Max Planck Institute for Human Cognitive and Brain Sciences
Research Group Cognition & Plasticity

Dr. Sandra Martin

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» I am a cognitive neuroscientist at the MPI for Human Cognitive and Brain Sciences, specializing in the application of advanced statistical and computational techniques to study language and cognition. My work integrates neuroimaging, neuromodulation, and behavioral methods, and I thrive in interdisciplinary settings.

I have extensive experience developing and implementing robust analytical workflows in R and Python. I am particularly passionate about using modern statistical tools to better describe complex data and am committed to promoting open science principles through data sharing, open-source software, and publishing results in open-access journals.

ACADEMIC APPOINTMENTS

Postdoctoral Researcher   since 09/2023
MPI for Human Cognitive and Brain Sciences,
Research Group Cognition and Plasticity
Project: The behavioral and neural correlates of predictive processing during natural language comprehension across the adult lifespan (DFG-funded project in collaboration with University of Lübeck)
Advisers: Prof. Dr. Gesa Hartwigsen (MPI CBS), Prof. Dr. Jonas Obleser (University of Lübeck)

EDUCATION

Dr. rer. med. in Cognition and Neuroscience (PhD)   2018−2023
MPI for Human Cognitive and Brain Sciences Leipzig, Germany
Lise Meitner Research Group Cognition and Plasticity &
University Hospital Leipzig, Language and Aphasia Lab

Supervisors: Prof. Dr. Gesa Hartwigsen, Prof. Dr. Dorothee Saur
Thesis title: The aging brain in semantic cognition—Insights from fMRI and TMS
Grade: With distinction

M.Sc. in Neuro- and Clinical Linguistics   2012−2014
University of Potsdam, Germany
University of Groningen, The Netherlands

Supervisors: PD Dr. Frank Burchert, Prof. Dr. Agnes Flöel
Thesis: Improving communication in aphasia: A comparison of naming- and discourse-based treatment, both facilitated by transcranial direct current stimulation
Grade: Excellent

B.A. in Linguistics   2007−2012
Humboldt-Universität zu Berlin, Germany

Grade: Excellent
2009 − 2010 Erasmus exchange student at Université Aix-Marseille, France

OTHER RESEARCH AND PROFESSIONAL EXPERIENCE

Spokesperson of the network for doctoral candidates   2020–2022
German Association of Speech-Language Therapy (dbs e.V.)

Speech-Language Pathologist   2015–2017
Median Klinik Berlin Kladow, Clinic for neurological rehabilitation

Research Internship   2014–2015
NeuroCure Clinical Research Center, Charité Berlin
Advisors: Prof. Dr. Agnes Flöel, Prof. Dr. Marcus Meinzer

Student Assistantship   2012–2013
Center for Language and Cognition, University of Groningen, The Netherlands
Advisor: Prof. Dr. Roelien Bastiaanse

PUBLICATIONS

[11] **Martin, S.***, Ferrante, M.*, Bruera, A., & Hartwigsen, G. (under review). Causal contributions of left inferior and medial frontal cortex to semantic and executive control. *Preprint* doi:10.1101/2025.04.16.649200

[10] Feng, Z.*, **Martin, S.***, Numssen, O., Weise, K., Jing, Y., Gerardos, G., Martin, C., Hartwigsen, G., & Knösche, T. (under review). Target-specificity and repeatability in neuro-cardiac-guided TMS for heart-brain coupling. *Preprint* doi:10.1101/2025.02.19.638988

[9] Schuckart, M.*, **Martin, S.***, Tune, S., Schmitt, L.-M., Hartwigsen, G., & Obleser, J. (under review). Executive resources shape the effects of language predictability across the adult lifespan. *Preprint* doi:10.1101/2024.05.08.592872

[8] Nieberlein, L., **Martin, S.**, Williams, K. A., Gussew, A., Cyriaks, S. D., Scheer, M., Rampp, S., Prell, J., & Hartwigsen, G. (2024). Semantic integration demands modulate large-scale network interactions in the brain. *Human Brain Mapping*, 45(18), e70113. doi:10.1002/hbm.70113

[7] **Martin, S.** & Hartwigsen, G. (2024). The dynamics of neuroplasticity in the recovery from post-stroke aphasia: Commentary on Billot and Kiran. *Brain & Language*, 258, 105479. doi:10.1016/j.bandl.2024.105479

[6] Numssen, O., **Martin, S.**, Williams, K., Knösche, T., & Hartwigsen, G. (2024). Quantification of subject motion during TMS via pulsewise coil displacement. *Brain Stimulation*, 17(5), 1045-1047. doi:10.1016/j.brs.2024.08.009

