

# Khazar Ahmadi

✉ [khazar.ahmadi@rub.de](mailto:khazar.ahmadi@rub.de) | [@khAzArAhmAdi](https://twitter.com/khAzArAhmAdi) | [Google Scholar](https://scholar.google.com/citations?user=...) | [Orcid](https://orcid.org/...) | <https://khazarahmadi.github.io/>

## Research Overview

My research is primarily focused on elucidating the underlying mechanisms of visual perception and higher order cognitive functions in health, aging and disease. To this end, I use a variety of techniques including state-of-the-art neuroimaging, behavioral tasks, and computational models to explore the functional and structural architecture of the human brain in particular the medial temporal lobe regions at fine levels of detail.

## Academic Experience

### National Institute of Mental Health (NIMH)

Visiting Researcher with Dr. Renzo Huber

*Bethesda, USA*

2024

### Ruhr University Bochum

Postdoctoral Researcher with Prof. Nikolai Axmacher

*Bochum, Germany*

2022 - Present

### Lund University

Postdoctoral Researcher with Prof. Oskar Hansson

*Lund, Sweden*

2020 - 2022

### Spinoza Center for Neuroimaging

Visiting Researcher with Prof. Serge Dumoulin

*Amsterdam, Netherlands*

2017

### University Medical Center Groningen

Visiting Researcher with Prof. Frans Cornelissen

*Groningen, Netherlands*

2017

## Education

### Otto-von-Guericke University

PhD in psychology (magna cum laude)

*Magdeburg, Germany*

2014 - 2019

- Thesis title: Plasticity and stability of the cortical wiring in the human visual system
- Advisor: Prof. Michael Hoffmann

### Shahid Beheshti University

M.Sc. in child and adolescent clinical psychology (with distinction)

*Tehran, Iran*

2010 - 2013

### Tabriz University

B.Sc. in clinical psychology (with distinction)

*Tabriz, Iran*

2006 - 2010

## Publications

### Published Manuscripts

- **Ahmadi, K.**, Pereira, J., van Westen, D., Pasternak, O., Zhang, F., Nilsson, Stomrud, E., Spotorno, N. and Hansson, O. (2024). Fixel-based analysis reveals tau-related white matter changes in early stages of Alzheimer's disease. *Journal of Neuroscience*. [\[Link\]](#)
- Molz, B., Herbig, A., Baseler, H., de Best, P., RAZ, N., Gouws, A., **Ahmadi, K.**, Lowndes, R., McLean, R., Gottlob, I., Kohl, S., Choritz, L., Maguire, J., Kanowski, M., Käsmann-Kellner, B., Wieland, I., Banin, E., Levin, N., Morland, A., and Hoffmann, M.B. (2023). Achromatopsia - limits to visual cortex plasticity in the absence of functional cones. *Investigative Ophthalmology & Visual Science* [\[Link\]](#)
- Cicognola, C., Mattsson-Carlsson, N., van Westen, D., Zetterberg, H., Blennow, K., Palmqvist, S., **Ahmadi, K.**, Strandberg, O., Stomrud, E., Janelidze, S., Hansson, O. (2023). Associations of CSF PDGFR $\beta$  with aging, blood-brain barrier damage, neuroinflammation and Alzheimer disease pathological changes. *Neurology*. [\[Link\]](#)

