Speech and rhythm perception and reproduction in children with posterior fossa tumors

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Temporal coding is important aspect of information coding in the brain and crucial in the perceptual processing of speech (Luo&Poeppel, 2007). Goswami (2011) suggest that in children with dyslexia auditory rhythmic entrainment is also likely to be impaired. Children with brain cancers and treatment after (radiation and chemotherapy) demonstrate speech problems among other symptoms. Posterior fossa tumors (PFT) affect cerebellum and brain stem structures. These areas play role in sensory-motor synchronization and speech production. The aim of this study was to reveal associations between speech problems and audio-motor synchronization in children after PFT treatment. Our sample consisted of 14 children diagnosed with medulloblastoma (the most frequent pediatric cancer localized in posterior fossa) (mean age 12.43.3 years) and 14 neurologically healthy children (controls) (mean age 11.32.9 years). Neuropsychologist examined all children to identify their speech characteristics. Then children were asked to perform audio-motor synchronization tasks: to synchronize their taps with the metronome sounds with a frequency of 40, 60, 90 and 120 beats per minute. Mean inter-tap-intervals (ITI) and its standard deviation and variation were analyzed with a special software. Our results suggest that PFT patients demonstrate more pronounced speech slowdown, difficulties with speech processing, they spoke without intonations, and have rhythmic dyspraxia (difficulties in rhythm perception and reproduction) compared to control group. Brain cancer patients have significantly higher ITI standard deviation and variation, which means poorer audio-motor synchronization ability. These results allow us to expect that audio-motor synchronization training with sound cues could help children improve their speech characteristics.

Keywords: posterior fossa tumors, speech, rhythm.