Simultaneous Recording of Tongue Ultrasound and Oral Airflow

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Background: We are interested in how airflow fits in with previous results on delayed naming (Rastle et al., 2005; Palo et al., 2015) and speech initiation (Schaeffler et al., 2014). In this study, we show that simultaneous Oral Airflow (OAF) and Ultrasound Tongue Imaging (UTI) measurement is feasible and provide preliminary results.

Methods: We recorded one 40-year-old native Finnish speaking participant (the first author) in a delayed naming experiment which combined simultaneous acquisitions of audio, OAF, and UTI. Audio was recorded separately in synchrony with OAF and with UTI. Overall synchrony is provided by post-hoc synchronisation of the audio tracks.

OAF data was acquired using an EVA2 system (S.Q.Labs, Aix-en-Provence) and SESANE software running on a Lenovo Core-i5 notebook PC. The nasality sensor was removed from the EVA2 airflow device to allow access for the ultrasound probe. Ultrasonic and audio data were recorded using an Articulate Instruments/Telemed Echo Blaster 128 portable ultrasound scanner with a C3.5/20/128 Z-3 probe operating at 3 MHz. The scan depth was set to 90mm, and the field of view was reduced to approximately 70 % (88 scanlines) to give a frame rate of 78 fps. Audio data was collected using an Audio Technica AT8010 omnidirectional condenser microphone and a Focusrite Scarlett Solo2 USB interface, at 22kHz/16bit.

Results and Discussion: Proof-of-concept is provided in Figure 2, which plots the oral airflow, pixel difference (Palo et al., 2014) and waveform from simultaneously recorded signals. More results will be available by the time of the conference.

References

Keywords: Methodological research, oral airflow, tongue ultrasound.