- **Ahmadi, K.**, Pereira, J. B., Berron, D., Vogel, J., Ingala, S., Strandberg, O. T., Janelidze, S., Barkhof, F., Pfeuffer, J., Knutsson, L., van Westen, D., Palmqvist, S., Mutsaerts, H. J., Hansson, O. (2022). Gray matter hypoperfusion is a late pathological event in the course of Alzheimer's disease. *Journal of Cerebral Blood Flow & Metabolism*. [\[Link\]](#)
- Molz, B., Herbig, A., Baseler, H. A., de Best, P., Vernon, R., Raz, N., Gouws, A. D., **Ahmadi, K.**, Lowndes, R., Mclean, R. J., Gottlob, I., Kohl, S., Choritz, L., Maguire, J., Kanowski, M., Käsmann-Kellner, B., Wieland, I., Banin, E., Levin, N., Hoffmann, M. B., Morland, A. B. (2021). Structural changes to primary visual cortex in the congenital absence of cone input in achromatopsia. *NeuroImage: Clinical*. [\[Link\]](#)
- Puzniak, R. J., McPherson, B.\*, **Ahmadi, K.\***, Herbig, A., Kaufmann, J., Liebe, T., Gouws, A. D., Morland, A. B., Gottlob, I., Hoffmann, M. B., Pestilli, F. (2021). CHIASM, the human brain albinism and achiasma MRI dataset. Scientific data. [\[\\* shared second-authorship; Link\]](#)
- Lowndes, R., Molz, B., Warriner, L., Herbig, A., de Best, P., Raz, N., Gouws, A. D., **Ahmadi, K.**, Mclean, R. J., Gottlob, I., Kohl, S., Choritz, L., Maguire, J., Kanowski, M., Käsmann-Kellner, B., Wieland, I., Banin, E., Levin, N., Hoffmann, M. B., Morland, A. B., Baseler, H. (2021). Structural differences across multiple visual cortical regions in the absence of cone function in congenital achromatopsia. *Frontiers in Neuroscience*. [\[Link\]](#)
- **Ahmadi, K.**, Fracasso, A., Puzniak, R. J., Gouws, A. D., Yakupov, R., Speck, O., Kaufmann, J., Pestilli, F., Dumoulin, S. O., Morland, A. B., Hoffmann, M. B. (2020). Triple visual hemifield maps in optic chiasm hypoplasia. *NeuroImage*. [\[Link\]](#)
- Carvalho, J., Invernizzi, A., **Ahmadi, K.**, Hoffmann, M. B., Renken, R. J., Cornelissen, F. W. (2020). Micro-probing enables fine-grained mapping of neuronal populations using fMRI. *NeuroImage*. [\[Link\]](#)
- Puzniak, R. J., **Ahmadi, K.**, Kaufmann, J., Gouws, A. D., Morland, A. B., Pestilli, F., Hoffmann, M. B. (2019). Quantifying nerve decussation abnormalities in the optic chiasm. *NeuroImage: Clinical*. [\[Link\]](#)
- **Ahmadi, K.**, Herbig, A., Wagner, M., Kanowski, M., Thieme, H., Hoffmann, M. B. (2019). Population receptive field and connectivity properties of the early visual cortex in human albinism. *NeuroImage*. [\[Link\]](#)
- Eick, C., **Ahmadi, K.**, Sweeney-Reed, C. M., Hoffmann, M. B. (2019). Interocular transfer of visual memory: influence of visual impairment and abnormalities of the optic chiasm. *Neuropsychologia*. [\[Link\]](#)
- **Ahmadi, K.**, Fracasso, A., van Dijk, J. A., Kruijt, C., van Genderen, M., Dumoulin, S. O., & Hoffmann, M. B. (2018). Altered organization of the visual cortex in FHONDA syndrome. *NeuroImage*. [\[Link\]](#)
- Arngim<sup>+</sup>, N., Hougaard<sup>+</sup>, A., **Ahmadi, K.\***, Vestergaard<sup>\*</sup>, M. B., Schytz, H. W., Amin, F. M., Larsson, H.B.W., Olesen, J., Hoffmann, M.B. & Ashina, M. (2017). Heterogenous migraine aura symptoms correlate with visual cortex functional magnetic resonance imaging responses. *Annals of neurology*. [\[<sup>+</sup> & \\* shared first & second-authorship; Link\]](#)
- Hoffmann, M. B., Thieme, H., & **Ahmadi, K.** (2017). Potential of fMRI for the Functional Assessment of the Pathological Visual System. *Klinische Monatsblätter für Augenheilkunde*. [\[Link\]](#)
- **Ahmadi, K.**, Pouretmad, H. R., Esfandiari, J., Yoonessi, A., Yoonessi, A. (2015). Psychophysical evidence for impaired Magno, Parvo, and Konio-cellular pathways in dyslexic children. *Journal of ophthalmic & vision research*. [\[Link\]](#)

## Conference Presentations

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### Talks

- **Ahmadi, K.** (2024). Laminar profile of hippocampal subregions during spatial navigation. International Society for Magnetic Resonance in Medicine (ISMRM), Singapore, Singapore.
- **Ahmadi, K.** (2022). Tau accumulation is associated with fiber-specific white matter degeneration in Alzheimer's disease. International Society for Magnetic Resonance in Medicine (ISMRM), London, England.
- **Ahmadi, K.** (2022). Disentangling fiber-specific white matter alterations in relation to hallmarks of Alzheimer's disease. Alzheimer's Disease and Parkinson's Disease (ADPD), Barcelona, Spain.
- **Ahmadi, K.** (2021). Altered cerebral blood perfusion in Alzheimer's disease spectrum and its association with amyloid- $\beta$  and tau pathology. Alzheimer's Disease and Parkinson's Disease (ADPD), Virtual conference.

