Curriculum Vitae

Prof. Dr. habil. Thomas R. Knösche

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Education

Habilitation	2010, Topic "*On the Non-Invasive Reconstruction of the Functional and Anatomical Basis for Cognitive Function",* Ilmenau University of Technology (Germany)
PhD	1997, Topic: "*The neuroelectromagnetic inverse problem – an evaluation study",* Technical University Twente (Netherlands)
Diploma	1992, Topic: "*Modelling of magnetocardiographic signals",* Ilmenau University of Technology (Germany)
Study	1987-1992, Course: *General and Theoretical Electrical Engineering,* Ilmenau University of Technology (Germany)
	1990-1991, Course: *Control Engineering,* Sheffield City Polytechnic (now Sheffield Hallam University, UK)

Positions

2018 – today	Honorary Professor of Imaging and Modeling in the Neurosciences at Ilmenau University of Technology (Germany)
2006 – today	Head of Research and Development Group „MEG & Cortical Networks"
2001 – 2006	Scientist at MPI for Human Cognitive and Brain Sciences, Leipzig (Germany)
1999 – 2001	R&D-Manager at A.N.T. Software B.V., Enschede (Netherlands)
1997 – 1998	PostDoc at MPI for Cognitive Neuroscience, Leipzig (Germany)
1993 – 1996	PhD student and research assistant, Technical University Twente, Enschede (Netherlands)
1992 – 1993	PhD student, Ilmenau University of Technology (Germany)

Research Interests

- Mathematical modeling of neuronal networks, with focus on mean field models.
- Biophysical modeling of EEG and MEG, with focus on source reconstruction.
- Reconstruction of fiber connections in the brain using diffusion MRI.
- Neurocognition of music, language and memory.

Grants

(Selection)

2000 – 2003	"SimBio - A Generic Environment for Bio-numerical Simulation" EU (IST-Project 10378)
2003 – 2005	"New multimodal strategies and statistical methods for the analyis of brain activity" AiF (ProINNO-Project KF0536001KLF3)
2004 – 2006	"Neuropsychological investigations on the cognitive processing of musical phrasing and its neurological relevance" DFG (KN588/1)
2006 – 2009	"Development and validation of methods for the localization of brain activity using finite elements" DFG (KN588/2)
2007 – 2010	"Development and validation of methods for the localization of brain activity using the finite element method" DFG (KN588/3)
2007 – 2010	"Cortical networks and modeling cognitve functions" Max Planck Society (Inter-institutional Research Initiative)
2009 – 2010	"Interactive visualization of highly complex structural and functional data in medicine and neuroscience" AiF (ZIM-Project KF2034701SS8)
2009 – 2012	„Consortium of Neuroimagers for the Non-invasive Exploration of Brain Connectivity and Tractography" EU (FP7-ICT-2007-C)
2010 – 2011	KORANET Pilot Joint Call Proposal KORANET- 038 "A Computational approach to Analyzing Morphology and Connectivity relationship in human brains with Alzheimer's Disease" BMBF [German Ministry for Education and Science]
2011 – 2014	"Development, validation and application of methods for estimating connectivity between brain structures" DFG (KN588/4-1)

2011 – 2014	"Multimodal neuronavigation system for the integration of transcranial magnetic stimulation and the visualization of nerve fibers" AiF (ZIM-Project KF2034702KJ1)
2014 – 2016	"Development of an innovative technology for reliable and fast computation of standardized EEG based on high resolution measurements" AiF (ZIM-Project KF2034703KJ3)
2018 – 2021	"The dynamic connectome of language in the brain" DFG (KN 588/7-1) within priority programme "Computational Connectomics" (SPP 2041)

Publications

(peer reviewed journal papers only)

Computational Neuroscience – Neural Modeling

T. Kunze, A.D.H. Peterson, J. Haueisen, T.R. Knösche: A Model of Individualized Canonical Microcircuits Supporting Cognitive Operations, *PLoS ONE* 12(12): e0188003.

