont)
- Issues in Musical Aesthetics (Justin London)
- Communication of Emotions (Disa Sauter)

### Special Courses: Synthetic Emotions and Robotics

- Human-Robot Interactions (Kerstin Dautenhahn)
- Affective Computing (Dirk Reichardt)

- Social Robotics (Christian Werner Becker-Asano)
- Aikido - A Martial Art with Aesthetics and Emotions (Thomas Christaller)

### **Special Courses: General**

- Digital Media (Rainer Malaka)
- Language and emotions (Gerhard Heyer)
- Cognitive Flexibility and Basal Ganglia (Andrea Stocco)
- Harmony of the Brain (Gerald Langner)

### **Practical Courses**

- Programming Autonomy (Hana Boukricha, Nhung Nguyen)
- Dance in the body, the mind and the brain (Bettina Bläsing)
- Aesthetics in Visual Perception (Gregor Hardiess)

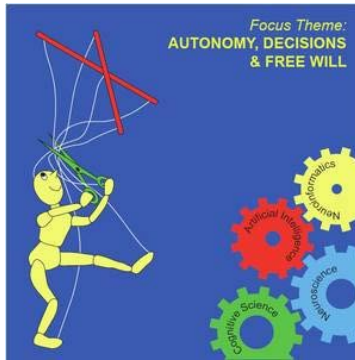
### **Rainbow Courses**

- Multivariate decoding of neural data: Introduction and hands-on (Kai Goergen)
- Investigating psychiatric conditions with functional MRI (Ronald Sladky)
- Non-linguistic metaphor & dance (Lcey Okonski)

### **Evening Lectures**

- Complexity and Wisdom (Gert Scobel)
- Machines that act like persons (Ipke Wachsmuth)
- Really Bad Music (Justin London)

## IK 2011



**Focus Theme:** Autonomy, Decision and Free Will

**Chairs:** John-Dylan Haynes, Michael Pauen, Ipke Wachsmuth

### Basic Courses

- Computational Neuroscience (Fred Hamker)
- Neurobiology (Ansgar Büschges, Manfred Spitzer)
- Cognitive Neuroscience (Hanspeter Mallot)
- Artificial Intelligence (Michael Beetz)

### Method Courses

- Machine Learning (Marc Toussaint)
- Computational Linguistics (Walter Daelemans)
- Functional Neuroimaging (Jens Schwarzbach)
- Philosophy of Cognitive Science (Achim Stephan)

### Special Courses: General

- Therapeutic Robots (Barbara Klein)
- Data Mining (Hagen Langer)
- Neuro-Symbolic Integration (Chris Eliasmith)
- Biomechatronics and Biorobotics (Axel Schneider)

### Special Courses: Goals, Intentions and Free Will

- Volition and Intention (Thomas Goschke)
- Intentional Agents and BDI (Michael Wooldridge)
- Philosophy and Neuroscience of Free Will (Michael Pauen, John-Dylan Haynes)
- Technical Intention Recognition (Sebastian Bader)

### Special Courses: Decisions

- Rationality and Heuristics (Jörg Rieskamp)
- Models of Decision Making (Gregor Schöner)

- Decision Support Systems (Jung P. Shim)
- Neurobiology of Decisions (Tobias Donner)

### **Special Courses: Self-Regulation and Autonomy**

- From Decentralized Control to Free Will (Holk Cruse)
- Neuroprosthetics (Wigand Poppendieck)
- Robot Ethics (Thomas Christaller)
- Control Theory (Jörg Raisch)

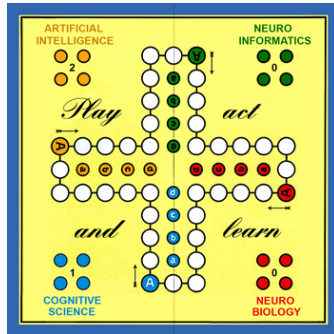
### **Practical Courses**

- Programming Autonomy - Practical - (Nhung Nguyen, Hana Boukricha)
- Experimental-Cognitive Music Lab (Thomas Fritz, Julius Popp)
- Theremin (Barbara Buchholz)
- Robotics Lab (Jochen Steil, Sebastian Wrede, Johannes Wienke)

### **Evening Lectures**

- Robot Ethics (Noel Sharkey)
- Pre-dinner talk (Natalie Sebanz)
- Science in the Media (Ulrich Schnabel)
- Panel Discussion on Free Will (guests: Wolfgang Prinz, Gerhard Roth)

## IK 2010



**Focus Theme:** Play, Act and Learn

**Chairs:** Robert Porzel, Natalie Sebanz, Manfred Spitzer

### Basic Courses

- Computational Neuroscience (Florian Roehrbein)
- Social Challenges for Cognitive Science (Günther Knoblich)
- The Computational Study of Language (John Bateman)
- Neurobiology of Learning (Ansgar Büschges, Manfred Spitzer)