- **Ahmadi, K.** (2018). Macroscopic and mesoscopic cortical organization in congenital visual pathway abnormalities. Brain-in-depth (BID) - Symposium on layer-dependent MRI, German Center for Neurodegenerative Diseases (DZNE), Magdeburg, Germany.
- **Ahmadi, K.** (2018). Altered organization of the visual cortex in FHONDA syndrome. 4<sup>th</sup> European Days of Albinism, Hurdal Vision and Activity Center, Oslo, Norway.
- **Ahmadi, K.**, (2016). Altered retino-cortical connections and visual cortex reorganization in the recently discovered FHONDA syndrome. Society for neuroscience (SfN), San Diego, USA.

## Poster Presentations

- **Ahmadi, K.**, Stawarczyk, D., Pfaffenrot, V., Gomes, C. A., Kashyap, S., Patai, Z., Norris, D. G., Axmacher, N. (2024). Laminar profiles of hippocampal subfields are differentially associated with navigation strategies. Organization for Human Brain Mapping (OHBM), Seoul, south Korea.
- Rau, E. M. B., Herweg, N. A., Heinen, R., **Ahmadi, K.**, Axmacher, N. (2024). Functions of the medial temporal lobe in memory and navigation of abstract conceptual spaces. Federation of European Neuroscience Societies (FENS), Vienna, Austria.
- Kashyap, S., Gomes, C. A., **Ahmadi, K.**, Axmacher, N., Uludag, K. (2024). A new proposed workflow for processing high spatial resolution MRI data with multiple sessions. Cognitive Computational Neuroscience (CCN), Boston, USA.
- **Ahmadi, K.**, Pereira, J. B., Berron, D., Vogel, J., Ingala, S., Strandberg, O. T., Janelidze, S., Barkhof, F., Pfeuffer, J., Knutsson, L., van Westen, D., Mutsaerts, H. J., Palmqvist, S., Hansson, O. (2021). Tau and synaptic biomarkers but not amyloid- $\beta$  are associated with cerebral perfusion in the Alzheimer's disease spectrum. Alzheimer's Association International Conference (AAIC), Virtual conference.
- Cicognola, C., Janelidze, S., Van Westen, D., **Ahmadi, K.**, Hansson, O. (2021). Cerebrospinal fluid platelet-derived growth factor receptor beta measured in BioFinder-2: an early biomarker in the Alzheimer's disease continuum? Clinical Trials on Alzheimer's Disease (CTAD), Boston, USA.
- Puzniak, R. J., McPherson, B., **Ahmadi, K.**, Herbig, A., Kaufmann, J., Liebe, T., Gouws, A. D., Morland, A. B., Gottlob, I., Hoffmann, M. B., Pestilli, F. (2020). Chiasmal malformations dataset: a unique neuroimaging testbed. Vision Science Society (VSS), Virtual conference.
- Hoffmann, M. B., Molz, B., Herbig, A., de Best, P., Raz, N., Gouws, A. D., **Ahmadi, K.**, Lowndes, R., Mclean, R. J., Kohl, S., Gottlob, I., Choritz, L., Maguire, J., Kanowski, M., Käsmann-Kellner, B., Wieland, I., Banin, E., Levin, N., Baseler, H. Morland, A. B. (2020). Visual cortex stability and plasticity in the absence of functional cones in achromatopsia. Vision Science Society (VSS), Virtual conference.
- **Ahmadi, K.**, Fracasso, A., Puzniak, R. J., Gouws, A. D., Yakupov, R., Speck, O., Kaufmann, J., Pestilli, F., Dumoulin, S. O., Morland, A. B., Hoffmann, M. B. (2019). Triple hemi-field input to the visual cortex in a patient with chiasmal hypoplasia. Organization for Human Brain Mapping (OHBM), Rome, Italy.
- Carvalho, J., **Ahmadi, K.**, Invernizzi, A., Hoffmann, M. B., Renken, R., Cornelissen, F. W. (2019). Micro-probing the visual cortex: high-resolution mapping of neuronal sub-populations. Organization for Human Brain Mapping (OHBM), Rome, Italy.
- Puzniak, R. J., **Ahmadi, K.**, Kaufmann, J., Gouws, A. D., Morland, A. B., Pestilli, F., Hoffmann, M. B. (2019). Quantification of nerve decussation abnormalities in the optic chiasm. Organization for Human Brain Mapping (OHBM), Rome, Italy.
- Prabhakaran, G., Al-Nosairy, K. O., Tempelmann, C., **Ahmadi, K.**, Hoffmann, M. B. (2019). Brain activity in input-deprived visual cortex in glaucoma – no fMRI-evidence of plasticity. Organization for Human Brain Mapping (OHBM), Rome, Italy.
- **Ahmadi, K.**, Fracasso, A., Gouws, A. D., Morland, A. B., Dumoulin, S. O., Hoffmann, M. B. (2017). Functional organization of the visual cortex in a unique case of achiasma. Society for neuroscience (SfN), Washington, D.C., USA.
- **Ahmadi, K.**, Fracasso, A., van Dijk, J. A., Kruijt, C., van Genderen, M., Dumoulin, S. O., & Hoffmann, M. B. (2017). Cortical plasticity in FHONDA: a new inherited visual system disorder. European conference on visual perception (ECVP), Berlin, Germany.