P. Wang, T.R. Knösche: A realistic neural mass model of the cortex with laminar-specific connections and synaptic plasticity – evaluation with auditory habituation, *PLoS ONE* 8(10) e77876 (2013)

M. Nguyen Trong, I. Bojak, T.R. Knösche: Associating spontaneous with evoked activity in a neural mass model of visual cortex, *NeuroImage* 66, 80-87 (2012)

A. Spiegler, T.R. Knösche, K. Schwab, J. Haueisen, F.M. Atay: Modeling brain resonance phenomena using a neural mass model, *PLoS Computational Biology*, 7(12) (2011)

A. Spiegler, S. Kiebel, F. Atay, T.R. Knösche: Bifurcation analysis of neural mass models: impact of extrinsic inputs and dendritic time constants. *NeuroImage* 52(3), 1041-1058 (2010)

K.E. Stephan, M. Tittgemeyer, T.R. Knösche, R.J. Moran, K.J. Friston: Anatomically informed priors for dynamic causal models, *NeuroImage* 47, 1628-1638 (2009

Diffusion MRI and Tractography

M. Tittgemeyer, L. Rigoux, T.R. Knösche: Cortical parcellation based on structural connectivity: A case for generative models. *NeuroImage*, 175: 592-603 (2018)

T.R. Knösche, A. Anwander, M. Liptrot, T.B. Dyrby: Validation of tractography – comparison with manganese tracing. *Human Brain Mapping*, 36(10):4116-34 (2015)

T. Riffert, J. Schreiber, A. Anwander, T.R. Knösche: Beyond fractional anisotropy: extraction of bundle-specific structural metrics from crossing fiber models. *NeuroImage* 100, 176–191 (2014)

D. Moreno-Dominguez, A. Anwander, T.R. Knösche: A Hierarchical Method for Whole-Brain Connectivity-Based Parcellation. *Human Brain Mapping* 35, 5000–5025 (2014)

A. Viehweger, T. Riffert, B. Dithal, T.R. Knösche, A. Anwander, M. Bauer, H. Stepan, I. Sorge, W. Hirsch: The Gini-coefficient: A new method to assess fetal brain development. *Pediatric Radiology* 44(10), 1290-1301 (2014)

J. Schreiber, T. Riffert, A. Anwander, T.R. Knösche: Plausibility Tracking: A method to evaluate anatomical connectivity and microstructural properties along fiber pathways. *NeuroImage* 90, 163-178 (2014)

M. Ruschel, T.R. Knösche, A.D. Friederici, R. Turner, S. Geyer, A. Anwander: Connectivity architecture and subdivision of the human inferior parietal cortex revealed by diffusion MRI. *Cerebral Cortex* 24(9): 2436-2448 (2014)

S.A. Kotz, A. Anwander, H. Axer, T.R. Knösche: Beyond cytoarchitectonics: The internal and external connectivity structure of the caudate nucleus, *PLoS ONE* 8(7), e70141 (2013)

Y. Assaf, D. Alexander, D. Jones, A. Bizzi, T. Behrens, C. Clark, Y. Cohen, T. Dyrby, P. Huppi , T.R. Knösche, D. Le Bihan, G. Parker, CONNECT consortium: The CONNECTOME and micro-structure, *Neuro*Image 80:273-282 (2013)

P. Schönknecht, A. Anwander, F. Petzold, S. Schindler, T.R. Knösche, H. E. Möller, U. Hegerl, R. Turner, S. Geyer: Diffusion imaging-based subdivision of the human hypothalamus: a magnetic resonance study with clinical implications. *European Archives of Psychiatry and Clinical Neuroscience* 263(6):497-508 (2013

D.K. Jones, T.R. Knösche, R. Turner: White matter integrity, fiber count, and other fallacies: the do's and don't's of diffusion MRI. *NeuroImage*, 73, 239-54 (2013)