### Method Courses

- Multi-Agent Systems: Hands On (Nhung Nguyen, Hana Boukricha)
- Functional Neuroimaging and Brain Reading (John-Dylan Haynes)
- Implementing Language Games (Vanessa Micelli, Remi van Trijp, Michael Spranger, Pieter Wellens)
- Machine Learning (Herbert Jaeger)

### Special Courses: Artificial Intelligence at Play

- Language Games for Autonomous Robots (Luc Steels)
- Entertainment Computing (Don Marinelli)
- A Cognitive Systems Approach to Cooperative Game Playing (Peter Ford Dominey)
- Reasoning and Action in Location-based Games (Christoph Schlieder)

### Special Courses: Playful Communication and Cooperation

- Experimental Semiotics (Bruno Galantucci)
- Creating Believable Game Characters (Karl Grammer, Lisa Oberzaucher)
- Evolution of Cooperation (Karl Sigmund)
- The Rules of the Game: Cognitive Constraints on Musical Virtuosity and Musical Humor (Justin London)

### Special Courses: Play and Develop

- Role of Play in Development (Sarah Beck)
- Playing in Animals (Ludwig Huber)

- Anthropology of Play (Maurice Bloch)
- Pretence Play (Hannes Rakoczy)

### **Special Courses: The Gaming Experience**

- Human Computation (Massimo Poesio)
- Game Design (Jörg Niesenhaus)
- Intelligent Interactive Entertainment Systems (Marc Erich Latoschik)
- Serious Gaming (Marc Herrlich)
- Affective Computing (Christian Becker-Asano)

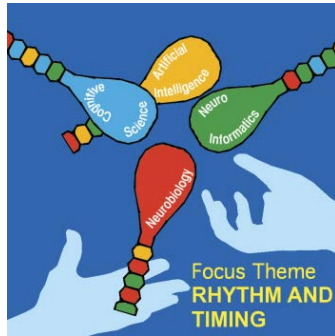
### **Practical Courses**

- Improvisational Theatre (Brenda Harger)
- Tango Argentino (Jytte Koppen and Utz Weißenfels)

### **Evening Talks**

- Playing with Language (Nancy Chang)
- Chess and Mind (Katharina Turecek)
- Brain Dance (Manfred Spitzer and the El Norte Tango Trio and the Maldito Tango Dance Company)
- Pre-Dinner Talk: On Virtuosity (Fraincois Pachtet)

## IK 2009



**Focus Theme:** Rhythm and Timing

**Chairs:** Herbert Jaeger, Thomas Kammer, Gregor Schöner

### Basic courses

- Behavioral Neurobiology (Günther K.H. Zupanc)
- Computational Neuroscience (Christian Leibold)
- Cognitive Science (Natalie Sebanz)
- Philosophy of Mind and Cognition (Achim Stephan)
- The computational study of language Linguistics and Computational Linguistics (John Bateman)

### Method courses

- Functional Neuroimaging and Brain Reading (John-Dylan Haynes)
- Dynamical Systems: a tutorial with an eye on timing and cognition (Gregor Schöner)
- Introduction to Colored Petri Nets (Kurt Jensen)

### Special courses Neuroscience

- Neural Mechanisms for Rhythm (and Pattern) Generation (Ansgar Büschges)
- Time and the Evolution of the Cerebellum (Fahad Sultan)
- Slow Feature Analysis Theory and Applications (Laurenz Wiskott)
- What, Why, When and How of Attention (Peter König)

### Special courses Psychology, Cognition and Philosophy

- When we Speak, we Gesture - How Time in Gesture Reflects and Affects Individual and Interactive Cognitive and Emotional Processes (Hedda Lausberg)
- Numerical Competence (Andreas Nieder)
- The Role of Timing in Social Interaction (Günther Knoblich)
- Philosophy of Time and Time Consciousness (Norman Sieroka)

### Special courses Artificial Intelligence and Robotics

- Human Performance Modelling for Safety Critical Systems (Leon Urbas)
- Reasoning about a Changing World, Actions, and Scripts (Erik Sandewall)



- Biologically Inspired Robotics: Locomotion, Central Pattern Generators, and Motor Primitives (Auke Ijspeert)
- Computational Modelling of Music Cognition and Musical Creativity (Geraint A Wiggins)

### **Rhythm and Timing extra track**

- A Geography of Time (Robert V. Levine)
- Motor Coordination Learning during Childhood and Adolescents (Matthias Weigelt)
- Musical Aesthetics, Rhythm and Meter (Justin London)
- Dynamics of Music Perception (Ed Large)

