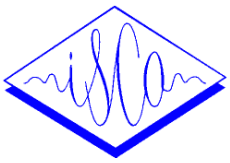

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Perception of emphatic stress: Multiple regression analyses

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We suppose that production and perception of speech prosody share the same mental representations, and that a stock of prosodic patterns is progressively built during childhood. The structure and development of those prosodic patterns are the goal of the study. The detection of emphatic stress by 8- and 10-year-old children and by adults is studied during listening to short narrative texts read aloud by an expert speaker. Subjects have to decide whether or not pre-selected lexical items carry an accent of insistence. The target words are acoustically and linguistically analysed. Then multiple regression analysis is used to make predictions about the pertinent factors and their relationship for each group of subjects. The factors describing the target words are: *prosodic* (word duration, mean fundamental frequency and loudness, standard deviations of pitch and loudness, melodic and intensity contours of the stressed words), *syntactic* (depth in the syntactic tree describing the sentences), *semantic* (expressive weight), and *structural* (number of syllables).

Three multiple regression models have been discovered: they explain respectively 64%, 70% and 77% of the variance for the 8- and 10-year-old children and the adults. The selected factors have differing explicative power depending on the subjects' ages. Mean f0 and loudness standard deviations are included in all 3 models, whereas word duration and other intensity parameters (mean and contour) are included only in the models for 10-year-olds and adults. Word depth in the syntactic tree and the number of syllables only contribute to the adult model. Finally, the melodic contour and the semantic force of the word itself do not contribute to any model.

Emphatic stress is known to produce joint variations of three kinds of prosodic parameters: duration, fundamental frequency and loudness. Our previous studies showed that the *production* of emphasis is not—or hardly—influenced by duration variations for 8- and 10-year-olds; however, as early as 10, children are able to use variation in time, in addition to variation in other parameters, to *recognize* various prosodic forms. They do therefore possess adequate mental representations. Globally, emphasis is less recognized at 8 years old, where the hit rates are not explained by the duration of stressed words. In contrast, we showed (in other experiments) that 8-year-olds perform just as well as older children and adults in the detection of fine differences in the duration of pauses in spoken sentences. Prosodic configurations are therefore stored during children's development to enable them to produce and understand statements. Integration of temporal parameters gradually improves through childhood, and such integration progressively structures the relative weight of the other factors (prosodic or not) involved in emphasis, until complete representations can be constructed.

Clément, J., Alexandre, M.A., and Gérard, C. (2001) Normal and disordered prosodic processing: Temporal variations in French. In B. Maassen, W. Hulstijn, R. Kent, H.F.M. Peters and P.H. van Lieshout (eds.), *Speech Motor Control in Normal and Disordered Speech*. Vantilt: Nijemegen, The Netherlands. 178-183.

Cutler, A., and Swinney, D.A. (1987) Prosody and the development of comprehension, *Journal of Child Language* 14, 145-167.

Gérard, C., and Clément, C. (1998) The Structure and development of French prosodic representations. *Language and Speech* 41, 117-142.

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

Morlec, Y., Bailly, G., and Aubergé, V. (2001) Generating prosodic attitudes in French: Data, model and evaluation. *Speech Communication* 33, 357-371.