HUANG Po-Hsuan

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EDUCATION

Ph.D.	*2024–*	**University of Southern California, CA** Linguistics
M.A.	*2020–2023*	**National Taiwan University, Taipei, TW** Linguistics Thesis: Production and perception of tonal coarticulation in Taiwan Mandarin and Taiwan Southern Min
B.A.	*2015–2020*	**National Chengchi University, Taipei, TW** English, French (majors)

GRANTS & HONORS

Taiwan Global Fellowship *2024–2027*
Ministry of Education, Taiwan

Graduate School Fellowship *2024–2025*
Dornsife College of Letters, Arts and Sciences, USC

Dean's List *2017*
National Chengchi University

PUBLICATIONS

Peer-reviewed Papers

Journal articles

Huang, Po-Hsuan and Her, One-Soon. 2024. On a dichotomy of question types: The case of Paiwan. *Concentric: Studies in Linguistics, 50*(1), 20–56. doi: 10.1075/consl.00033.her

Proceedings

Huang, Po-Hsuan and Shao, Hsuan-Lei. 2024. Applying mutual information to extract legal domain-specific collocation nouns in Mandarin. *Proceedings of the Thirtieth Annual Meeting of the Association for Natural Language Processing*, 1329–1333. Sanbi Printing.

Huang, Po-Hsuan and Chiu, Chenhao. 2023. Perception of coarticulated tones in Taiwan Mandarin and Taiwan Southern Min. In: Radek Skarnitzl & Jan Volín (Eds.), *Proceedings of the 20th International Congress of Phonetic Sciences*, 446–450. Guarant International.

Chiu, Chenhao and **Huang, Po-Hsuan**. 2023. Lip postures of high vowels in Taiwan Mandarin. In: Radek Skarnitzl & Jan Volín (Eds.), *Proceedings of the 20th International Congress of Phonetic Sciences*, 1052–1056. Guarant International.

Chiu, Chenhao, Huang, Jian-Zhi and **Huang, Po-Hsuan**. 2023, December 4–8. Perceptual identification of high vowels in Taiwan Mandarin. *The Journal of the Acoustical Society of America, 154*, A35

Presentations

Chiu, Chenhao, **Huang, Po-Hsuan** and Huang, Jian-Zhi. 2024, June 24–25. Coordination of tongue and lips in Taiwan Mandarin high rounded vowels. Ultrafest XI: Conference on Ultrasound Imaging for Speech and Language Research. Aizu, Japan.

Huang, Po-Hsuan. 2024, May 13–17. Production and perception of tonal coarticulation through computational communication simulation. The 13th International Seminar on Speech Production (ISSP 2024). Autrans, France. [Poster]

Chiu, Chenhao, Chang, Cheng-Hsiang, Huang, Jian-Zhi and **Huang, Po-Hsuan**. 2024, May 13–17. Enhancing lip contrasts between /u/ and /y/ in Taiwan Mandarin. The 13th International Seminar on Speech Production (ISSP 2024). Autrans, France. [Poster]

Huang, Po-Hsuan and Liu, Yi-Chen. 2023, October 21. Ultrasonic-and-optical-imaging-assisted automated speech correctness judgment model. Tunghai International Conference on Second Language Teaching and Research (SLTR.THU). Taichung, Taiwan.

Huang, Po-Hsuan and Chiu, Chenhao. 2023, May 26–27. Tonal coarticulation in Taiwan Mandarin and Taiwan Southern Min. Hanyang International Symposium on Phonetics and Cognitive Sciences of Language (HisPhonCog). Seoul, Korea. [Poster]

Wang, Chi-Wei, Chen, Bo-Wei, **Huang, Po-Hsuan**, Lai, Ching-Hung, and Chiu, Chenhao. 2023, May 26–27. Evaluating forced alignment for under-resourced languages: A test on Squliq Atayal. Hanyang International Symposium on Phonetics and Cognitive Sciences of Language (HisPhonCog). Seoul, Korea. [Poster]

Huang, Po-Hsuan and Chiu, Chenhao. 2022, November 3–4. Articulation and syllabic affiliation of prenuclear glide in Taiwan Mandarin. Ultrafest X: Conference on Ultrasound Imaging for Speech and Language Research. Manchester, United Kingdom.

Huang, Po-Hsuan, Lai, Ching-Hung and Liu, Te-Hsin. 2022, September 23–25. On the interaction between L1 Transfer and universal constraints – Evidence from the acquisition of Mandarin tones by French speakers. North American Conference on Chinese Linguistics (NACCL). Bloomington, IN, United States.

Huang, Po-Hsuan and Chiu, Chenhao. 2022, January 6–9. Vowel-glide distinction in high vocoid diphthong structures in Squliq Atayal: An ultrasound and acoustic study. Annual Meeting of the Linguistic Society of America (AML). Washington, DC, United States. [Poster]

Huang, Po-Hsuan. 2021, October, 23. Vowel–glide distinction in high vocoid diphthong structures in Squliq Atayal: An ultrasound and acoustic study. National Conference on Linguistics (NCL). Taipei, Taiwan.

