

Behavioral and EEG Reactions in Native Turkic-Speaking Inhabitants of Siberia and Siberian Russians during Recognition of Syntactic Errors in Sentences in Native and Foreign Languages

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Abstract : The aim of the study is to compare behaviorally and EEG reactions in Turkic-speaking inhabitants of Siberia (Tuvinians and Yakuts) and Russians during the recognition of syntax errors in native and foreign languages. 63 healthy aboriginals of the Tyva Republic, 29 inhabitants of the Sakha (Yakutia) Republic, and 55 Russians from Novosibirsk participated in the study. All participants completed a linguistic task, in which they had to find a syntax error in the written sentences. Russian participants completed the task in Russian and in English. Tuvinian and Yakut participants completed the task in Russian, English, and Tuvinian or Yakut, respectively. EEG's were recorded during the solving of tasks. For Russian participants, EEG's were recorded using 128-channels. The electrodes were placed according to the extended International 10-10 system, and the signals were amplified using 'Neuroscan (USA)' amplifiers. For Tuvinians and Yakuts EEG's were recorded using 64-channels and amplifiers Brain Products, Germany. In all groups 0.3-100 Hz analog filtering, sampling rate 1000 Hz were used. Response speed and the accuracy of recognition error were used as parameters of behavioral reactions. Event-related potentials (ERP) responses P300 and P600 were used as indicators of brain activity. The accuracy of solving tasks and response speed in Russians were higher for Russian than for English. The P300 amplitudes in Russians were higher for English; the P600 amplitudes in the left temporal cortex were higher for the Russian language. Both Tuvinians and Yakuts have no difference in accuracy of solving tasks in Russian and in their respective national languages (Tuvinian and Yakut). However, the response speed was faster for tasks in Russian than for tasks in their national language. Tuvinians and Yakuts showed bad accuracy in English, but the response speed was higher for English than for Russian and the national languages. With Tuvinians, there were no differences in the P300 and P600 amplitudes and in cortical topology for Russian and Tuvinian, but there was a difference for English. In Yakuts, the P300 and P600 amplitudes and topology of ERP for Russian were the same as Russians had for Russian. In Yakuts, brain reactions during Yakut and English comprehension had no difference and were reflected foreign language comprehension -while the Russian language comprehension was reflected native language comprehension. We found out that the Tuvinians recognized both Russian and Tuvinian as native languages, and English as a foreign language. The Yakuts recognized both English and Yakut as a foreign language, only Russian as a native language. According to the inquirer, both Tuvinians and Yakuts use the national language as a spoken language, whereas they don't use it for writing. It can well be a reason that Yakuts perceive the Yakut writing language as a foreign language while writing Russian as their native.

Keywords : EEG, language comprehension, native and foreign languages, Siberian inhabitants

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