R.M. Heidemann, A. Anwander, T. Feiweier, T.R. Knösche, R. Turner: k-space and q-space: Combining ultrahigh spatial and angular resolution in diffusion imaging using ZOOPPA at 7T. *NeuroImage* 60(2), 967-978 (2012)

T.R. Knösche and M. Tittgemeyer: The role of long-lange connectivity for the characterization of the functional-anatomical organization of the cortex, *Frontiers in System Neuroscience* 5:58. (Epub 2011)

R.M. Heidemann, D.A. Porter, A. Anwander, T. Feiweier, K. Heberlein, T.R. Knösche, R. Turner: Diffusion imaging in humans at 7T using readout-segmented EPI and GRAPPA. *MRM* 64(1), 9-14 (2010)

R.I. Schubotz, A. Anwander, T.R. Knösche, D.Y. von Cramon, M. Tittgemeyer: Connectivity-based parcellation of the precentral gyrus, *NeuroImage* 50, 396-408 (2010)

T.S. Yo, A. Anwander, M. Descoteaux, P. Fillard, C. Poupon, T.R. Knösche: Quantifying brain connectivity: a comparative tractography study, *Med Image Comput Comput Assist Interv.* 12(Pt 1):886-93 (2009)
M. Descoteaux, R. Deriche, T.R. Knösche, A. Anwander: Deterministic and probabilistic tractography based on complex fiber orientation distributions*, IEEE-Transactions on Medical Imaging* 28, 269-286 (2009)

E. Kaden, A. Anwander, T.R. Knösche: Variational inferences of the fiber orientation density using diffusion MR imaging, *NeuroImage* 42, 1366-1380 (2008)

E. Kaden, T.R. Knösche, A. Anwander: Parametric spherical deconvolution: Inferring anatomical connectivity using diffusion MR imaging, *NeuroImage* 37, 474-488 (2007)

A. Anwander, M. Tittgemeyer, A.D. Friederici, D.Y. von Cramon, T.R. Knösche: Connectivity-based cortex parcellation of Broca's area, *Cerebral Cortex* 17(4), 816-825 (2007)

Analysis of EEG/MEG and Source Modeling

Ü. Aydin, S. Rampp, A. Wollbrink, H. Kugel, J.-H. Cho, T.R. Knösche, C. Grova, C.H. Wolters: Zoomed MRI guided by combined EEG/MEG source analysis: A multimodal approach for optimizing presurgical epilepsy work-up and its application in a multi-focal epilepsy patient case study. Brain Topography, accepted (2017)

J.H. Cho, J. Vorwerk, C.H. Wolters, T.R. Knösche: Influence of the head model on EEG and MEG source connectivity analysis. NeuroImage 110, 60-77 (2015)

M. Fukushima, O. Yamashita, T.R. Knösche, M. Sato: MEG source reconstruction based on identification of directed source interactions on whole-brain anatomical networks. NeuroImage 105, 408–427 (2015)

J. Vorwerk, J.H. Cho, S. Rampp, H. Hamer, T.R. Knösche, C.H. Wolters: A guideline for head volume conductor modeling in EEG and MEG. *NeuroImage* 100, 590-607 (2014)

S. Eichelbaum, M. Dannhauer, M. Hlawitschka, R. MacLeod, D. Brook, T.R. Knösche, and G. Scheuermann: Visualizing electrical fields from EEG/tDCS: a comparative evaluation. *NeuroImage* 101, 513-530 (2014)

C. Pieloth, T.R. Knösche, B. Maess, M. Fuchs: Online distributed source localization from EEG/MEG data, *International Journal of Computing* 13(1), 17-24 (2014)

T.R. Knösche, M. Gräser, A. Anwander: Prior knowledge on cortex organization in the reconstruction of source current densities from EEG. *NeuroImage* 67, 7-24 (2013)

