

**Speech production in blind and sighted speakers:  
an analysis of tongue positions in different prosodic contexts**

Mélanie Thibeault, Amélie Brisebois, Annie Leclerc, Jérôme Aubin et Lucie Ménard  
Phonetics Laboratory, Université du Québec à Montréal

This presentation aims at examining the effects of sensory modality on the production of focus-induced prominence in French at the articulatory and acoustic levels (Lacheret-Dujour and Beaugendre, 1999; Loevenbruck et al., 1999; Ménard et al., 2006). Two experiments were conducted. In the first one, normative values of tongue contours in neutral and emphasis condition were recorded in sighted adult speakers. The corpus consisted of CVC syllables, where C corresponds to /p t k ʃ/ and V is one of the vowels /i y e ε a o u/. Target words were embedded in carrier sentences elicited in two prosodic conditions: neutral (unfocused) and under contrastive focus. Four adult speakers (all native speakers of French) produced ten repetitions of each sequence. The audio signal and tongue shapes were recorded using a digital camera and a Sonosite 180 plus ultrasound system. Formant frequencies, fundamental frequency (F0), rms values, duration, and tongue contours corresponding to each vowel were extracted. Analyses show that prosodic context has a significant effect on acoustic data for all vowels, increasing F0, rms values, duration and F1 under contrastive focus, compared to the neutral context. However, this stable acoustic pattern is achieved by various articulatory strategies across subjects.

In a second experiment, a subset of the vowels used in the first experiment was produced by 8 congenitally blind speakers and 8 sighted speakers (Leclerc, 2007). The audio signal, lip movement, and tongue shapes were recorded using a digital camera and an ultrasound system. Data analyses were similar to those performed in the first experiment. The results show that, despite similar acoustic properties, the rounded and unrounded vowels are less differentiated along the protrusion dimension for blind speakers than for sighted speakers. It is suggested that this variability is related to a trade-off between lip protrusion and tongue position. Significant interaction effects between consonant environment, vowel category, and prosodic context are discussed for each speaker group.

Lacheret-Dufour, A. and Beaugendre, F. (1999): *La prosodie du français*, Paris, CNRS Langage.

Leclerc, A. (2007) : *Le rôle de la vision dans la production de la parole : Étude articulatoire et acoustique des voyelles orales du français québécois produites par des locuteurs voyants et aveugles*. Master's thesis in Linguistics, Université du Québec à Montréal.

Loevenbruck, H. (1999): "An investigation of articulatory correlates of the accentual phrase in French", *Int. Congr. Phon. Sc.*, San Francisco, Vol. 1, 667-670.

Ménard, L., Loevenbruck, H. and Savariaux, C. (2006) : "Articulatory and acoustic correlates of contrastive focus in French: a developmental study", in Harrington, J. and Tabain, M. (eds), *Speech Production: Models, Phonetic Processes and Techniques*, Psychology Press : New York, 227-251.