

# HUANG Po-Hsuan

3601 Watt Way Grace Ford Salvatori 301 Los Angeles CA 90089 | [pohsuan@usc.edu](mailto:pohsuan@usc.edu) | <https://peh-suan.github.io>

## 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/cons.00033.her](https://doi.org/10.1075/cons.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 13<sup>th</sup> 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 13<sup>th</sup> 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

(PI: Dr. Lun-Wei Ku)

Full-time Research Assistant

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

(PI: Dr. Chenhao Chiu)

Lab Member & Research Assistant

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 Assistant

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

### Institute of Information Science

Academia Sinica

February, 2024–June, 2024

### Graduate Institute of Linguistics

National Taiwan University

July, 2021–February, 2024

### Research Center for Digital Law

National Taiwan University

August, 2023–December, 2023

Research Assistant

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**

June, 2018–July, 2020

Research student

Project

**Classification of Paiwan questions**

- Conducted a thorough literature review.
- 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**

- Conducted a thorough literature review and found research gaps.
- 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

- Conducted a thorough literature review on unfamiliar areas and found research gaps.
- 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.
- Conducted a thorough literature review on unfamiliar areas and found research gaps.
- 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**

Lecturers: Prof. Joshua G.O. Soo & Prof. Chia-Lin Lee

Teaching Assistant

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

**Uncovering Languages**

**Graduate Institute of Brain and Mind Sciences**

**National Taiwan University**

Spring semester, 2023

**Graduate Institute of Linguistics**

Lecturer: Prof. Chenhao Chiu

Teaching Assistant

- 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

Lecturer: Prof. Wen-Hsien Hsu

Teaching Assistant

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

National Taiwan University

Spring semester, 2022/2023

Department of Foreign Languages and Literatures

National Taiwan University

Fall semester, 2020/ Spring semester, 2021

## INVITED TALKS

"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 1 <sup>st</sup> NTU GIL Ultrasound Workshop, Taipei	

## 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*; *networkx*; *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 [\[View\]](#)

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