Probability in phonotactic acquisition and loanword adaptation

Silke Hamann
Universiteit van Amsterdam
Silke.Hamann@uva.nl

Several models of speech perception employ probability theory directly in their calculation of phonological categories, see e.g. Gaussian mixture models (McMurray *et al.* 2009), which were successfully applied to account for sound change (Kirby 2014). In this talk I argue that the neural-network model of *Bidirectional Phonetics and Phonology* by Boersma, Benders & Seinhorst (2013) provides a more realistic model of speech perception and diachronic change because it continuously updates the connections between auditory input and abstract phonological layer with each incoming event (gradual learning) without storing probabilistic knowledge. I will illustrate the workings and advantages of this model with the acquisition of phonotactic restrictions, more specifically, with a case of diachronic change in loanword adaptation. In Hong Kong Cantonese, new loans violate the former restriction on plosive-liquid onset clusters and the requirement for minimally bisyllabic words, see the loan doublet from English in (1) (Hamann & Li 2016):

(1) a. *cream* [kejli:m] 'bakery cream' borrowed before 1945
b. *cream* [kwhi:m] 'facial cream' borrowed after 1985

Younger speakers adapt English [k$_{ɪ}$] differently (1b) from the older generation (1a) due to their greater exposure to English, which is reflected in their acquired grammar.

References: Boersma, P., T. Benders & K. Seinhorst (2012): *Neural network models of the phonology-phonetics interface.* Manuscript, University of Amsterdam. • Hamann, S. & D.W.L. Li (2016): Adaptation of English onset clusters across time in Hong Kong Cantonese: the role of the perception grammar. *Linguistics in Amsterdam* 9, 56–76. • Kirby, J.P. (2014): Acquisition of covert contrats: An unsupervised learning approach. *Proc. 35th Conf. of Cognitive Science Society*, 776–781. • McMurray, B., R.N. Aslin & J.C. Toscano (2009): Statistical learning of phonetic categories: insights from a computational approach. *Developmental Science* 12, 369– 378.