### **Practical courses**

- Calligraphy - rhythm visualized (Cordula Bork)

### **Evening lectures**

- Modern dance and music performance (Surprise Artists)
- A Geography of Time (Robert V. Levine)
- Predinner Speech Rhythm and Dance: a Neuroscience Perspective (Manfred Spitzer)
- Swinging with the Rhythm - Measuring Duration and Beat and the Effect of Size on Movement Production (Scott Hooper)

## **IK 2008**



**Focus Theme:** Cooperation

**Chairs:** Josep Call, Ipke Wachsmuth

### **Basic Courses**

- Neurobiology (Ansgar Büschges)
- Neural Networks (Herbert Jaeger)
- Cognitive Science (Günther Knoblich)
- Artificial Intelligence and Robotics (Andreas Birk, Andreas Nüchter)

### **Methods Courses**

- Neuroimaging (Jens Schwarzbach)
- Behavioral Economics (Werner Güth, Oliver Kirchkamp)
- Cooperative Project Management in Research (Wolfgang Samlowski)

### **Special Courses: Biology/Neurobiology**

- Evolution of Cooperation (Peter Hammerstein)
- Animal Communication (Elke Zimmermann)
- Swarm Intelligence (Guy Theraulaz)
- Animal Cooperation (Redouan Bshary)

### **Special Courses: Neuroinformatics/Economics**

- Neuroeconomics (Armin Falk)
- Neural Field Theory and Neural Dynamics (Gregor Schöner)
- Game-theoretic Modeling of Cultural Language Evolution (Gerhard Jäger)
- Music Cooperation (François Pachet)

### **Special Courses: Cognitive Science**

- Origins of Human Cooperation (Michael Tomasello)
- Joint Action: Behavioural and Brain Mechanisms (Natalie Sebanz)
- Behavioral Economics in Apes (Keith Jensen)

- Networked Team Cooperation (Nikol Rummel, Jürgen Vogel)

### **Special Courses: Artificial Intelligence / Robotics**

- Emergent Communication as a Form of Cooperation (Luc Steels)
- Cooperative/Competitive Behavior Acquisition in Robotic Soccer (Minoru Asada, Yasutake Takahashi)
- Multi-Agent Organizations (Virginia Dignum)
- Cooperative Systems for Human-Computer Interaction (Stefan Kopp)
- Structure and Evolution of Collaborative Web-Based Systems (Ciro Cattuto)

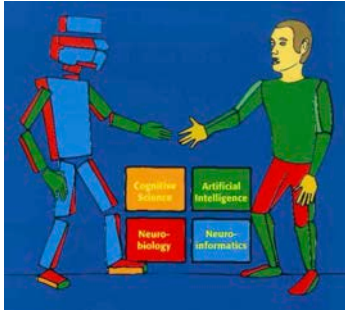
### **Practical Courses**

- How to Coordinate Musical Performances (Ruth-Iris Frey-Samlowski)
- African Drumming (Nils Kercher)

### **Evening Lectures**

- Kommunikation und Täuschung in tänzerischer Kooperation / Communication and deceit in dance cooperation (Martin Puttke, aalto ballett theater essen)
- Social dilemmas, freedom and enforcement (Karl Sigmund)
- The neural machinery of an economic mind (Onur Güntürkün)
- Humankind as a superorganism: cooperation as driving force (Franz-Josef Radermacher)

## **IK 2007**



**Focus Theme:** Embodied Minds

**Chairs:** Ansgar Büschges, Stefan Kopp

### **Basic Courses**

- Artificial Intelligence (Michael Thielscher)
- Neurobiology (Manfred Spitzer)
- Cognitive Science (Gerhard Strube)
- Neuroinformatics (Barbara Hammer)

### **Method Courses**

- Modelling Animal Behavior (Holk Cruse)
- Engineering Humanoid Robots (Oskar von Stryk)
- Brain Mapping and Functional Imaging (Peter Weiss-Blankenhorn)
- Machine learning - Learning in embodied and situated systems (Gregor Schöner)

### **Special Courses: Embodied Perception**

- Mirror Systems (Leonardo Fogassi)
- Active Sensing (Norbert Boeddeker)
- Cognitive Neurology of Embodiment (Peter Brugger)
- The Embodied Visual System (Maggie Shiffrar)

### **Special Courses: Embodied Cognition**

- Action Selection (Bernhard Hommel)
- Situation Models (Rolf A. Zwaan)
- Spatial Cognition (Hanspeter Mallot)
- Embodying AI — GOF AI Goes Robotics (Joachim Hertzberg)

### **Special Courses: Embodied Communication**

- Embodied Conversational Agents (Catherine Pelachaud)
- Embodied models of language learning and use (Sriniv Narayanan, Nancy Chang)
- Non-verbal Communication (Karl Grammer, Nicole Krämer)

