# Junbeom Kwon

**mobile: (+1) 737-342-7057 • email: kjb961013@gmail.com**

## Education

**University of Texas at Austin, Austin, Texas – Ph.D. in Psychology**

- August 2024 – Present
- Advisor: Prof. Franco Pestilli, PhD

**Seoul National University, Seoul, South Korea – M.A in Psychology**

- September 2021 – August 2023
- Thesis: *'Exploring spatiotemporal brain dynamics with fMRI Transformers'*
- Advisor: Prof. Jiook Cha, PhD
- Overall GPA: 4.26/4.3

**Sogang University, Seoul, South Korea – B.A. in Psychology and B.S. in Big Data Science**

- March 2016 - August 2021
- Overall GPA: 4.07/4.3 (Summa Cum Laude)

## Research Experience

**Pestilli Lab (University of Texas at Austin) Aug 2024 – Present**

- Teaching Assistant (08/2024 – 12/2024), Graduate Research Assistant (01/2025 – Present)
  - **Project 1. Deep Learning Tract Segmentation Framework**
    - Implemented neural tract segmentation using foundation models, benchmarking performance against established methodologies to demonstrate comparative advantages.
    - Built a comprehensive analysis pipeline on the Brainlife platform, enabling efficient model training and validation across multiple diffusion MRI datasets.
  - **Project 2. Structural Connectivity Analysis Pipeline for Early Visual Cortex**
    - Developed the VISCONTI pipeline, integrating tractography with population receptive field mapping to quantify structural connectivity patterns in the early visual cortex.
    - Revealed structural connectivity basis for visual performance asymmetry through systematically analyzing white matter pathways connecting visual processing regions.

[1] This CV was updated at Dec 26, 2025

**Connectome Lab (Seoul National University)** **Dec 2020 – Jul 2024**

- Intern (12/2020 - 08/2021), Research Assistant (09/2021 – 08/2023), Research Associate (09/2023 – 07/2024), Advised by Prof. Jiook Cha
    - **Project 1. SwiFT: Swin 4D fMRI Transformer**
        - Developed a deep learning model (SwiFT) for end-to-end fMRI data analysis, surpassing existing methods in predicting biological and cognitive variables.
        - Used SwiFT to predict task-related brain activity from resting-state data, identifying strong correlations with personal attributes like neuroticism and depressive symptoms.
    - **Project 2. Diagnosing and Predicting Future Trajectories of Psychiatric Disorders**
        - Employed clustering algorithms to categorize psychiatric symptoms and used machine learning models to identify corresponding Electroencephalography (EEG) biomarkers.
        - Preprocessed EEG data and integrated multi-modal neuroimaging data with machine learning in the Establishing Moderators and Biosignatures of Antidepressant Response in Clinical Care (EMBARC) study.
    - **Project 3. Enhancing Neuroimaging with Generative Deep Learning Models**
        - Corrected site effects in MRI data with cycle-consistent Generative Adversarial Networks (GANs).
        - Generated diffusion MRI data from existing structural data using frequency-aware GANs.
        - Introduced Fourier Neural Approximator for synthesizing bandlimited signals like EEG.
- Server Administrator (09/2021 – 12/2023)
    - Managed programs such as Slurm (Source workload manager), Globus (file transfer service), and Docker (Container Application)
    - Provided tutorials for the lab members and hosted workshops

**Organizational Psychology Lab (Sogang University)** **Jan 2020 – Dec 2020**

- Research intern under Prof. Jae Yoon Chang
- Conducted sentiment analysis on general forums of bank workers for evaluating organizational culture
- Performed structural topic modeling on job search sites to identify job transfer reasons

## Publications

### PUBLISHED PAPERS

1. **Kwon, J.**, Seo, J., … & Cha, J. (2025). **Predicting task-related brain activity from resting-state brain dynamics with fMRI Transformers**. Imaging Neuroscience
2. Kim, P. Y.*, **Kwon, J***.,... & Moon, T. (2023). **SwiFT: Swin 4D fMRI Transformer.** *In the Thirty-seventh Conference on Neural Information Processing Systems.*
3. Kim, M., Shim, Y., **Kwon, J**., Bae, S., Lee, J., Cha, J., ... & Kwon, J. S. (2023). **Resting-state theta-phase gamma amplitude coupling as a biomarker for the transdiagnostic dimensional approach in psychiatric disorders**. *Psychiatry and clinical neurosciences*.

## PREPRINTS

1. Bae, S., **Kwon, J.**, Yoo, S., & Cha, J. (under review). Spatiotemporal Learning of Brain Dynamics from fMRI Using Frequency-Specific Multi-Band Attention for Cognitive and Psychiatric Applications. arXiv preprint arXiv:2503.23394.
2. Kim, S.*, Kwon, J.*, **Kwon, J.***, Bae, S., Lin, Y., Yoo, S., & Cha, J. (under review). Macro2Micro: Cross-modal Magnetic Resonance Imaging Synthesis Leveraging Multi-scale Brain Structures. *arXiv preprint arXiv:2412.11277*.