M. Dannhauer, E. Lämmel, C. Wolters, T.R. Knösche: Spatio-temporal regularization in linear distributed source reconstruction from EEG/MEG – A Critical Evaluation, *Brain Topography* 26(2), 229-246 (2013)

B. Lanfer, M. Scherg, M. Dannhauer, T.R. Knösche, M. Burger, C.H. Wolters: Influences of skull segmentation inaccuracies on EEG source analysis. *NeuroImage* 62, 418-431 (2012)
M. Dannhauer, B. Lanfer, C. Wolters, T.R. Knösche: Modelling the human skull in EEG source analysis, *Human Brain Mapping* 32(9), 1383-1399 (2011)

T.H. Sander, T.R. Knösche, A. Schlögl, Kohl, C.H. Wolters, J. Haueisen, L. Trahms: Recent advances in modeling and analysis of bioelectric and biomagnetic sources. *Biomedical Engineering* 55(2), 65-76 (2010)

R. Eichardt, J. Haueisen, T.R. Knösche, E.G. Schukat-Talamazzini: The application of single- and multi-level fast evolution strategies for the reconstruction of multiple neuromagnetic sources, *IEEE Transactions for Biomedical Engineering* 55, 703-712 (2008)

D. Güllmar, J. Haueisen, M. Eiselt, F. Gießler, L. Flemming, A. Anwander, T.R. Knösche, C.H. Wolters, M. Dümpelmann, D.S. Tuch, J.R. Reichenbach: Influence of anisotropic conductivity on EEG source reconstruction: investigations in a rabbit model. *IEEE Transactions of Biomedical Engineering* 53(9), 1841-1850 (2006)

H. Woldag, G. Waldmann, T.R. Knösche, B. Maess, A.D. Friederici, H. Hummelsheim: Rapidly induced changes in neuromagnetic fields following repetitive hand movements, *European Journal of Neurology* 13(7), 723-728 (2006)

F. Zanow, T.R. Knösche: ASA – Advanced source analysis of continuous and event-related EEG/MEG signals. *Brain Topography* 16(4) (2004**)**

T.R. Knösche: Transformation of whole head MEG recordings between different sensor positions, *Biomedical Engineering* 47(3) 59-62 (2002)

T.R. Knösche, M.C.M. Bastiaansen: On the time resolution of event-related desychronization: a simulation study, *Clinical Neurophysiology*, 113, 754-763 (2002)

N. Fujimaki, T. Hayakawa, M. Nielsen, T.R. Knösche, S. Miyauchi: An fMRI-constrained MEG source analysis with procedures of dividing and grouping activation, *NeuroImage* 17, 324-343 (2002)

J. Haueisen, J. Schreiber, H. Brauer, T.R. Knösche: The dependence of the inverse solution accuracy in magnetocardiography on the boundary element discretization. *IEEE Transactions on Magnetics* 38(2), 1045-1048 (2002)

M.C.M. Bastiaansen, T.R. Knösche: Tangential derivative mapping of axial MEG applied to event-related desynchronisation (ERD) research, *Clinical Neurophysiology*, 111(7), 1300-1305 (2000)

T. R. Knösche, E.M. Berends, H. R. A. Jagers, M. J. Peters: Determining the number of independent sources of the EEG - a simulation study on information criteria, *Brain Topography* 11 (2): 111-124 (1998)

M. van Burik, T.R. Knösche, C. Neuper, G. Pfurtscheller, M.J. Peters: Post-movement beta synchronization studied with linear estimation, *Electroencephalography and Clinical Neurophysiology* 106, 195 – 198 (1998)

T.R. Knösche, P. Praamstra, D. Stegeman, M.J. Peters: Linear Estimation discriminates midline source and motor cortex contribution to readiness potential, *Electroencephalography and Clinical Neurophysiology* 99, 183 – 190 (1996)

Music Perception and other Cognitive Faculties

S.G. Kim, T.R. Knösche: On the perceptual subprocess of absolute pitch. *Frontiers in Neuroscience - Auditory Cognitive Neuroscience* (2017)

S.G. Kim, T.R. Knösche: Resting state functional connectivity of the ventral auditory pathway in musicians with absolute pitch. *Human Brain Mapping* 38(8):3899-3916 (2017)

S.G. Kim, T.R. Knösche: Intracortical myelination in musicians with absolute pitch: quantitative morphometry using 7-T MRI. *Human Brain Mapping* 37, 3486–3501 (2016).

