

## ESR 8. Effortful Listening, Cognitive Energy and Learning in Children Fitted with Cochlear Implants

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Background: Learning novel words is dependent on the listener's ability to compare the phonetic patterns of an input signal with the phonetic and semantic representations in the lexicon [1]. In cochlear implants users, the uncertainty that accompanies underspecified and undistinctive inputs can enhance lexical competition [2] and challenge the identification of novel versus known words.

Objective: In our first pilot study, we investigate the relation between phonemic discrimination, novel word detection and novel word learning rate in the Danish language.

Methods: nonwords respecting Danish phonology were generated as proxies for novel word learning. Lexical similarity assessments were completed on the corpus by Native Danish speaking adults with normal hearing (n=14). Based on this material, a test battery addressing phonological discrimination, novel word detection and rapid word-learning in different phonemic contrasts, was performed with simultaneous pupillometry, in a pilot group of six adults with normal hearing. Audio input was degraded using an 8-channel noise vocoder.

Results: Performance on the discrimination task had no important influence of signal degradation, with almost ceiling results. Errors in the detection task were related to wrong localization of the nonwords in the non-vocoded condition, and a mixed pattern the vocoded condition. In the rapid novel word learning, the number of trials to learn all words to the criterion were around two times larger when the stimuli are degraded and 1.75 larger when the stimuli are phonologically similar.

Conclusion: The ability to easily discriminate multiple phonological inputs (as in the two conditions of the rapid word-learning task) and contrast them with previous lexical knowledge (as in the detection task) seems to be determinant for the learning of new words. Even when the degraded signal has non-significant impact on speech discrimination, it seems to cause substantial decay in tasks that require more cognitive resources, as learning of new words.

[1] Pittman, A. L., Stewart, E. C., Willman, A. P., & Odgear, I. S. (2017). Word Recognition and Learning: Effects of Hearing Loss and Amplification Feature. *Trends in Hearing*, 21, 1–13.

[2] Nagels, L., Bastiaanse, R., Başkent, D., & Wagner, A. (2020). Individual Differences in Lexical Access Among Cochlear Implant Users. *Journal of Speech, Language, and Hearing Research*, 63(1), 286–304.