Fieldwork data, models and theory in phonetics and phonology

Didier Demolin

Gipsa-Lab, Université de Grenoble, Alpes

didier.demolin@gipsa-lab.fr

The instrumentation used in experimental phonetics nowadays allows obtaining reliable and quantified data in the field. These data often question phonological models and permit to refine theoretical aspects of speech production. Two examples, specific of indigenous languages of South America, will be discussed in this presentation.

The first concerns the realization of voiced and voiceless nasalized fricatives in Guarani. Guarani data are interesting since they challenge claims made by Ohala & Ohala (1983) about realizations of nasalized fricatives when they claimed that buccal obstruents require velic closure. This made them propose the following theorem '*The velic closure must be closed (i.e., the soft palate must be elevated) for an obstruent articulated further forward than the point where the velic valve joins nasal cavity and the oral cavity*'. One of the consequences of this is that nasalized fricatives are unlikely in the world's languages. Ohala & Ohala say that voiced nasalized fricatives, such as those mentioned by Schadeberg (1982) could rather be frictionless continuants (i.e. [v] → [ʋ̃] and possible cases of voiceless nasalized fricatives like in the Appelcross dialect of Scots Gaelic (Tenes 1973) should be determined instrumentally. Shosted (2006) showed from a model of speech production that if nasalized voiceless fricatives should have a flattened spectrum compared to their oral counterpart, [s] → [θ], [x] → [ħ], [ɣ] → [ɦ]. Data from Guarani, show that variations predicted by Shosted's model are found in the language and that there are occurrences of nasalized voiceless fricatives. Their realizations vary from what is predicted by Shosted's model to phonetic realizations which do not affect the acoustic spectrum. Aerodynamic data show even if there is a clear nasal airflow during the realizations of voiceless nasalized fricatives it does not affect the acoustic output which sounds like oral. This is likely because some threshold of airflow and intraoral pressure must be reached in order to alter the acoustic spectrum. Ohala & Ohala had the right insights for voiced nasalized fricatives since in Guarani they turn frictionless approximants. Shosted prediction are met for voiceless fricatives but the reality is a bit more subtle as this is not about an all or nothing amount of nasal airflow but about reaching or not some threshold of nasal airflow during the constriction of voiceless fricatives.

The second phenomena which will be examined concerns glottalization phenomena in many South American languages. Numerous glottalization phenomena can be observed in South American languages. The focus of an investigation on this topic is to move beyond the view that attributes a weakly defined 'glottalization' or 'laryngalization' feature with the voice source. These phenomena are very frequent in many languages and deserve careful examination. The presentation will provide empirical evidence in support for a new model of laryngeal features. Data come from fieldwork research in Dâw Pirahã, Kotiria, Wanano, Juruna and Karitiana from Brazil. A frequent phenomena found in South American languages is observed in Wanano, Stenzel (2007), Kotiria and Waikhana, Stenzel & Demolin (2012), and Juruna, among other languages. This is the presence of sounds perceptually similar to glottal stops and glottalized phenomena between or around vowels. The most complicated case to explain is when two identical vowels (or even two different vowels) are separated by a creaky transition or by a rapid falling/rising pattern in the source. The latter is realized between two consecutive pulses. These sounds have sometimes been described as glottal stops but phonetically they are fully voiced sounds with a lower intensity and sometimes a creaky character. From recent propositions made by Moisik (2013) and Moisik and Esling (2011) it seems that these glottalized transitions between vowels which mark a syllable onset might be described by a constriction of the epilaryngeal tube. This would account in a natural way for the creaky character of these transitions and/or for the variable dip in amplitude and f0 between two identical vowels separated by a syllabic onset. Esling's (2005) Laryngeal Articulator Model (LAM) establishes that there are canonical relationships among the three components of laryngeal constriction (larynx raising, lingual retraction, and intrinsic laryngeal muscle constriction). A revised set of LAM features is characterized by the adoption of a feature representing epilaryngeal constriction. This feature: [± constricted epilarynx tube (± cet)], proposed by Moisik & Esling (2011), is not only precise but also introduces acoustic connotations (via the concept of a tube). The feature [± cet] has two possible interpretations depending on place of articulation: when linked with [Glottal], it indicates ventricular incursion (constriction of the lower margin of the epilaryngeal tube); when dominated by [Epilaryngeal], [± cet] it denotes aryepiglotto-epiglottal constriction. The introduction of this feature provides a new way to interpret glottal stops and accounts for the distinctive use of epilaryngeal sound sources. The laryngeal features proposed by Moisik & Esling (2011) allow more accurate and precise descriptions of sounds defined either as laryngalized or glottalized without much phonetic instrumental data. Moisik & Esling's model claims that ventricular folds play a critical role in the production of glottal stops and creaky voice through ventricular incursion and abandons the traditional use of the [± constricted glottis feature]. The constriction of the epilaryngeal tube constitutes an integral part of laryngeal articulation. This epilayngeal source posited by the model can be employed distinctively by phonologies.

References

Esling, John H. & Jimmy G. Harris. 2005. States of the glottis: An articulatory phonetic model based on laryngoscopic observations. In William J. Hardcastle & Janet M. Beck (eds.), *A figure of speech: A Festschrift for John Laver*, 347-383. Mahwah. NJ : Lawrence Earlbaum.

Moisik, Scott R. 2013. *The epilarynx in speech*. PhD disseration, University of Victoria, BC.

Moisik, Scott R. & John Esling. 2011. The 'whole larynx' approach to laryngeal features. *ICPHS*. 1406-1409. Hong Kong.

Ohala, John J. & Manjari Ohala. 1993. The phonetics of nasal phonology: theorems and data. In Huffman, M.K. & Krakow, R. A. (eds.), *Nasals, Nasalization and the Velum*, vol. 5, 225-249. San Diego. Academic Press.

Schadeberg, Thilo. 1982. Nasalization in Umbundu. *Journal of African Languages and Linguistics* 4. 109-132.

Shosted, Ryan K. 2006b. *The aeroacoustics of nasalized fricatives*. PhD Dissertation. University of California Berkeley.

Stenzel, Kristine. 2007. Glottalization and other suprasegmental features in Wanano. *International Journal of American Linguistics* 73(3). 331-366.

Stenzel, Kristine & Didier Demolin. 2012. Traços Laringais em Kotiria e Wa'ikhana (Tukano Oriental). In Gisela Collischonn e Leda Bisol (orgs.) *Fonologia: Teoria e Perspectivas-Anais* do IV Seminario Internacional de Fonologia. Porto Alegre, PURS.

Tenes, Elmar. 1973. *The phonemic analysis of Scottish Gaelic: Based on the dialect of Applecross*, Roos-Shire. Hamburg. Buske.

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