**O N B U C T I O N S**

- Pronunciation is an integral part of communication, but it has proven to be one of the most challenging aspects to incorporate into language pedagogy and to implement in the classroom.
- Our project brings to language pedagogy technological innovations that address the challenges faced in teaching and learning pronunciation, and gives learners control and autonomy over their own learning.
- Our tools and resources draw on ultrasound and other speech visualization technology and its application in articulatory phonetics.
- Evidence-based approach: we evaluate and report on the impact of our resources on teaching and learning.

**MULTIMODAL TOOLS TO VISUALIZE SPEECH**

- Educational resources enable students to visualize speech sounds of world’s languages.
- **Ultrasound overlay videos** combine mid-sagittal images of tongue movements with external profile views of a speaker’s head.
- **High-quality animations** present stylized representations of speech mechanisms.
- View videos at [enunciatearts.ubc.ca](http://enunciatearts.ubc.ca).

**INTERACTIVE AND AUTONOMOUS TRAINING**

- **Japanese Pronunciation Tutorial** website offers learners opportunities for self-directed, interactive pronunciation training.
- [blogs.ubc.ca/enunciatejapanese](http://blogs.ubc.ca/enunciatejapanese).
- Learners have control and autonomy over their learning, engaging with site in a way that mimics one-on-one interactions with speakers.
- **Tutorial consists of instructional videos, practice exercises, and quizzes.**
- **Content developed collaboratively**, drawing on Japanese instructors’ knowledge of pronunciation challenges and linguists’ understanding of speech production.
- **Student surveys** report that learners’ understanding and pronunciation of Japanese sounds improved.
- Future developments include similar websites for other languages, including French, Spanish, German, and Chinese.

**BIOVISUAL FEEDBACK FOR PRONUNCIATION TRAINING**

- **Novel use** of **biovisual feedback using visualization technology** can improve pronunciation for language learners.
- **Repetition and feedback** are essential for pronunciation training, but difficult to implement in a classroom setting.
- **Ultrasound-based tutorials** allow learners to get feedback on their pronunciation of challenging sounds.
- **Online prosody visualizer** allows students to record utterances and compare with model speaker.

**ULTRASOUND KIT FOR CUSTOMIZED RESOURCES**

- **“Tongue visualizer” software** enables language instructors and other users to develop customized ultrasound overlay videos.
- Ultrasound kit includes software + all required hardware (portable ultrasound machine, camcorder, laptop computer, accessories).
- Language instructors will be able to produce custom resources focusing on specific pronunciation challenges in their own languages.
- Particularly useful for the sounds of BC’s First Nations languages.
- Custom videos in development for:
  - Cantonese (final obstruents, vowels)
  - Upriver Halq’emeylem (dorsal sounds)
  - SENĆOŦEN (full alphabet, created by community language apprentices).

**REFERENCES**


**ACKNOWLEDGEMENTS**

We gratefully acknowledge the financial support for this project provided by UBC Vancouver students via the Teaching and Learning Enhancement Fund. Research related to this project is funded by a grant awarded to B. Gick from the UBC Faculty of Arts, and we gratefully acknowledge this support.