

# 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/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.

### Institute of Information Science

Academia Sinica

February, 2024–June, 2024

### Graduate Institute of Linguistics

National Taiwan University

July, 2021–February, 2024

- 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**

*August, 2023–December, 2023*

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**

**National Taiwan University**

*July, 2021–October, 2022*

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 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**

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### **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**

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.

**Graduate Institute of Brain and Mind Sciences**

**National Taiwan University**

*Spring semester, 2023*

**Graduate Institute of Linguistics**

**National Taiwan University**

*Spring semester, 2022/2023*

**Department of Foreign Languages and Literatures**

**National Taiwan University**

*Fall semester, 2020/ Spring semester, 2021*

## **INVITED TALKS**

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"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*

## PEER-REVIEW SERVICE

Annual Meeting of the Association for Computational Linguistics (ACL)

2024

## SERVICE & ACTIVITIES

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

## 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*