**Fu, Ze**
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## Education & Professional Experience

**Ph.D., Psychology (Cognitive Neuroscience)** | 2019-2025 (expected)
Beijing Normal University
Concept Lab (https://bilab.bnu.edu.cn/)
Advisor: Prof. Yanchao Bi
State Key Laboratory of Cognitive Neuroscience and Learning & IDG/McGovern Institute for Brain Research
*Lab relocated to School of Psychological and Cognitive Science, Peking University (2024)*

**Visiting Student, Psychology** | 2016-2017
University of California, Berkeley

**B.S., Psychology (Computer Science minor)** | 2014-2019
Central China Normal University

## Research Interests

- ✧ Cognitive Neural Basis of (Semantic) Knowledge Representation
- ✧ Cultural-Historical Dynamics of Collective Knowledge
- ✧ Relationships Between Language, Cultural, and Mind

## Publication & Manuscript

### First/Co-First Author

**Ze Fu**, Yuxi Chu, Tangxiaoxue Zhang, Yawen Li, Xiaosha Wang, Yanchao Bi (Under Review at *Nature Communications*). Semantics across the globe: A universal neurocognitive semantic structure adaptive to climate. [PDF]

- ✓ *Developed comprehensive framework combining multiple approaches: 53 languages' embeddings, 253 subjects' ratings, and 86 subjects' fMRI data;*
- ✓ *Identified 13 neurocognitive dimensions as universal structures in cross-language meaning representation;*
- ✓ *Demonstrated the robust effects of climate on cross-language semantic structures' variations.*

**Ze Fu***, Huimin Chen*, Zhan Liu, Maosun Song, Zhiyuan Liu, Yanchao Bi (2025). Pathogen stress heightens sensorimotor dimensions in the human collective semantic space. *Communications Psychology*, 3(2). [PDF]

- ✓ *Conducted large-scale historical analysis on collective semantic space across 4 countries and 100 years;*
- ✓ *Demonstrated link between pathogen stress and language evolution of semantics.*

**Ze Fu**, Xiaosha Wang, Xiaoying Wang, Huichao Yang, Jiahuan Wang, Tao Wei, Xuhong Liao, Zhiyuan Liu, Huimin Chen, Yanchao Bi (2023). Different computational relations in language are captured by distinct brain systems. *Cerebral Cortex*, 33(4). [PDF]

- ✓ *Revealed distinct neural mechanisms for different types of language-drived semantic relations;*
- ✓ *Novel application of graph-theoretical approaches to semantic relation modeling.*

**Contributing Author**

Shuang Tian*, Lingjuan Chen*, Xiaoying Wang, Guochao Li, **Ze Fu**, Yufeng Ji, Jiahui Lu, Xiaosha Wang, Shiguang Shan, Yanchao Bi (2024). Vision matters for shape representation: Evidence from sculpturing and drawing in the blind. *Cortex*, 174, 241-255.

- ✓ *Led congenital blinds' artworks data collection; Helped with language model analysis methods*

Shuang Tian, Yuankun Chen, **Ze Fu**, Xiaoying Wang, Yanchao Bi (2023). Simple shape feature computation across modalities: convergence and divergence between the ventral and dorsal visual streams. *Cerebral Cortex*, 33(15).

- ✓ *Participated in fMRI experiment design and data collection; Helped with cross-decoding methods*

Xiaohui You, **Ze Fu,** Yue Liu, Yanchao Bi, Xi Yu (In Prep). Word learning patterns in toddlerhood reflect semantic categorical organization representation: converging evidence from 21 languages.

- ✓ *Contributed to idea formulation; Helped with data analysis methods and discussion*

## Talks & Conference Presentations

**2024**

Representing historical cognition in language models. *Journal Club: AI for psychology*, Tsinghua University (Oral)

Application of language models to semantic cognition research. *Lab Meeting*, Zhejiang University (Oral)

Semantics across the globe. *Rovereto Workshop on Concepts, Actions, and Objects*, Italy (Poster)

**2023**

The ecological drivers of cross-cultural semantic structures. *Conceptual Brains and Cultural Evolution Workshop*, Zhuhai (Oral)

Pathogen stress heightens sensorimotor dimensions. *Society for the Neurobiology of Language*, Marseille (Poster)

**2021**

Graph and vector-embedding models. *Society for the Neurobiology of Language* (Online Slam)

## Research Training

**Research Intern** | 2018-2019
State Key Laboratory of Cognitive Neuroscience and Learning, Beijing Normal University
Advisors: Prof. Xiaoying Wang, Prof. Yanchao Bi

- ✓ *Designed experiments for multimodal shape perception study*
- ✓ *Collected and analyzed congenital blinds' drawings and sculptures*
- ✓ *Developed protocols for cross-modal shape representation analysis*

## Mentorship Experience

**Thesis Supervision** | 2023-2024

- ✓ *Supervised 3 undergraduate theses including one Outstanding Thesis Award recipient (Yuxi Chu, Tangxiaoxue Zhang, Yawen Li)*

**Research Training Program** | 2022-2024

- ✓ *Mentored undergraduates in Innovative Entrepreneurial Training Plan Program*

## Professional Service

Ad Hoc Reviewer: Imaging Neuroscience

## Honors & Awards

Award for Research and Innovation, Beijing Normal University (2023)
Graduate Academic Award, Beijing Normal University (2020-2023)

## Technical Skills

**Programming**
R; Python; MATLAB

**Statistical Analysis**
Network analysis; Multilevel modeling; Time-series analysis

**Research Method**
Functional-MRI; Language text analyses; Large language models; Online behavioral experiments