- Contextual Computing (Rainer Malaka, Robert Porzel)

### **Special Courses: Body and Mind in Theory, Action and Development**

- Evolving Robots (Hod Lipson)
- Cortical control of robotic and prosthetic systems (Dawn Taylor)
- Embodiment and disembodiment: Conceptual foundations and a case-study. (Thomas Metzinger)
- Prosthetics (Klaus-Peter Hoffmann)

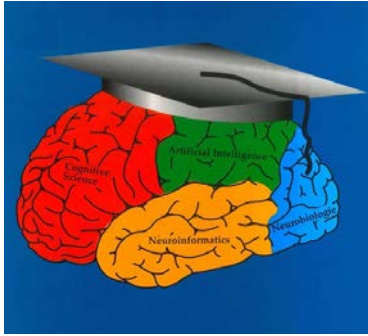
### **Special event courses**

- Aikido. A Japanese Martial Art As Embodied Meditation (Thomas Christaller)
- African Drumming (Nils Kercher)

### **Evening Talks**

- The Neuroscience of Out-of-body Experiences (Olaf Blanke)
- Embodied Communication with a Virtual Human (Ipke Wachsmuth)
- Cooperation in Primates (Josep Call)

## **IK 2006**



**Focus Theme:** Learning

**Chairs:** Rainer Malaka, Manfred Spitzer

### **Basic Courses**

- Artificial Intelligence (Wolfram Burgard)
- Neurobiology (Ansgar Büschges)
- Cognitive Science (Hanspeter Mallot)
- Machine Learning and Neural Networks (Herbert Jaeger)

### **Method Courses**

- Bayesian Modelling for Data Analysis and Learning from Data: From Linear Models to Gaussian Processes (Matthias Seeger)
- How to measure learning and memory. Lessons from psychology (Thomas Kammer, Markus Kiefer)
- Functional imaging (Thomas Wolbers)

### **Special Courses: Mechanisms of learning**

- Neuroplasticity – are there after all options not to change brains? (Hubert Dinse)
- Learning und Sleep (Lisa Marshall)
- Formal learning theory and the brain (Philippe Tobler)
- Learning as knowledge acquisition (Gerhard Strube)

### **Special Courses: Computational Models Knowledge and Learning**

- Reinforcement Learning, Neuroinformatics (Martin Riedmiller)
- Ontology Learning and Ontology Mapping (Steffen Staab)
- Neural-symbolic learning and reasoning (Pascal Hitzler, Sebastian Bader)
- The emergent ontology: knowledge collectives and conceptual design patterns (Aldo Gangemi)

### **Special Courses: Learning by Machines and Robots**

- A Neural Theory of Language Learning and Use (Srini Narayanan)
- From Sensorimotor Sequence to Grammatical Construction: Insights from Neurophysiology, Simulation and Robotics (Peter Dominey)

- The Recruitment theory of Language Origins (Luc Steels)
- Cognitive Developmental Robotics (Minoru Asada)

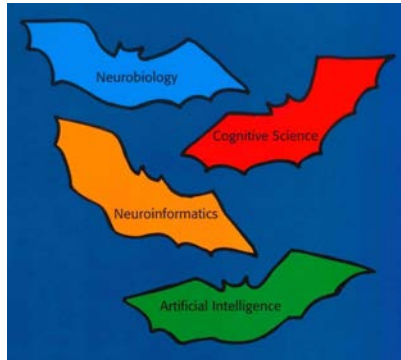
### **Special Courses: Developmental, Evolution and Neuropsychology**

- Language Acquisition: An interdisciplinary perspective Description (Kim Plunkett)
- Psychopathology in Adolencense (Matthias Weisbrod, Rieke Oelkers-Ax)
- Learning and problem solving in monkeys and apes (Josep Call)
- The evolution of cognition and learning (Peter Gärdenfors)

### **Evening Talks**

- On Happiness. From Psychology to Neuroeconomics, and Back (Manfred Spitzer)
- A sensorimotor hypothesis for the evolution of cognition (Holk Cruse)
- The Intelligent Classroom of the Future (Raúl Rojas)
- Learning Societies? On the Humancentric Trend in Modern Societies (Chris Welzel)

## **IK 2005**



**Focus Theme:** Real, Mental and Virtual Space

**Chairs:** Nicole Krämer, Hanspeter Mallot

### **Basic Courses**

- Artificial Intelligence (Joachim Hertzberg)
- Systems Neurobiology (Manfred Spitzer)
- Cognitive Science (Stephan Schwan)
- Computation in Neural Systems - Vision in Biological and Computational Systems (Heiko Neumann)

