The perception of native and foreign language vowels
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The study of speech perception utilizes various phonetic tests such as categorization, goodness rating, and discrimination experiments. These experiments can be supplemented by studies of the plastic changes in the phoneme representations of the brain. The same methods can be applied when the aim is to see how a foreign language is acquired. Moreover, by testing the mismatch negativity (MMN) response to both native and foreign language speech sounds, it is possible to demonstrate whether new memory traces have emerged during the process of acquisition. Three groups were included: 1) native speakers of Finnish, 2) advanced Finnish students of English and 3) native speakers of English. The stimuli consisted of 4 blocks of standard and deviant vowels: Finnish /i/ - /e/ (Euclidean acoustic distance 185 Mel), English tense /i/ - lax /e/ (272 Mel), English tense /i/ - lax /i/ (108 Mel) and English lax /e/ - lax /i/ (182 Mel). The aim was to determine by measuring the EEG whether the brain reacts more strongly to familiar than unfamiliar vowel contrasts and whether the proficiency in the new language would be manifested in responses to contrasts that are insignificant for the mother tongue.

The results confirmed (Näätänen et al., 1997) that—in the case of naïve speakers of Group 1—the MMN response to familiar contrasts is stronger than to unfamiliar ones irrespective of the acoustic difference. Thus, it seems that the brain continues to favor the contrasts of the primary language, which was also manifested when Group 2 showed only small, non-nativelike, responses for the English /æ/-/ɨ/ contrast. In addition, the responses of the two Finnish groups were not significantly different for this foreign contrast. This shows that new memory traces are in some circumstances not formed even for subjects whose proficiency level is high. This proficiency, which was obtained in the context of classroom learning, is therefore markedly different from learning in an authentic environment (Winkler et al., 1999): in a classroom, the amount of input might be insufficient for the formation of new phoneme representations. In addition, the findings from the English listeners (Group 3) suggest that listening to Finnish for only approximately 3 months in the authentic environment results in a nativelike MMN response to the Finnish contrast. [Supported by The Finnish Cultural Foundation.]