

Introductory Remarks to Symposium 16

Big science, big challenges, and the diversity of life sciences – where does neuroscience go?

Andreas Draguhn and Constanze Seidenbecher, Heidelberg and Magdeburg

Neuroscience figures prominently within the scientific community, public funding organizations and societal discourse. This may be due to two reasons: (1) the biological foundations of behavior, emotions and cognition are at the heart of our self-understanding as human beings; (2) our aging societies are in growing need of innovative medical tools to prevent and treat neurodegenerative disorders. Despite the impressive scientific dynamics, major neuroscientific concepts (e.g., memory, cognition, representation, consciousness) are used in loosely defined and heterogeneous ways. There is also little discourse about the structure of neuroscientific arguments, e.g., the precise meaning of claims for causality, the relation between findings at different system levels, the explanatory role of computer models and similarities between brains and IT artefacts. At the same time, 'big science' has entered the field of neurosciences with large-scale projects generating unprecedented amounts of data and creating hopes for transformative progress in basic research and medical applications. This recent development changes the scientific landscape and raises important questions on the co-existence of individual, hypothesis-driven projects and industrial-scale research programs.

The symposium will unite renowned neuroscientists and science publishers to discuss these recent developments from different perspectives. Petra Ritter (Berlin) will illustrate how integration of multi-modal data is used to construct digital twins which reveal new insights into brain dynamics and function. Alison Abbott (Munich) will draw on different examples to highlight the challenges and advantages that big data offers to journalists looking for reliable narratives. Finally, Peter Stern (Cambridge) will address the recent exponential increase in mega-scale science projects and discuss the resulting new opportunities and challenges. We hope that the symposium will reinforce awareness for recent developments in neuroscience and trigger fruitful discussions during the event and beyond.

We dedicate this symposium to our late colleague Yves Frégnac, who has made fundamental contributions to the critical discourse on modern neurosciences. His voice will be missed.

Symposium 16

*Thursday, March 27, 2025
14:30 - 16:30, Lecture Hall 8*

Chairs: Andreas Draguhn and Constanze Seidenbecher,
Heidelberg and Magdeburg

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| 14:30 | Welcome and Opening Remarks |
| 14:35 | Andreas Draguhn, Heidelberg
IN MEMORY OF YVES FRÉGNAC – A CRITICAL MIND IN THE SCIENCE OF THE MIND (S16-1) |
| 14:45 | Petra Ritter, Berlin
AN INTERDISCIPLINARY AND THEORY DRIVEN APPROACH TO INTEGRATE MULTIPLE DATA SOURCES THAT INFORM BRAIN FUNCTION ACROSS BIOLOGICAL SCALES (S16-2) |
| 15:15 | Alison Abbott, Munich
COMMUNICATING NEUROSCIENCE IN THE ERA OF BIG DATA (S16-3) |
| 15:45 | Peter Stern, Cambridge, UK
NEUROSCIENCE – PAST DEVELOPMENTS AND EMERGING TRENDS (S16-4) |
| 16:15 | Discussion and Concluding Remarks |