- **Ahmadi, K.**, Pouretmad, H. R., Esfandiari, J., Yoonessi, A. (2013). Investigation of magno, parvo and koniocellular pathways in children with dyslexia. International conference of cognitive sciences (ICCS), Tehran, Iran.

## Technical Skills

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<b>Neuroimaging Modalities</b>	fMRI (at 7 and 3 T), dMRI, sMRI & ASL
<b>Neuroimaging Software</b>	Nipype, AFNI, FSL, MRtrix, DIPY, FreeSurfer, Laynii, ExploreASL, Hippunfold, ASHS, SPM, ANTs & MrVista
<b>Neuroimaging Hardware</b>	Siemens 7T MAGNETOM Terra Scanner Operator
<b>Programming</b>	Bash, R, Python, MATLAB, L <sup>A</sup> T <sub>E</sub> X
<b>Experiment Software</b>	Psychtoolbox, Neurobehavioral Systems Presentation
<b>Languages</b>	Azerbaijani (native), Persian (native), English (fluent), German (upper-intermediate fluency; Level B2)

## Awards and Honors

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### Erwin L. Hahn Institute's brain-art competition

2023

([About](#))

Essen, Germany

- Winning art-work "Hippocampal Moon" € 200

### Greta & Johan Kock's foundation grant for medical research

2021

([About](#))

Lund, Sweden

- Role: Principal Investigator
- Project: Clinical use of novel diffusion-MRI markers in Alzheimer's disease
- € 10K research funds

### Lund University MultiPark travel grant

2021-2022

([About](#))

Lund, Sweden

- € 2K in total covering conference registrations and travel costs

### The ISMRM Summa Cum Laude Merit Award

2022

([About](#))

London, UK

- Selected abstract in top 5% of all submissions

### Marie Curie Ph.D Fellowship

2015-2018

Research Training in Computational Visual Neuroscience

Magdeburg, Germany

### Top Student Award

2010

Undergraduate Class Ranked: 1<sup>st</sup>/50

Tabriz, Iran

## Teaching & Mentorship

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### Ruhr University Bochum

*Bochum, Germany*

Main Instructor of "Aging, dementia and memory disorders"

2024

Main Instructor of "fMRI: From Theory to Practice"

2022 - 2023

- Mentored Students: Dana Schröder & Paul Höchter (research assistants),  
Kubra Karatas, Niko Britt (M.Sc & B.Sc interns), Alena Machentanz (B.Sc Thesis)

### Neuromatch Academy: Computational Neuroscience Workshop

*Online Event*

Mentor of the group "NeuroMatched Philosophers"

2021

- Project: predicting fearful stimuli from HCP fMRI data using MVPA

## Otto-von-Guericke University

Instructor of “Neuroscience Journal Club”

*Magdeburg, Germany*

2016 - 2018

- Co-mentored Students: Charlotta Eick (M.Sc Thesis), Gokulraj Prabhakaran (PhD student)  
Anne Herbig (Postdoc)

## Professional Service

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### Ad-hoc Reviewer

Alzheimer's & Dementia, Alzheimer's Research & Therapy, Journal of Cerebral Blood Flow & Metabolism, Brain Communications, Scientific Reports, Neuropsychologia, British Journal of Ophthalmology, ISMRM abstracts (x 33), OHBM abstracts (x 31)

### Symposia & Lecture Organization

“Advances in Layer-specific fMRI”

“Surface-based analysis for Hippocampal subfield segmentation”

*Bochum, Germany*

2023

### Public Outreach

Long Night of Science at Otto-von-Guericke University

*Magdeburg, Germany*

2016 - 2019

### Memberships

Trainee Member of ISMRM, OHBM, SfN, ECVP, ADPD & AAIC