

MATTHEW KING-HANG MA

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EDUCATION

2023 **The Chinese University of Hong Kong, PhD**
Electronic Engineering, DSP & Speech Technology Laboratory (DSP-STL).

2015 **The Chinese University of Hong Kong, BEng (First-Class Honours)**
Biomedical Engineering.

WORK EXPERIENCES

03/2023 – Present **The Hong Kong Polytechnic University, Postdoctoral Fellow**
Research Centre for Language, Cognition and Neuroscience, Department of Language Science and Technology
PolyU Distinguished Postdoctoral Fellow
HKRGC Postdoctoral Fellow

02/2023 – 03/2023 **The Hong Kong Polytechnic University, Research Associate**
Research Centre for Language, Cognition and Neuroscience, Department of Chinese and Bilingual Studies

08/2015 – 07/2016 **The Chinese University of Hong Kong, Research Assistant**
DSP & Speech Technology Laboratory (DSP-STL), Department of Electronic Engineering

MANUSCRIPTS IN PROGRESS

2025 **Ma, M. K.-H.**, Fong, M. C.-M., & Wang, W. S. (2025). *A Path Toward Reproducibility: A Dual Perspective on Resting-State EEG Network Characteristics*. Submitted to ISBI2026.

2025 **Ma, M. K.-H.**, Fong, M. C.-M., Feng, Y., Li, C. P.-H., & Wang, W. S. (2025). *More than a feeling: Expressive style influences cortical speech tracking in subjective cognitive decline* (No. arXiv:2509.21277). arXiv. Submitted to ICASSP2026.

2025 Wang, B., **Ma, M. K.-H.**, Huang, S. (2025). *Evidential Value of Cantonese Filled Pause in Forensic Voice Comparison – A comparison between acoustic phonetic and automatic speaker recognition systems*. Submitted to Journal of Phonetics.

GRANT/FUNDING

2025 **Departmental Collaborative Research Fund (DCRF) (HKPolyU, 2025 – 2028, \$500,000)**: The effects of combined tDCS and conversation therapy on language and cognitive performance of people with mild cognitive impairment with integration of a multimodal analyzer.
- PI: Prof. WONG Min Ney.

- Served as Co-I.
- 2023 **HKRGF Postdoctoral Fellowship Scheme (HKRGF, 2023 – 2026, \$1351,352):** Attention and Attrition: Neural Speech Tracking of L1 and L2 Speech in Ageing Bilinguals.
 - PI: Prof. WANG William Shiyuan
 - Conceptualized the study, wrote the proposal, and conducted all primary research and analysis.
- 2022 **Inter-Faculty Collaboration Scheme for FH, FHSS and FENG (HKPolyU, 2022 – 2024, \$489,934):** What can we learn of subjective cognitive decline (SCD) from discourse comprehension? A neural speech tracking study.
 - PI: Prof. WANG William Shiyuan
 - Conceptualized the study, wrote the proposal, and conducted all primary research and analysis.
- 2021 **Dean's Reserve (HKPolyU, 2021 – 2023, \$100,000):** Complexity of electroencephalographic responses to speech and music: a comparison between patients with Alzheimer's disease and cognitively normal adults.
 - PI: Prof. WANG William Shiyuan
 - Conceptualized the study, wrote the proposal, and conducted all primary research and analysis.