[5] **Martin, S.**, Frieling, R., Saur, D., & Hartwigsen, G. (2023). TMS over the pre-SMA enhances semantic cognition via remote network effects on task-based activity and connectivity. *Brain Stimulation*, 16(5), 1346-1357. doi:10.1016/j.brs.2023.09.009

[4] **Martin, S.**, Williams, K., Saur, D., & Hartwigsen, G. (2023). Age-related reorganization of functional network architecture in semantic cognition. *Cerebral Cortex*, 33(8), 4886-4903. doi:10.1093/cercor/bhac387

[3] Kuhnke, P., Chapman, C., Cheung, V., Turker, S., Graessner, A., **Martin, S.**, Williams, K., & Hartwigsen, G. (2022). The role of the angular gyrus in semantic cognition: A synthesis of five functional neuroimaging studies. *Brain Structure and Function*, 228, 273–291. doi:10.1007/s00429-022-02493-y

[2] **Martin, S.**, Saur, D., & Hartwigsen, G. (2022). Age-dependent contribution of domain-general networks to semantic cognition. *Cerebral Cortex*, 32(4), 870–890. doi:10.1093/cercor/bhab252

[1] Darkow, R., **Martin, S.**, Burchert, F., Meinzer, M., & Flöel, A. (2015). Effects of tDCS on spontaneous speech in aphasia: A study of naming and discourse treatment [in German]. *Sprache, Stimme, Gehör, 39*, 140-145. doi:10.1055/s-0035-1559656

BOOK CHAPTERS

Martin, S. & Hartwigsen, G. (2025). Semantic and syntactic networks in the brain. *Transcranial Electrical Stimulation in Aphasia and Acquired Language Disorders*. Springer Nature.

Hartwigsen, G. & **Martin, S.** (2025). Plasticity and reorganisation in the language network after stroke. In *Transcranial Electrical Stimulation in Aphasia and Acquired Language Disorders*. Springer Nature.

TALKS

About my research

Institute Colloquium, Max Planck Institute for Human Cognitive and Brain Sciences   02/2025
The interplay of semantic memory and executive functions across the adult lifespan: Multimodal perspectives

Cognitive Aging Lab, University of Geneva   01/2025
The interplay of semantic memory and executive functions across the adult lifespan: Multimodal perspectives

German Society for Aphasia Rehabilitation (GAB)   10/2024
The neural basis of semantic control: A voxel-based study in chronic aphasia

Psychologie und Gehirn (PuG)   05/2024
Beyond motor effects: Repetitive TMS in cognitive control and the impact of protocol selection
Symposium on individualized TMS in cognition (chair)

German Society for Neurorehabilitation (DGNR)   12/2023
Functional interactions and plasticity in the language network—Insights from young and aging brains
Symposium on neurorehabilitation, plasticity, and learning

Korea Institute for Advanced Study (KIAS)   11/2022
Center for Artificial Intelligence and Natural Sciences
The aging brain in semantic cognition—Insights from fMRI and TMS

Würzburger Aphasietage   03/2022
Aphasia as neural network disorder

German Association of Speech-Language Therapy (dbs e.V.)   11/2021
Non-invasive brain stimulation techniques in language rehabilitation

Psychologie und Gehirn (PuG)   06/2021
The role of domain-general networks in semantic processing in the young and the aging brain
Symposium "Cognition and plasticity in the aging brain" (chair)

German Academic Scholarship Foundation   03/2021
Domain-general networks in semantic processing in the aging brain
Annual meeting for doctoral students of the German Academic Scholarship Foundation (Studienstiftung des deutschen Volkes).

Clinic Christophsbad, Göppingen, Germany   04/2019
The application of non-invasive brain stimulation techniques in neurorehabilitation

German Society for Aphasia Rehabilitation (GAB) 11/2014
Expressing your own intentions with aphasia: A comparison of a naming and a discourse treatment, both enhanced by transcranial direct current stimulation

About Open Science

Colloquium at MPI for Human Cognitive and Brain Sciences 01/2022
Advancing the responsible conduct of research at the MPI CBS
Invited talk to present a recommendations paper I wrote together with other researchers from MPI CBS (available here: osf.io/9n2at/)

Research Interactions Symposium by Wiley 06/2021
Trust in science: How early career researchers benefit from open and transparent research practices
Invited talk at symposium organized by Wiley.