Huang, Po-Hsuan and Her, One-Soon. 2021, October 15–16. On a two-way distinction of questions in Paiwan. Young Scholars' Symposium on Taiwan Languages (YSSTL). Online.

Preprints & Manuscripts

Huang, P.-H. and Shao, H.-L. (2024). *Comparison between the structures of word co-occurrence and word similarity networks for ill-formed and well-formed texts in Taiwan Mandarin*. arXiv. https://doi.org/10.48550/arXiv.2408.09404

Huang, Po-Hsuan and Chiu, Chenhao. (2023). *Production and perception of coarticulated tones: The cases of Taiwan Mandarin and Taiwan Southern Min*. SSRN. https://ssrn.com/abstract=4637487

Huang, Po-Hsuan. Informativity and its allocation in tonal coarticulation in Taiwan Southern Min and Taiwan Mandarin. Manuscript.

Huang, Po-Hsuan. What's in a name? Phonetic and phonological conditioning of personal names in Taiwan Mandarin. Manuscript.

RESEARCH EXPERIENCE

Natural Language Processing and Sentiment Analysis Lab — **Institute of Information Science**
(PI: Dr. Lun-Wei Ku) — **Academia Sinica**
Full-time Research Assistant — *February, 2024–June, 2024*

Projects (on-going)

Enhancing abstract reasoning for LLMs and VLMs

- Built a multi-hop instance-association dataset aimed for enhancing language models' abstract reasoning ability.

VLM-based ultrasonic-optical speech production learning tool

- Using a large open-source lingual ultrasound corpus to train VLMs as speech production assistants for L2 acquisition/speech therapy.

Linguistic relativity in LLMs

- Investigating linguistic influence on multilingual LLMs' performances.

Speech Behavior and Science Lab — **Graduate Institute of Linguistics**
(PI: Dr. Chenhao Chiu) — **National Taiwan University**
Lab Member & Research Assistant — *July, 2021–February, 2024*

Notable projects

High/low vowel differences in laryngeal height and EGG amplitude for different tones

- Supervised lab interns on experiment design, experiment conduction, and analyses.
- Developed pipelines for data analysis and visualization for multi-channel data.

Lip postures of Taiwan Mandarin High vowels

- Developed automated face recognition for linguistic purposes with MediaPipe.
- Designed automated lip landmark tracing for side faces with cluster analysis.

Squliq Atayal corpus construction

- Labeled 20-hour-long recordings of Squliq Atayal produced by one female informant.

- Cataloged the sound inventory of Squliq Atayal.
- Assisted in Squliq Atayal speech auto-segmentation.

Prof. Hsuan-Lei Shao **Research Center for Digital Law**
National Taiwan University

Research Assistant *August, 2023–December, 2023*

Projects

Legal judgment similarity computation

- Devised a novel similarity computation based on graph analysis of textual data.
- Overcame the lack of prior-case citations in the continental law system.

Association-rule-based domain-specific collocation extraction

- Extracted domain-specific collocations in two different corpora (legal judgments and political talks) through iterative word re-segmentation based on (average) MI (mutual information).
- Devised an algorithm for (average) MI threshold determination based on mean sentential word ratios and the elbow method.
- Built a package that performs calculation of (average) MI for adjacent bigrams, re-segmentation of the original sentences, and visualization of the sentences as binary trees.

Prof. Te-Hsin Liu **Graduate Program of Teaching Chinese as a Second Language**
National Taiwan University

Research Assistant *July, 2021–October, 2022*

Project

Interaction between L1 transfer and universal constraints for French-speaking Mandarin L2 learners

- Conducted thorough literature reviews for weekly seminars.
- Devised and conducted suitable statistical analyses for the corpus data.

Prof. One-Soon Her **Graduate Institute of Linguistics**
National Chengchi University

Research student *June, 2018–July, 2020*

Project

Classification of Paiwan questions

- Conducted thorough fieldwork.
- Visualized the prosodic patterns of the collected materials.
- Authored a journal paper.

Thesis

Production and perception of tonal coarticulation in Taiwan Mandarin and Taiwan Southern Min

- Formulated hypotheses pertaining to the research gaps and designed experiments to validate these hypotheses.
- Independently completed three large-scale experiments.
- Devised and conducted suitable statistical analyses for the experiment data.
- Provided explanation for the experiment results.
- Authored a journal paper (under review).

Course/Personal Projects

Ultrasonic-and-optical-imaging-assisted automated speech correctness judgment model
Data Analysis and Machine Learning with Python
Lecturer: Prof. Tommy C.Y. Ho
Fall semester, 2023

- Applied newly learned knowledge and skills to existing expertise; integrated distinct fields with linguistics.
- Designed a sophisticated neural network structure that combines two different forms of data, with a sound identification accuracy of 83%.