SELECTED PUBLICATIONS

- 2025 **Ma, M. K.-H.***, Xie, C.*, Wang, W., & Wang, W. S. (2025). Exploring Layer-wise Representations of English and Chinese Homonymy in Pre-trained Language Models. *Findings of the Association for Computational Linguistics: ACL 2025*, 19705–19724.
- 2025 Xie, C.*, **Ma, M. K.-H.***, Wang, W., & Wang, W. S. (2025). Context and POS in Action: A Comparative Study of Chinese Homonym Disambiguation in Human and Language Models. In C. Christodoulopoulos, T. Chakraborty, C. Rose, & V. Peng (Eds.), *Proceedings of the 2025 Conference on Empirical Methods in Natural Language Processing* (pp. 27596–27613). Association for Computational Linguistics.
- 2025 **Ma, M. K.-H.**, Fong, M. C.-M., & Wang, W. S. (2025). A reliability study in resting-state EEG network characteristics: frequency of interest, number of oscillatory cycles and thresholding. *2025 47th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC)*.
- 2025 Rilliard, A. de Moraes, J. A., Erickson, D. Guerry, M., Hönemann, A., Lee, T., **Ma, M. K.-H.**, Mixdorff, H., Rao, P., Shochi, T. (2025). Cross-cultural dimensions organizing prosodic attitudes reception: a meta-analysis of free labeling studies. *Journal of Speech Sciences*, 14(00), e025012.
- 2025 Fong, M. C.-M., **Ma, M. K.-H.**, Ng, X. S.-W., Liu, J. C. H., Waye, M. M. Y., Chien, W. T., & Wang, W. S. (2025). Regional Brain Age Measures Based on Convolutional Neural Networks (CNNs)—Symmetry Properties and Associations with Fluid and Crystallized Intelligence. *2025 47th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC)*.
- 2024 Wang, J., Wang, S., Fong, M. C.-M., **Ma, M. K. H.**, & Wang, W. S. Y. (2024). What Can Complex Systems Theory Tell Us About Understanding in the Human–AI

Communication System? 2024 6th International Conference on Natural Language Processing (ICNLP), 650–656.

- 2023 **Ma, M. K.-H.** (2023). Six-Year Longitudinal Changes in EEG Spectral Characteristics of a Healthy Older Individual. In *Inspirations from a Lofty Mountain: Festschrift in Honor of Professor William S.-Y. Wang on his 90th Birthday*.
- 2023 Xie, C., Fong, M. C.-M., **Ma, M. K.-H.**, Wang, J., & Wang, W. S. (2023). The retrogenesis of age-related decline in declarative and procedural memory. *Frontiers in Psychology*, 14.
- 2022 Fong, M. C.-M., **Ma, M. K.-H.**, Chui, J. Y. T., Law, T. S. T., Hui, N.-Y., Au, A., & Wang, W. S. (2022). Foreign language learning in older adults: anatomical and cognitive markers of vocabulary learning success. *Frontiers in Human Neuroscience*, 16, 787413.
- 2021 **Ma, M. K.-H.**, Fong, M. C.-M., Xie, C., Lee, T., Chen, G., & Wang, W. S. (2021). Regularity and randomness in ageing: Differences in resting-state EEG complexity measured by largest Lyapunov exponent. *Neuroimage: Reports*, 1(4), 100054.
- 2021 Fong, M. C.-M., Law, T. S.-T., **Ma, M. K.-H.**, Hui, N. Y., & Wang, W. S. (2021). Can inhibition deficit hypothesis account for age-related differences in semantic fluency? Converging evidence from Stroop color and word test and an ERP flanker task. *Brain and Language*, 218, 104952.
- 2020 **Ma, M. K.-H.**, Lee, T., Fong, M. C.-M., & Wang, W. S. (2020). Resting-State EEG-Based Biometrics with Signals Features Extracted by Multivariate Empirical Mode Decomposition. *ICASSP 2020 - 2020 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, 991–995.
- 2020 Fong, M. C.-M., Hui, N. Y., Fung, E. S.-W., **Ma, M. K.-H.**, Law, T. S.-T., Wang, X., & Wang, W. S. (2020). Which cognitive functions subserve clustering and switching in category fluency? Generalisations from an extended set of semantic categories using linear mixed-effects modelling. *Quarterly Journal of Experimental Psychology*, 73(12), 2132–2147
- 2018 Mixdorff, H., Rilliard, A., Lee, T., **Ma, M. K. H.**, & Hönemann, A. (2018). Cross-cultural (A)symmetries in Audio-visual Attitude Perception. *Interspeech 2018*, 426–430.
- 2018 Lee, T., **Ma, K. H. M.**, Rilliard, A., Mixdorff, H., & Hönemann, A. (2018). Free Labeling of Audio-visual Attitudinal Expressions in Cantonese. *Speech Prosody 2018*, 483–487.
- 2017 Mixdorff, H., Hönemann, A., Rilliard, A., Lee, T., & **Ma, M.** (2017). Cross-Language Perception of Audio-visual Attitudinal Expressions. *The 14th International Conference on Auditory-Visual Speech Processing*, 119–124.
- 2017 Mixdorff, H., Hönemann, A., Rilliard, A., Lee, T., & **Ma, M. K.** (2017). Audio-visual expressions of attitude: How many different attitudes can perceivers decode? *Speech Communication*, 95, 114–126.