## MANUSCRIPTS IN PREPARATION

1. **Kwon, J.**, Amorosino, G., and Pestilli F. (in preparation). A Benchmark for White Matter Tract Segmentation.
2. Choi, J., Wang H., **Kwon, J.**, Yoo, S., Cha, J. (in preparation). SwiFT V2: Towards Large-scale Foundation Model for Functional MRI.
3. Amorosino, G., **Kwon, J.**, Carrasco M., Caron, B., and Pestilli F. (in preparation). Mapping Asymmetries in Structural Connectivity of the Visual Network.
4. Han, D., Lee, A., **Kwon, J.**, Cha, J. (in preparation). Enhancing Psychiatric Disorder Diagnosis: Integrating Multilabel Metadata with Contrastive Learning on T1 Structural MRI.
5. Lee, S.*, **Kwon, J.*,** Seo, J., Yoo, S., Cha, J. (in preparation). Predicting arbitrary task-related brain activations from the resting-state brain connectome with multi-modal Swin fMRI Transformer.
6. Choi, J., Park, D., **Kwon, J.**, Yoo, S., Cha, J. (in preparation). NeuroMamba: A State-Space Foundation Model for Functional MRI.

*** denotes equal contribution**

## CONFERENCE PRESENTATIONS & TALKS

1. **NeuroMamba: A State-Space Foundation Model for Functional MRI,** Spotlight talk and poster at Neurips 2025 BrainBodyFM workshop, San Diego.
2. **SwiFT V2: Towards Large-scale Foundation Model for Functional MRI,** Poster presented at Cognitive Computational Neuroscience (CCN) 2025, Amsterdam, The Netherlands.
3. **Enhancing Psychiatric Disorder Diagnosis: Integrating Multilabel Metadata with Contrastive Learning on T1 Structural MRI**, Poster presented at Organization for Human Brain Mapping (OHBM) 2025. Brisbane, Australia.
4. **Mapping Asymmetries in Structural Connectivity of the Visual Network**, Poster presented at Organization for Human Brain Mapping (OHBM) 2025, Brisbane, Australia.
5. **SwiFT: Swin 4D fMRI Transformer**
    - Poster presented at International Neuroinformatics Coordinating Facility (INCF) Sep 2024, Austin, TX
    - Invited talk presented virtually at MedARC NeuroAI Journal Club. Nov 21, 2023
    - Selected talk at Korean Human Brain Mapping (KHBM) 2023. Oct 27, 2023, Seoul, Korea
    - Invited talk at NERSC Users Group (NUG) meeting. Sep 28, 2023, Berkeley, CA
6. **Harmonization of Structural MRI with 3D cycleGAN**, Poster presented at International Congress on MRI (ICMRI) 2022. Nov 04, Seoul, Korea
7. **Prediction of biological features with spatiotemporal fMRI Transformers**, Poster presented at KHBM 2022. Nov 19, Seoul, Korea

## Honors and Awards

- Best Poster Award, Korean Human Brain Mapping (KHBM) 2022 — Nov 2022
- Dean's List (Award to top 1% of students in the Social Sciences Department) — Apr 2021
- Academic Excellence Scholarship, Sogang University — Sep 2016

## Teaching Experience

**Cognitive Neuroscience (University of Texas at Austin) Sep 2024 – Dec 2024**

- Selected as a teaching assistant to teach fundamental topics in cognitive neuroscience

**Data Science in Human Neuroimaging (Seoul National University) Sep 2021 – Dec 2021**

- Selected as a teaching assistant to teach fundamental topics in neuroscience, analysis of neuroimaging modalities, and ML techniques for predicting human behaviors
- Led hands-on sessions for the classes, guided students for final projects, and graded assignments

**Introduction to BigData Programming (Sogang University) Mar 2020 – Jun 2021**

- Selected as a head teaching assistant to introduce Python and object-oriented programming techniques
- Led computer labs and review sessions, prepared homework and exams, and supported and mentored other TAs

## Skills

- **Tools**
  - Python (Proficient), R (intermediate), SQL (intermediate), LaTeX
  - PyTorch, TensorFlow (Keras), DeepSpeed, Scikit-learn

- **Expertise**
  - **Human neuroimaging data (4 years experience)**
    - Familiar with neuroimaging tools such as fMRIprep, QSIprep, FSL, and nilearn
    - Worked with functional MRI, structural MRI, and diffusion MRI data.
    - Applied deep learning modules to various types of brain images (2D slices, 3D volumes, 4D sequences of volumes, and brain connectivity)

  - **High Performance Computing (3 years experience)**
    - Worked with supercomputers supported by NERSC Exascale Science Applications Program (NESAP)
    - Participated as a team member on 'Extreme-Scale Sptatiotemporal Learning' project (PI: Prof. Shinjae Yoo at Brookhaven National Lab)
    - Experienced in code profiling with NVIDIA's Nsight profiler
    - Awards: 2021 NERSC GPU Hackathon, 2022 KISTI-NVIDIA Hackathon, 2022 BNL GPU Hackathon, 2024 ALCF INCITE GPU Hackathon

- **Certifications**
  - Google TensorFlow Certificate
  - NVIDIA DLI for ‘Model Parallelism: Building and Deploying Large Neural Networks’

## Volunteer

- OHBM 2024
- INCF 2024 (23 Sep 2024 - 27 Sep 2024)

## Academic Service

- International Symposium on Biomedical Imaging 2025, Reviewer (4 reviews completed)