

Comparing the effect of pronunciation and ultrasound trainings to pronunciation training only for the improvement of the production of the French /y/-u/ contrast by four Japanese learners of French

Tanja Kocjančič Antolík¹, Claire Pillot-Loiseau¹, Takeki Kamiyama^{2, 1}

¹Laboratoire de Phonétique et Phonologie (LPP) UMR 7018 CNRS) /
Université Paris 3 Sorbonne Nouvelle

²Linguistique Anglaise Psycholinguistique (LAPS), EA 1569, Université Paris 8

Japanese learners of French commonly have difficulties producing perceptually recognisable French /y/ and /u/. The two sounds are articulatorily different from Japanese /u/, a high non-front vowel in the Tokyo variety with the tongue less retracted and lips less rounded than in French /u/ (Bothorel *et al.*, 1986; Uemura & Takada, 1990). The French /u/ produced by native speakers of Tokyo Japanese is typically perceived as /ø/ by native listeners of French (Kamiyama & Vaissière, 2009). French /u/ and /y/ are phonemically contrastive in Parisian French and are present in a number of minimal pairs. Being able to produce perceptually recognisable French /u/ is thus necessary for Japanese learners, even more so because the more anterior realisations may overlap with French /y/. The two sounds are typically learned by way of perception, but the progress can be slow because of the lack of perceptual differentiation between them. For this reason, it was hypothesised that learners benefit from visual feedback of tongue position by avoiding relying only on perceptual route but rather addressing articulation directly.

In total, seven participants took part in the study. The first subject was a 42-year-old female French native, recorded for reference articulatory and acoustic data. The six others were adult female native speakers of Japanese and living in Paris at the time of the study. They all started learning French as adults, were intermediate level learners and, at the time of participation, they were all attending a 12-week French pronunciation course including training sessions in language lab. Four of the participants (experimental group) received three 45-minute training sessions in which ultrasound was used as a visual aid in achieving and controlling the tongue position of the target vowels. The training began with isolated vowels, progressed to non-words with different phonetic contexts (facilitating, neutral and difficult contexts), then on to real words and sentences. The exact protocol was adjusted to the abilities and preferences of each participant. Each of these four participants underwent ultrasound and audio recordings three times: one week before the first training session (pre-training), one week after the last training session (post-training) and two months after the post-training recording (follow-up). The remaining three participants did not receive any ultrasound training (control group) but were also recorded two times: at the beginning and at the end of the pronunciation course. The recorded corpus consisted of ten repetitions of (1) [y] and [u] in isolation, as well as [a], [i] and the Japanese [u] (not recorded in pre-training), (2) alternation between [y] and [u], (3) disyllabic non-words CVCV where V is /y/ or /u/, and C is /p/, /t/ or /k/, (4) 28 real words and (5) four sentences (not recorded in pre-training). The French native speaker was recorded only once. Acoustic and articulatory analyses are under way. In this abstract, we focus on the articulatory data for two of the subjects in the experimental group, the two in the control group and for the native subject.

The current analysis of isolated /y/ and /u/ of the two Japanese learners who received ultrasound training confirms the difficulties that Japanese learners of French have with the production of French /y/ and /u/ (Kamiyama and Vaissière 2009). It also shows some improvements both in acoustic and in articulatory (Figure 1) data in post-training: AK shows a clearer separation between the tongue contours for each of the two vowels in the post-training recording, and even a greater distinction in follow-up. CS showed a further posteriorisation of the tongue root for /u/ after the ultrasound trainings (Figure 1), while the tongue shape is similar between the two recordings for both control learners: their /u/ is similar to the Japanese [u] after traditional pronunciation lessons (figure 2).

The four Japanese learners who received lessons with ultrasound reported that these sessions were enjoyable and effective for both /y/ and /u/. They said that the image helped them to better control the position of their tongue. 3 of 4 speakers easily understood this

image, which helped them a lot. All of them would take some lessons with ultrasound to better articulate other French sounds.