### **Methodical Courses**

- Cognitive Neuroscience and Psychophysics (Sabine Gillner)
- Virtual Reality for Human Computer Interaction (Marc Erich Latoschik)
- Simulating Animal Behaviour (Ansgar Büschges, Holk Cruse)

### **Special Courses: Evolution of spatial behaviour**

- Urban Ethology - From the Savannah into Crowded Cities (Elisabeth Oberzaucher)
- The vestibular system: sensing and controlling motion in space (Stefan Glasauer)
- Spatial cognition of animals during food search behaviour (York Winter)
- Orientation and navigation in animals - Evolution of spatial cognition (Markus Knaden)
- Neural mechanisms of spatial cognition (Sidney I Wiener)

### **Special Courses: Perception, memory and usage of space**

- Human Spatial Cognition (Daniel Montello)
- Perception of architectural spaces (Gerald Franz)
- Language and Space (Joachim Grabowski)
- Perspective Taking in Spatial and Social Cognition (Kai Vogeley)

### **Special Courses: Virtual spaces**

- Immersive Virtual Environment Technology: Principles and Practice (Andrew C. Beall)
- Human Behavior in Immersive Virtual Environments (James J. Blascovich)



- Net-based/computer-mediated communication (Friedrich W. Hesse)
- Presence and perception in virtual environments (Wijnand Ijsselstein)
- The Factual, the Fictional, the Virtual: Finding One's Way Around (Margrit Schreier)

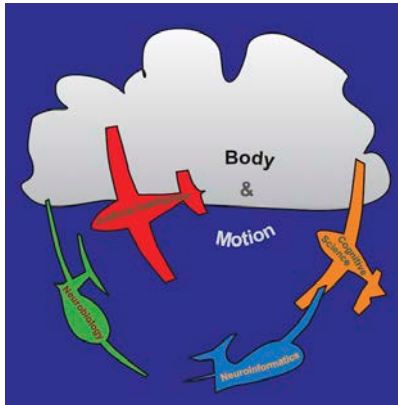
#### **Special Courses: Concepts of space**

- Space as Construct: An Antinomy (Karsten Harries)
- Spatial Representation for Robots (Ralf Möller)
- Spatial Inference (Christian Freksa)

#### **Evening Talks**

- Embodied Communication (Ipke Wachsmuth)
- Space: a cosmologist's view (Marcus Brüggem)
- The role of embodiment in virtual encounters (Gary Bente)

## **IK 2004**



**Focus Theme:** Body and Motion

**Chairs:** Herbert Jaeger, Holk Cruse

### **Basic Courses**

- Systems Neurobiology (Manfred Spitzer)
- Neural Computation (Laurenz Wiskott)
- Artificial Intelligence (Ipke Wachsmuth)
- From perception to action and back (Bernhard Hommel)

### **Methods Courses**

- Neural Dynamics (Klaus Pawelzik)
- Analysis and Interpretation of Spike Time Data (Sonja Grün)

### **Special Courses: Neurobiology**

- Neural circuits for locomotion (Ansgar Büschges)
- The vestibular system: sensing and controlling motion in space (Stefan Glasauer)
- Sensorimotor Transformations for Moving in Three Dimensions (John Soechting)

### **Special Courses: Neuroinformatics**

- Classifying visual stimuli with attractors of the neural dynamics: concepts and brain experiments (Stefano Fusi)
- Dynamical Systems Approach to Represent Cognition of Robots (Jun Tani)
- Intelligent data analysis (Rudolf Kruse, Christian Borgelt)

### **Special Courses: Artificial Intelligence / Robotics**

- Evolving embodied grammars for autonomous humanoid robots (Luc Steels)
- Synthetic Modeling: Biorobotics and Cognitive Robotics (Ralf Möller)
- Intelligent Information Integration for the Semantic Web (Ubbo Visser)
- Case-based reasoning (Klaus-Dieter Althoff)

**Special Courses: Psychology / Cognitive Science**

- Guiding movement (David Lee)
- The Cognitive Science of Mathematics (Rafael Nunez)
- The brain in action (Marc Jeannerod)

**Special Courses: Motion**

- How simple models can help us to understand human movement (McNeill Alexander)
- Learning in the Recognition and Control of Human Body Movements (Martin Giese)
- Muscle, Motion, and Selfstability (Reinhard Blickhan)
- Education Initiative "Move to Learn" – Exercise, Enjoyment, Education (Jimmy Little)

**Evening Lectures**

- Desert ant navigation: mini brains - mega tasks - smart solutions (Rüdiger Wehner)
- Vectors, Landmarks, Maps: An Evolutionary Approach to Spatial Cognition (Hanspeter Mallot)
- music for a human body - composing movements by organizing sounds (Robin Hoffmann)