Slides for selected talks are avilable on my OSF site: ✿ osf.io/hvzu2/

CONFERENCE PROCEEDINGS & POSTERS (SELECTED)

Martin, S., Schuckart, M., Obleser, J., & Hartwigsen, G. 04/2025
Robust predictive mechanisms in aging: Insights from behavioral and neuroimaging research, Cognitive Neuroscience Society, Boston, USA

Martin, S., Schuckart, M., Obleser, J., & Hartwigsen, G. 02/2025
Robust predictive mechanisms in aging: Insights from behavioral and neuroimaging research, Dallas Aging and Cognition Conference, Dallas, USA

Martin, S., Kuhnke, P., Chapman, C., & Hartwigsen, G. 06/2024
Aging effects on task-based activity and functional networks during semantic processing and rest, OHBM, Seoul, South Korea

Numssen, O., **Martin, S.**, Williams, K., Knösche, T., & Hartwigsen, G. 06/2024
A quality metric to assess pulsewise coil displacements during TMS, OHBM, Seoul, South Korea

Schuckart, M., **Martin, S.**, Tune, S., Schmitt, L.-M., Hartwigsen, G., & Obleser, J. 06/2024
No free lunch in language prediction – Limitation of cognitive resources reduces the impact of surprisal at multiple time scales, HörHanse, Lübeck, Germany

Ferrante, M., **Martin, S.**, & Hartwigsen, G. 10/2023
Probing the functional relevance of pre-SMA and aIFG for controlled semantic processing with transcranial magnetic stimulation, Society for the Neurobiology of Language (SNL), Marseille, France

Martin, S., Schuckart, M., Obleser, J., & Hartwigsen, G. 10/2023
The impact of domain-general cognitive load on language processing in the aging brain, Society for the Neurobiology of Language (SNL), Marseille, France

Schuckart, M., Tune, S., Schmitt, L.-M., Hartwigsen, G., **Martin, S.**, & Obleser, J. 07/2023
No free lunch in language prediction – Limitation of cognitive resources reduces the impact of surprisal at multiple time scales, Salzburg Mind and Brain Annual Meeting, Salzburg, Austria

Martin, S., Frieling, R., Saur, D., & Hartwigsen, G. 06/2023
Facilitatory stimulation of the pre-SMA enhances semantic cognition via remote network effects in task-based activity and connectivity, selected for poster flash session with additional talk. Psychologie und Gehirn (PuG), Tübingen, Germany

Martin, S., Frieling, R., Saur, D., & Hartwigsen, G. 03/2023
Facilitatory stimulation of the pre-SMA has distinct effects on task-based activity and connectivity

networks in healthy aging, selected as "hot abstract" with talk.Congress for Clinical Neuroscience (DGKN), Hamburg, Germany, Clinical Neurophysiology 148:e5-e6

Martin, S., Frieling, R., Saur, D., & Hartwigsen, G. 02/2023
Facilitatory stimulation of the pre-SMA has distinct effects on task-based activity and connectivity, Brain Stimulation, Lisbon, Portugal

Martin, S., Saur, D., & Hartwigsen, G. 06/2021
Age-dependent contribution of domain-general networks to semantic cognition, OHBM, virtual edition

Martin, S., Saur, D., & Hartwigsen, G. 11/2020
The multiple-demand network in language processing of the young and the aging brain, Congress for Clinical Neuroscience (DGKN), virtual edition, Clinical Neurophysiology 131:e201-e202

van Scherpenberg, C., **Martin, S.**, Hartwigsen, G., Obrig, H., & Beese, C. 09/2019
Age-related decline of semantic inhibition despite the preservation of semantic memory, PaePsy, Leipzig, Germany

Martin, S., Saur, D., & Hartwigsen, G. 08/2019
The multiple-demand network in language processing: Its role in the aging brain, Society for the Neurobiology of Language (SNL), Helsinki, Finland

Martin, S., Darkow, R., Burcher, F, Meinzer, M., & Flöel, A. 09/2014
Improving communication in aphasia: A comparison of naming- and discourse based treatment, both facilitated by transcranial direct current stimulation (tDCS), Science of Aphasia, Venice, Italy

Darkow, R., Meinzer, M., **Martin, S.**, Würtz, A. & Flöel, A. 12/2013
Transcranial direct current stimulation and aphasia, German Society for Neurorehabilitation, Berlin, Germany

HONORS & AWARDS

Travel award 02/2025
Dallas Aging and Cognition Conference (DACC)

Poster prize 06/2023
Psychologie und Gehirn (PuG)

PhD fellowship (80,000 €) 2018–2022
German Academic Scholarship Foundation (Studienstiftung des deutschen Volkes)
Full stipend for graduate program

Poster prize 11/2020
Meeting of the German Society for Clinical Neurophysiology and Functional Imaging (DGKN)

First prize at Science Slam 02/2019
20th Annual Meeting of the German Association of Speech-Language Therapy

Travel grant (1,500 €) 2014
Erasmus Mundus program

Erasmus Mundus stipend (24,000 €) 2012–2014
Erasmus Mundus Program European Union
Full stipend for Master's studies