Word networks for ill-formed versus well-formed documents in Taiwan Mandarin
Special Topics on Text Mining and Natural Language Processing
Lecturer: Prof. Hsuan-Lei Shao

Fall semester, 2023

- Devised a pipeline to collect documents to form corpora with a static web crawler.
- Self-taught word vectorization.
- Built a word2vec model based on 1 million documents.
- Applied word networks to graph analyses.
- Developed a novel kind of word network based on word similarity and compared its properties with conventional word co-occurrence networks.

Simulated production and perception of tonal coarticulation through communication neural agents

- Developed speaker/listener neural agents in tone communication.
- Self-taught related deep learning knowledge, including multilayer perceptrons and communication networks.
- Successfully induced human-like behaviors, including perceptual normalization and avoidance of coarticulation based on different tone distributions.

TEACHING EXPERIENCE

Technology of Brain Science — **Graduate Institute of Brain and Mind Sciences, National Taiwan University**
Lecturers: Prof. Joshua G.O. Soo & Prof. Chia-Lin Lee
Teaching Assistant — *Spring semester, 2023*

- Supervised students' term project progress.
- Provided students with coding assistance.
- Evaluated and graded students.

Uncovering Languages — **Graduate Institute of Linguistics, National Taiwan University**
Lecturer: Prof. Chenhao Chiu
Teaching Assistant — *Spring semester, 2022/2023*

- Supervised students' term project progress.
- Provided students with coding assistance.
- Designed pop-up quizzes and mid-term exams.
- Supervised and led student's discussions in weekly tutorials.
- Evaluated and graded students.
- Prepared class materials.

Freshman English — **Department of Foreign Languages and Literatures, National Taiwan University**
Lecturer: Prof. Wen-Hsien Hsu
Teaching Assistant — *Fall semester, 2020/Spring semester, 2021*

- Gave oral presentation tutorials and example presentations.
- Supervised student's mid-term and final presentations.
- Evaluated and graded students.
- Prepared class materials.

INVITED TALKS

"Implementation of Praat through Python" — *November, 2024*
Department of Linguistics, USC, CA

"Electroglottography in linguistics research with Python" — *March, 2024*
Institute of Linguistics, Academia Sinica, Taipei

"Face extraction with MediaPipe in linguistics research" — *October, 2023*
Speech Behaviours and Speech Sciences In-class Talk, Taipei

"Face extraction with MediaPipe in linguistics research" — *November, 2022*
MultiMoco NTU Workshop, Taipei

"Using PCA and LDA for ultrasound image classification" — *November, 2021*

The 1st NTU GIL Ultrasound Workshop, Taipei

PEER-REVIEW SERVICE

Annual Meeting of the Association for Computational Linguistics (ACL) *2024*

SERVICE & ACTIVITIES

Organizer, Education Camp for Rural Schools, NCCU *February–August, 2017*
President of Activity, Changhua Student Association, NCCU *July, 2017–June, 2018*
Vice organizer, Education Camp for Rural Schools, NCCU *September, 2016–January, 2017*
Leading actor, Concours universitaire national de théâtre, Taiwan *May, 2017*
Project manager, Education Camp for Rural Schools, NCCU *August, 2016*
Voluntary after-school tutor, Wanhsing Elementary School, Taipei *Spring semester, 2016*

SKILLS & KNOWLEDGE

Languages: Mandarin (native); Southern Min (native); English (advanced); French (advanced); Spanish (basic)
Programming languages/software: Python; R; Javascript; Praat Script; Psychopy; E-Prime; Matlab; SQL; bash; Swift
Packages/modules:

- Data analyses: *numpy*; *scikit-learn*; *statsmodels*; *pandas*; *network*; *lme4*
- Visualization: *matplotlib*; *seaborn*; *Plotly*
- Image processing: *OpenCV*; *MediaPipe*; *FFmpeg*
- Acoustic analyses: *parselmouth*; *wave*
- Text mining: *jieba*; *ckip*; *gensim*

Others: *tensorflow*; *PyTorch*; *tkinter*; *PyPI*; *pickle*; *cython*; *git*
Statistical analyses: fundamental analyses (t-test, ANOVA, etc.); dimensionality reduction (PCA, LDA, t-SNE, etc.); regression/modeling (linear/logistic regression, LMM, GLM, GAMM, etc.), cluster analysis (hierarchical; K-Means, etc.); correlation-related analyses (fundamental correlation analyses, CCA, Apriori Algorithm, mutual information, label ranking average precision scores, etc.); basic graph analyses
Machine learning: linear/logistic regression; SVM; decision tree; random forest; KNN; neural networks (CNN, spatial-transformer network, RNN, GAN, etc.); neural agent simulation, transformers and LLMs
Data structures & Algorithms: linked list, tree, array, A* pathfinding, Levenshtein distance
Laboratory instrumentation: ultrasound; electromyography; electroglottography

LICENSES & CERTIFICATIONS

Deep Learning Specialization [View] Issued by: *Coursera*