## **IK 2003**



**Focus Theme:** Applications, Brains and Computers

**Chairs:** Gerhard Strube, Rainer Malaka

### **Basic Courses**

- Neurobiology (Uwe J. Ilg)
- Cognitive Science: Foundations, Trends, and Applications (Peter Bosch, Franz Schmalhofer)
- Neural Networks (Christian Borgelt, Rudolf Kruse)
- Artificial Intelligence (Günther Görz)

### **Methods Courses**

- Brain Mapping (Thomas Kammer)
- A short trip from pixels to objects (Thorsten Hermes, Andreas Winters)

### **Special Courses: Biomedical Applications**

- Visual Perception - Function and Malfunction (Michael Bach)
- Neuropsychology - The limits of cerebral localization (Georg Goldenberg)
- Clinical Aphasiology and Psycholinguistics (Gerhard Blanken)
- Neuroimplants (Thomas Schanze)

### **Special Courses: User-Friendly Information Systems**

- Soft Constraints on Interactive Behavior: Perspectives, Recent Research, and Future Directions (Wayne D. Gray)
- Usability Engineering (Dieter Wallach)
- Systems That Adapt to Their Users (Anthony Jameson)
- Towards a user-friendly Web experience - research & applications (Christoph Hölscher)

### **Special Courses: Language and Dialog Systems**

- Natural and multi-modal interaction (Andrea Corradini)
- The Neural Theory of Language (Jerome Feldman)
- Embodied Conversational Characters - Design and Applications (Elisabeth André, Thomas Rist)

### **Special Courses: Engineering**

- Kalman Filter Training of Neural Networks: Methodology and Applications (Danil Prokhorov)
- Probabilistic Robotics (Wolfram Burgard)
- Statistical Learning Theory (Bernhard Schölkopf, Olivier Bousquet)

#### **Special Courses: Education & Collaboration**

- Net-based Knowledge Communication in Groups (Friedrich W. Hesse)
- Computer supported discovery learning: pitfalls and solutions (Ton de Jong)
- Collaborative Design: Theory, Systems, Practice, and Assessment (Gerhard Fischer)
- Learning: From Neurons to PISA (Manfred Spitzer)

#### **Evening Talks**

- Different Views on Multimodal Assistance (Stefan Rapp)
- Spatial Cognition: From Rat-Research to Multifunctional Spatial Assistance Systems (Markus Knauff)
- Max, our Agent in the Virtual World. A machine that communicates with humans (Ipke Wachsmuth)
- Control of hexapod walking in animals and robots (Holk Cruse)

## **IK 2002**



**Focus Theme:** Autonomie und Emotion

**Chairs:** Thomas Christaller, Manfred Spitzer

### **Basic Courses**

- Neurobiologie (Manfred Spitzer)
- Dynamische Systeme und rekurrente Neuronale Netze: Eine Einführung (Frank Pasemann)
- Introduction to Cognitive Science (Gerhard Strube)
- Künstliche Intelligenz (Christoph Beierle, Gabriele Kern-Isberner)

### **Special Courses: Neurobiology and Neurology track**

- The cognitive neuroscience of volition and its disorders (Henrik Walter)
- Der Präfrontale Cortex (Onur Güntürkün)

### **Special Courses: Neuroscience track**

- Learning and Autonomy in Humanoid Robots Inspired by Principles of Computational Neuroscience (Stefan Schaal)
- Emotion and Learning in Context: From Biology to Robotics (Christian Balkenius)
- Generating behavior and representations through attractor states of dynamical systems: analysis and synthesis (Gregor Schöner)
- Decomposing brain signals (Klaus-Robert Müller)

### **Special Courses: Cognitive Science track**

- Philosophie des Geistes, Bewusstseinsphilosophie. (Michael Pauen)
- The building blocks of behavior: Biological system constraints in human communication (Karl Grammer)
- ABC: Anticipative Behavioral Control (Joachim Hoffmann)
- Cognition, emotion, and executive control (Thomas Goschke)

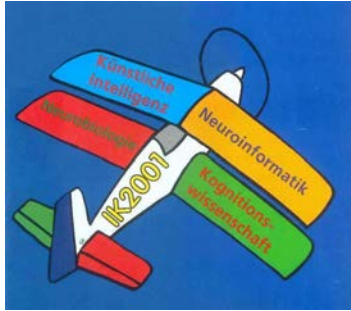
### **Special Courses: Artificial Intelligence track**

- Evolutionary Robotics: The Biology, Technology, and Intelligence of Self-Organizing Machines (Dario Floreano)
- Embodied cognition from the dynamical systems perspectives (Jun Tani)
- Architectures for emotional animals and machines (Aaron Sloman)
- Machine Learning (Stefan Wrobel)
- Autonomous Behavior in Multiagent Systems (Christoph Schlieder, Thorsten Hermes, Ingo Timm)