This study is a first step. Further analysis of the available data will allow inspecting articulatory improvements in more varied contexts (words vs. nonwords, mono- vs. disyllabic words, isolated vowels vs. words vs. sentences) as well as in more quantitative details (tongue height and curvature, tongue curvature position, Ménard *et al.* 2012; Dorsum Excursion Index DEI, Zharkova 2013, among others parameters). The method will also be useful for the analysis of other kinds of productions such as the singing voice.

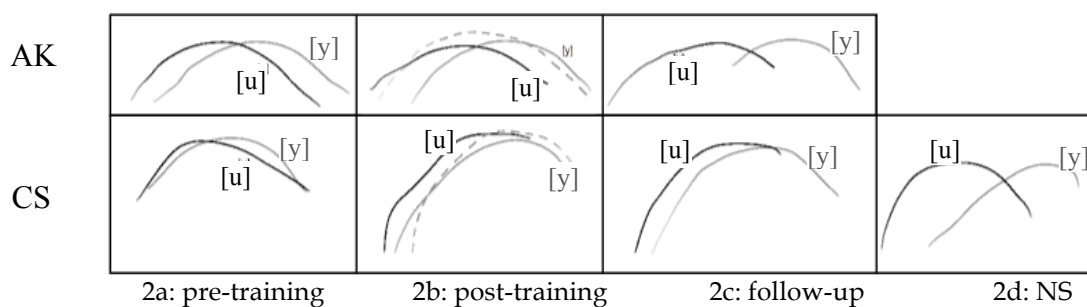


Figure 1: Mean tongue position (10 repetitions) for [y] (solid grey curve), [u] (black curve) and [u] (dashed grey curve) for AK (top) and CS (bottom) in the Experimental Group. From left to right: pre-training (2a), post-training (2b), follow-up (2c), native French speaker (2d). Front of the tongue is on the right side of each image.

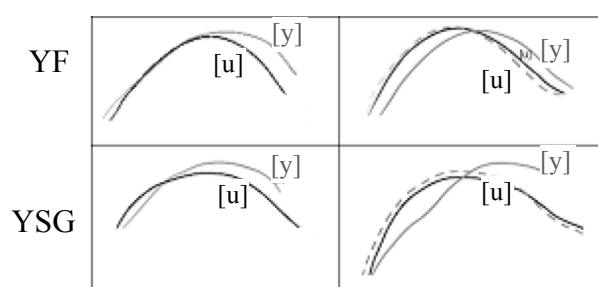


Figure 2: Mean tongue position (10 repetitions) for [y] (solid grey curve), [u] (black curve) and [u] (dashed grey curve) for YF (top) and YSG (bottom) in the Control Group.

References

- Bothorel A., Simon P., Wioland F., Zerling J.P. (1986). *Cinéradiographie des voyelles et consonnes du français*. Strasbourg, Publications de l'Institut de Phonétique de Strasbourg.
- Kamiyama T., Vaissière, J. (2009). Perception and production of French close and close-mid rounded vowels by Japanese-speaking learners, *Acquisition et interaction en langue étrangère Aile... Lia* 2, 9-41.
- Ménard, L., Aubin, J., Thibeault, M., Richard, G. (2012). Measuring Tongue Shapes and Positions with Ultrasound Imaging: A Validation Experiment Using an Articulatory Model, *Folia Phoniatica et Logopaedica*, 64, 64-72.
- Uemura Y., Takada M. (Kokuritsu Kokugo Kenkyūjo [National Institute for the Japanese Language]) (1990). *Nihongo no boin, shiin, onsetsu: chouon undou no jikken-onseigakuteki kenkyuu* [Vowels, consonants and syllables in Japanese: experimental phonetics study in articulatory movements]. Tokyo, Shūei shuppan.
- Zharkova, N. (2013). A normative-speaker validation study of two indices developed to quantify tongue dorsum activity from midsagittal tongue shapes, *Clinical Linguistics & Phonetics*, 27(6-7), 484-496.

Acknowledgements: this work has been supported by the Labex EFL (ANR/CGI) and the PF7 i-Treasures N° 600676.