A. Nakamura, B. Maess, T.R. Knösche, A.D. Friederici: Different hemispheric roles in recognition of happy expressions. *PLoS One* 9(2) e88628 (2014)

D. Sammler, S. Koelsch, T. Ball, A. Brandt, M. Grigutsch, H.-J. Huppertz, T. R. Knösche, J. Wellmer, G. Widman, C. E. Elger, A. D. Friederici, A. Schulze-Bonhage: Co-localizing linguistic and musical syntax with intracranial EEG, *NeuroImage* 64, 134-146 (2012)

M. Macedonia, T.R. Knösche: Body in mind: How gestures empower foreign language learning, *Mind, Brain and Education* 5(4), 196-211 (2011)

Y. Nan, T.R. Knösche, A.D. Friederici: Non-musicians' perception of phrase boundaries in music: a cross-cultural ERP study, *Biological Psychology* 82(1), 70-81 (2009)

C. Neuhaus, T.R. Knösche: Processing of pitch and time sequences in music. *Neuroscience Letters* 441, 11-15 (2008)

Y. Nan, T.R. Knösche, S. Zysset, A.D. Friederici: Cross-cultural music phrase processing – an fMRI study, *Human Brain Mapping* 29(3), 312-328 (2008)

C. Neuhaus, T.R. Knösche: Processing of rhythmic and melodic 'Gestalts' – an ERP study, *Music Perception* 24(2), 209-222 (2006)

Y. Nan, T.R. Knösche, A.D. Friederici: The perception of musical phrase structure: a cross-cultural ERP study. *Cognitive Brain Research* 1094, 179-191 (2006)

Y. Nan, T.R. Knösche, Y.-J. Luo : Counting in everyday life : enumeration and discrimination, *Neuropsychologia* 44(7), 1103-1113 (2006)
C. Neuhaus, T.R. Knösche, A.D. Friederici: Effects of musical expertise and boundary markers on phrase perception in music, *Journal of Cognitive Neuroscience*, 18 (3) 1-22 (2006)

T. R. Knösche, C. Neuhaus, J. Haueisen, K. Alter, B. Maess, A. D. Friederici, O. W. Witte: The perception of phrase structure in music, *Human Brain Mapping* 24 (4) 259-273 (2005)

T.R. Knösche, B. Maess, A. Nakamura & A.D. Friederici: Human communication investigated with magnetoencephalography – speech, music, and gestures. International Review of Neurobiology 68 (2005)

M. Brass, M. Ullsperger, T.R. Knösche, D.Y. von Cramon, N.A. Phillips: Who comes first? The role of the prefrontal and parietal cortex in cognitive control. *Journal of Cognitive Neuroscience* 17, 1367-1375 (2005)

A. Nakamura, B. Maess, T. R. Knösche, T. C. Gunter, P. Bach & A. D. Friederici: Cooperation of different neuronal systems during hand sign recognition, *NeuroImage* 23(1) 25-34 (2004)

T.R. Knösche, S. Lattner, B. Maess, M. Schauer & A.D. Friederici: Early parallel processing of auditory word and voice information. *NeuroImage* 17, 1493-1503 (2002)

J. Haueisen & T.R. Knösche: Involuntary Motor Activation in Pianists Evoked by Music Perception, *Journal of Cognitive Neuroscience* 13: 786-792 (2001)

T.R. Knösche, B. Maess & A.D. Friederici: Processing of syntactic information monitored by brain surface current density mapping based on MEG, *Brain Topography*, 12(2), 75-87 (1999)