### **Evening Talks**

- How Much Intelligence Do You Need to Play Soccer? (Bernhard Nebel)
- presentation of new journal "Gehirn & Geist" by Dr.Reinhard Breuer, Spektrum der Wissenschaft
- Software Individuals: an Approach to the Software Design for Long-Living AI Systems (Erik Sandewall)

## **IK 2001**



**Focus Theme:** Kommunikation

**Chairs:** Ipke Wachsmuth, Elke Zimmermann

### **Basic Courses**

- Neurobiologie (Ursula Dicke, Gerhard Roth)
- Neuronale Netze (Rainer Malaka)
- Kognitionswissenschaft (Gerhard Strube)
- Künstliche Intelligenz (Thomas Christaller)

### **Special Courses: Neurobiology track**

- Der präfrontale Cortex (Onur Güntürkün)
- How the brain analyses the acoustic environment (Georg Klump)
- Kommunikationssysteme bei sozialen Insekten (Jürgen Heinze)
- Wie steuert das Gehirn Sprache und den nonverbalen akustischen Ausdruck? (Uwe Jürgens)

### **Special Courses: Neuroscience track**

- Bildgebende Verfahren (Thomas Kammer)
- Mathematics for the neural and cognitive sciences (Christian Eurich, Hanspeter A. Mallot)
- Automatische Spracherkennung (Raul Rojas)
- Eye-Tracking (Elena Carbone, Hendrik Kösling)

### **Special Courses: Cognitive Science track**

- Coverbal gesture in human communication (David McNeill, Francis Quek)
- Social cognition and gestural communication in primates (Josep Call)
- Human sentence processing (Barbara Hemforth/Lars Konieczny)
- Knowing, doing and feeling: communicating with your digital products (Caroline Hummels, Tom Djajadiningrat)

### **Special Courses: Artificial Intelligence track**

- Communication with humanoid robots (Luc Steels)
- Sprachdialogsysteme (Günther Görz, Martin Klärner)
- Kommunizierende virtuelle Agenten und Avatare (Stefan Kopp, Nicole Krämer)



- Soziale Kommunikation und KI (Petra Ahrweiler)

### **Evening Talks**

- E-motion: Digital image analysis of human body movements (Karl Grammer)
- Der Sonderforschungsbereich "Situierte Künstliche Kommunikatoren" (SFB 360) (Gert Rickheit, Ipke Wachsmuth)
- Manuelle und nichtmanuelle Parameter der Deutschen Gebärdensprache (Helen Leuninger, Daniela Happ)
- The neurobiology of music perception: cortical processing of time- and pitch-structures (Eckart O. Altenmüller)
- Musterverarbeitung im Hörcortex (Henning Scheich)

## **IK 2000**



**Focus Theme:** Sehen und Handeln

**Chairs:** Gerhard Roth, Hanspeter Mallot

### **Grundkurse**

- Neuronale Netze (Raul Rojas)
- Neurobiologie (Gerhard Roth)
- Kognition (Gerhard Strube)
- Künstliche Intelligenz (Stefan Wrobel)

### **Spezialkurse Neurobiologie**

- Präfrontaler Cortex (Onur Güntürkün)
- Bewegungssteuerung einschl. Blicksteuerung (Frank Bremmer)
- Hirnevolution (Mario Wullimann)
- Neuroethologie (Hermann Wagner)
- Motorsysteme und motorische Erkrankungen (Reinhard Dengler)

### **Spezialkurse Kognitionswissenschaften**

- Visuelle Wahrnehmung (Michael Bach)
- Kognition und Gehirn (Thomas Kammer)
- Neurophilosophie (Michael Pauen)
- Kognition und Handlung (Hanspeter Mallot)

### **Spezialkurse Neuroinformatik**

- Neuronale Netzwerke und Computersehen (Helge Ritter)
- Gehirn als dynamisches System (Klaus Pawelzik, Christian Eurich)
- Statistische Lerntheorie (Bernhard Schölkopf, Microsoft Research)
- Neuronale Signalverarbeitung (Klaus Pawelzik, Christian Eurich)

### **Spezialkurse Künstliche Intelligenz**

- Biomimetische Robotik (Ralf Möller)

- Gesichtserkennung (Thomas Vetter)

### **Abendprogramm**

- Zeitliches und Räumliches Imaging kognitiver Prozesse (Thomas Münte)
- Künstliche Intelligenz - Was ist das eigentlich? (Thomas Christaller)
- The alpha and omega of motion vision: From detector to perception (Wim van de Grind)

