Ultrasound Technology and its Role in Cantonese Pronunciation Teaching and Learning

Over a decade of research has shown how using ultrasound imaging for biovisual feedback of tongue movement can help improve language learners' pronunciation. In this paper we report on a study investigating the utility of incorporating ultrasound technology into pronunciation training in Cantonese language classes, from both the teaching and learning perspectives. In particular, we evaluate both the *procedure* and *product* of developing ultrasound overlay videos, which combine ultrasound images of tongue movements in speech with external profile views of a speaker's head to allow learners to visualize speech production (e.g., enunciate.arts.ubc.ca). The videos were developed using a toolkit designed for language teachers and consisting of a portable ultrasound machine, video/audio recorders, and customized software for aligning and overlaying the two types of recordings (ultrasound and audio-video). Our team is the first to pilot the toolkit, and our evaluation of the time and challenges in creating the videos will help the developers improve the toolkit and its documentation for future users. The 10 videos we produced focus on two sets of challenging sounds for Cantonese learners: (i) the three-way contrast of unreleased final obstruents and (ii) the low-mid central and low central vowel. The videos were tested using two groups of introductory Cantonese students at UBC: an experimental group, given access to a website housing the videos, and a control group, given access to a mirror website housing the corresponding audio clips alone. The results of this experiment speak to the impact of ultrasound overlay videos on student learning.

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