DAAD PROMOS stipend (2,000 €) 2011
German Academic Exchange Service

TEACHING

Introduction to Mixed-Effects Regression   05/2025, 04/2024, 04/2023
MA course, Department of Psychology, Ghent University, Belgium

Seminar Perception and Action   Summer 25, Winter 24/25, Summer 24, Winter 23/24
MA program Brain & Behavior, Wilhelm Wundt Institute of Psychology, Leipzig University

Language and Aging   05/2023
Guest lecture IMPRS graduate school NeuroCom, Leipzig, Germany

Introduction to Data Analysis in Cognitive Neuroscience   10/2022
Master's program Cognitive Neuroscience, University of Amsterdam

Data analysis with R   06/2021
Summer School, German Association of Speech-Language Therapy. I built an R package for the workshop: gitlab.gwdg.de/sandra.martin/r-workshop-summer-school-2021

Introduction to fMRIPrep   05/2020

Workshop at annual meeting of German Society for Aphasia Research   10/2019
Aphasia as a network disorder: Implications for speech-language therapy and the application of non-invasive brain stimulation methods for recovery from aphasia. Leipzig University, Germany

Slides for selected lectures and workshops are avilable on my OSF site: ✿ osf.io/hvzu2/

MENTORING & SUPERVISION

Co-Supervision of doctoral researchers
Laura Nieberlein (PhD Psychology, ongoing)
Matteo Ferrante (PhD Psychology, ongoing)

Master thesis
Yulia Guseva (M.Sc., 2024-2025, Mind & Brain, Humboldt University Berlin)
Flavia Ercoli (M.Sc., 2024-2025, University of Amsterdam)
Pia Siegel (M. Sc., 2023-2024, Leipzig University)
Katharina Polsterer (M. A., 2022, University of Groningen)
Regine Frieling (M. A., 2021, University of Cologne)

Interns / Student assistants
Niklas Kroner-Weigl (Doctoral student, Max Planck School of Cognition)
Johannes Kim (M.Sc., 2025, Maastricht University)
Jim Krups (M.Sc., 2025, Leipzig University)
Alina Leiss (M.Sc., 2025, Leipzig University)
Lena Radach (M.Sc., 2024, University of Göttingen)
Hanna Weigand (B.Sc., 2024, University of Würzburg)
Christian Koblitz (M. Sc., 2023, Leipzig University)
Marcel Blumenthal (M. Sc., 2023, Leipzig University)
Madeleine Mesgarian (B. Sc., 2023, Freie Universität Berlin)
Caroline Duchow (M. A., 2019, University of Erfurt)
Annika Dunau (M. A., 2018, Leipzig University)

OPEN SCIENCE

fMRI Preregistration template   2021
Co-author of current Template. doi:10.23668/psycharchives.5121

Panelist at discussion on Research Data Management, MPDL   05/2021

Open Access Ambassador of the Max Planck Society   2019-2020

Doing Good – Scientific Practice under Review   11/2019
Organizer of a 2-day symposium on Open Science and Good Scientific Practice at MPI CBS, Leipzig.

Open Science Initiative MPI CBS   since 2018
Co-founder of the initiative.

SKILLS

Programming	R, Python, Matlab, Bash, Git
Statistical Modeling	Mixed-effects models, Generalized additive models, Hierarchical Bayesian models, Hierarchical sequential sampling, Cognitive modeling (Summer School Model-based Neuroscience Amsterdam, 08/2022)
Neuroimaging Analysis	Nilearn, SPM12, Functional connectivity analysis, Multivariate analysis, Graph theory
Experimental Methods	fMRI, sMRI, TMS, Eyetracking, tDCS, Psychopy, Presentation
Other	LATEX, Markdown, Inkscape
Languages	German (native), English (fluent), French (advanced), Hebrew (basic)

OUTREACH

- Workshop "Introduction to Programming in Neuroscience" at Girls' and Boys' Day 2022, 2023
- Article about my research at MDR Wissen (in German), 09/2021: Link to article
- Co-author on the Blog Thinky & Brain by MPI CBS, 08/2020: Link to article
- Guest at the Orion Open Science Podcast, 11/2019: Link to episode

JOURNAL REVIEWING

Ad-hoc-reviewing	Brain, Brain Communications, Brain & Language, Cerebral Cortex, Frontiers in Psychology, Imaging Neuroscience, Journal of Neuroscience, Journal of Gerontology, Nature Human Behaviour, NeuroImage, NeuroImage Clinical

PROFESSIONAL MEMBERSHIPS

- Society for the Neurobiology of Language (SNL)
- Cognitive Neuroscience Society (CNS)
- Organization for Human Brain Mapping (OHBM)