**1999: no IK**

## **IK 1998**



**Focus Theme:** Sprache und Kommunikation

**Chair:** Raul Rojas

### **Grundkurse**

- Neurobiologie (Gerhard Roth)
- Künstliche Neuronale Netze - Theorie und Praxis (Günther Palm)
- Einführung in die KI (Ipke Wachsmuth)
- Kognitive Systeme - Eine Einführung in die Kognitionswissenschaft (Gerhard Strube)

### **Theoriekurse**

- Das komplexe reale Neuron (Helmut Schwegler)
- Connectionist Speech Recognition (Herve Bourlard)
- Perception of Temporal Structures -- Especially in Speech (Robert F. Port)
- Sprachstruktur - Hirnarchitektur ; Sprachverarbeitung - Hirnprozesse (Helmut Schnelle)
- Optimierungsstrategien für neuronale Lernverfahren (Helge Ritter)

### **Spezialkurse**

- Hybride konnektionistische und symbolische Ansätze zur Verarbeitung natürlicher Sprache (Stefan Wermter)
- Intelligente Agenten für Multimedia-Schnittstellen (Wolfgang Wahlster, Elisabeth Andre)
- Wie hört das Gehirn - Neurobiologie des Hörsystems (Günter Ehret)
- Sprachproduktion (Thomas Pechmann)
- Wissensmanagement mit Multiagentensysteme (Boris Petkoff)
- Bildverarbeitung in der Postautomatisierung mit Neuronalen Netzen (Marcus Pfister)

### **Disziplinübergreifende Kurse**

- Fuzzy und Neurosysteme (Rudolf Kruse, Detlev Nauck)
- Zeitliche Kognition (Ernst Pöppel, Till Rönneberg)
- The origins and evolution of language and meaning (Luc Steels)

- Kontrolle von Bewegung in biologischen Systemen und Navigation mobiler Roboter (Thomas Christaller, Josef Schmitz)
- Optimieren neuronaler Netze durch Lernen und Evolution (Heinrich Braun)
- Koordination von Sprache und Handlung (Wolfgang Heydrich, Hannes Rieser)
- Dynamik spikender Neurone und Zeitliche Kodierung (Andreas Herz)

#### **Abendprogramm**

- Vortrag von Angela D. Friederici
- Sprachtechnologie: Vom kognitiven Modell bis zum Produkt (Wolfgang Wahlster)
- Vortrag von Robert F. Port
- Fußball, Roboter und Computer: Der RoboCup (Hans-Dieter Burkhard)

## IK 1997



### (No focus theme)

**Chairs / Organisation team:** Christopher Habel, Hanspeter Mallot, Helge Ritter, Claus Rollinger, Kerstin Schill

### Grundkurse

- Neurobiologie (Ursula Dicke, Gerhard Roth, Wolfgang Wiggers)
- Künstliche Neuronale Netze - Theorie und Praxis (Raul Rojas)
- Künstliche Intelligenz (Otthein Herzog, Claus Rainer Rollinger)
- Kognitive Systeme - Eine Einführung in die Kognitionswissenschaft (Gerhard Strube)

### Theoriekurse

- Das komplexe reale Neuron (Helmut Schwegler)
- Unüberwachte Datengruppierung und Visualisierung mit künstlichen neuronalen Netzen (Joachim M. Buhmann)
- Inferenzsysteme (Ulrich Furbach)
- Kognitive Modelle natürlicher Intelligenz (Werner H. Tack)

### Spezialkurse

- Meßmethoden und bildgebende Verfahren (Hans-Jochen Heinze, Hermann Hinrichs)
- Optimierungstrategien für neuronale Lernverfahren (Helge Ritter)
- New Artificial Intelligence - Real-World Autonomous Agents (Hansruedi Früh, Ralf Salomon)
- Multimodales Gedächtnis (Hubert D. Zimmer)

### Disziplinübergreifende Kurse

- Dynamik neuronaler Systeme: Synchronisation - Desynchronisation - Segmentierung (Reinhard Eckhorn, Frank Pasemann)
- Kontrolle von Bewegung in biologischen Systemen und Navigation mobiler Roboter (Holk Cruse, Thomas Christaller)
- Zeitliche Kognition (Ernst Pöppel, Till Roenneberg)
- Data Mining und Regelextraktion (Joachim Diederich, Stefan Wrobel)
- Sehen (Heiko Neumann, Hanspeter Mallot)
- Raumkognition (Axel Buchner, Christopher Habel, Karl Wender)

### **Abendvorträge**

- Neuronale Netze: Biologie vs. Technik (Guenther Palm)
- Zwischen Biologie und Semantik - zur mimischen Kommunikation des Menschen (Wulf Schiefenhoewel)
- Pre-Dinnertalk (Norbert Szyperski)
- From Living Insects to Seeing Machines (M.V. Srinivasan)