INVITED TALKS

- 2024 **Introduction to EEG/ERP analysis.** CBS596 Neurolinguistics. HKPolyU.

2023	Age-related trajectory of resting-state EEG: spectral characteristics and signal complexity. <i>1st RISA Symposium on Brain Ageing, Imaging and Stimulation.</i> HKPolyU.
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TEACHING

Fall 2019	Signal and Systems (Teaching Assistant). Instructor: Prof. LEE Tan. CUHK.
Fall 2018	Introduction to Embedded System (Teaching Assistant). Instructor: Mr. YIP Kim Fung. CUHK.
Spring 2017	Introduction to Electric Power Systems (Teaching Assistant). Instructor: Prof. LOH, Poh Chiang. CUHK.
Fall 2016	Signal and Systems (Teaching Assistant). Instructor: Prof. LEE Tan. CUHK.

SELECTED ORAL/POSTER PRESENTATIONS

2023	<u>Ma, M. K.-H.</u> , Fong, M. C.-M., & Wang, W. S. (2023, May 8). <i>Lempel-Ziv complexity shows inverted U-shaped pattern across the adult lifespan</i> [Poster]. PolyU Academy for Interdisciplinary Research (PAIR) Conference, Hong Kong.
2023	<u>Ma, M. K.-H.</u> , Fong, M. C.-M., Lee, T., & Wang, W. S. (2023, August 20). <i>Resting-state EEG complexity: Antagonistic associations with cognition pre- and post-middle age</i> [Oral]. BrainConnects2023, Ho Chi Minh City, Vietnam.
2022	<u>Ma, M. K.-H.</u> , Fong, M. C.-M., Lee, T., & Wang, W. S. (2022, August 8). <i>Disentangling broadband EEG microstates into frequency-specific features of ageing</i> [Poster]. BrainConnects2022, Nagoya, Japan.
2020	<u>Ma, M. K.-H.</u> , Lee, T., Fong, M. C.-M., & Wang, W. S. (2020, May 2). <i>Using multivariate empirical mode decomposition to analyze broad-band EEG microstates.</i> 27th Annual Meeting, Cognitive Neuroscience Society, San Francisco, United States.
2019	<u>Ma, M. K.-H.</u> , Lee, T., Fong, M. C.-M., Hui, N. Y., & Wang, W. S. (2019, March 23). <i>Reliability of resting-state EEG spectral power—Advantage of normalization is not guaranteed</i> [Poster]. 26th Annual Meeting, Cognitive Neuroscience Society, San Francisco, United States.

SELECTED AWARDS

2023	HKRGFC Postdoctoral Fellowship , Hong Kong Research Grant Council
2023	PolyU Distinguished Postdoctoral Fellowship , HKPolyU
2023	Young Investigator Award , BrainConnects2023
2022	CUHK Outstanding Student Award , CUHK
2022	Excellent Presentation Award , BrainConnects2022
2020	Endeavour Merit Award 2019/2020 , Hong Kong Government Scholarship Fund
2020	PCCW-HKT Scholarship , PCCW
2020	Tutor with Commendation , CUHK

UNIVERSITY AND COMMUNITY SERVICES

- 2022 Initiated and participated in a rehabilitation project to assist patients with their vocal cord removed as a part of treatment of their tongue, laryngeal or esophageal cancers. The team successfully delivered a deep learning text-to-speech system to synthesize the patients' voice. The project has been reported by local television programme [1].
[1] 【小事大意義】留住媽媽聲線：患舌癌須切除聲帶 大學團隊用 AI 為兒子留住媽媽聲線. (2022, June 3). i-CABLE.
- 2019 **Hong Kong Primary and Secondary Schools STEM Robotics Competition 2019 (Student Organizer), CUHK**