

PROPERTIES OF EVOKED AND EVENT-RELATED EEG POTENTIALS IN INSTITUTIONALIZED CHILDREN

Eismont E. V., Pavlenko V. B.

V. I. Vernadsky Crimean Federal University, Simferopol, Russian Federation

E-mail: evgenija.eismont@mail.ru

The study engaged the 32 children aged 11–15 years split in two groups. The experimental group included the 16 children who permanently lived and studied at a boarding school in Simferopol. The control group consisted of the 16 children reared by their biological parents and studying at general education schools in Simferopol. The evoked and event-related EEG potentials were recorded in a double stimulus go/no-go paradigm (electroencephalograph EEG-16S, "Medicor"). There were measured such variables as the mean reaction time, the number of misses of important stimuli (the subject did not press the button when required), and also the number of erroneous clicks (the subject pressed the button in response to presentation of stimuli that did not require motor reaction). The most part of the parameters of the evoked EEG potentials did not differ significantly between the two groups. Significant differences were found only for the indices of the N1 latent period, N2 amplitude potential and mean reaction time, which were higher in the institutionalized children in comparison with the family-reared ones. These findings can be interpreted as an evidence of a slower cognitive processing speed characteristic for the institutionalized children.

Keywords: evoked potentials, event-related potentials, institutionalized children.

References

1. Zeanah C. H., Egger H. L., Smyke A. T., Nelson C. A., Fox N. A., Marshall P. J., Guthrie D. Institutional rearing and psychiatric disorders in Romanian preschool children, *Am. J. Psychiatry*, **166** (7), 777 (2009).
2. Dobrova-Krol N. A., Bakermans-Kranenburg M. J., Van Ijzendoorn M. H., Juffer F. The importance of quality of care: effects of perinatal HIV infection and early institutional rearing on preschoolers' attachment and indiscriminate friendliness, *J. Child Psychol. Psychiatry*, **51** (12), 1368 (2010).
3. Berens A. E., Nelson C. A. The science of early adversity: is there a role for large institutions in the care of vulnerable children?, *Lancet.*, **386** (9991), 388 (2015).
4. Tarullo A., Garvin C., Gunnar R. Atypical EEG power correlates with indiscriminately friendly behavior in internationally adopted children, *Developmental Psychology*, **47** (2), 417 (2011).
5. Benasich A. A., Gou Z., Choudhury N., Harris K. D. Early cognitive and language skills are linked to resting frontal gamma power across the first three years, *Behavioural Brain Research*, **195** (2), 215 (2008).
6. Hanson J. L., Nacewicz B. M., Sutterer M. J. Behavioral problems after early life stress: contributions of the hippocampus and amygdale, *Biological Psychiatry*, **77** (4), 314 (2014).
7. Éismont E. V., Pritchenko O. V., Pavlenko V. B. Peculiarities of the Pattern of EEG Activity in Institutionalized Children, *Neurophysiology*, **46** (5), 415 (2014).
8. Downes M., Bathelt J., De Haan M. Event-related potential measures of executive functioning from preschool to adolescence, *Dev. Med. Child. Neurol.*, **59** (6), 581 (2017).
9. McDermott J. M., Westerlund A., Zeanah C. H., Nelson C. A., Fox N. A. Early adversity and neural correlates of executive function: implications for academic adjustment, *Dev. Cogn. Neurosci.*, **2** (1), 59 (2012).

10. Loman M. M., Johnson A. E., Westerlund A., Pollak S. D., Nelson C. A., Gunnar M. R. The effect of early deprivation on executive attention in middle childhood, *J. Child. Psychol. Psychiatry*, **54** (1), 37 (2013).
11. Lutsyuk N. V., Éismont E. V., Pavlenko V. B. Correlations between characteristics of evoked EEG potentials recorded in a go/no-go paradigm and indices of attention in children, *Neurophysiology*, **37** (5/6), 396 (2005).
12. Nagamoto H. X., Adler L., Waldo M. Gating of auditory response in schizophrenics and normal controls. Effects of recording site and stimulation interval on the P50 wave, *Schizophr. Res.*, **4** (1), 35 (1991).
13. Naatanen R. *Vnimanie i funktsii mozga*, 560 (M.: MGU, 1998).
14. Vogel E. K., Luck S. The visual N1 component as an index of a discrimination process, *Psychophysiology*, **37** (2), 190 (2000).
15. Satterfield J. H., Schell A. M., Nicholas T. Preferential neural processing of attended stimuli in attention deficit hyperactivity and normal boys, *Psychophysiology*, **31** (1), 1 (1994).
16. Johnstone S. J., Barry R. J., Anderson J. W., Coyle S. F. Age-related changes in child and adolescent event-related potential component morphology, amplitude and latency to standard and target stimuli in an auditory odd-ball task, *Int. J. Psychophysiol.*, **24** (3), 223 (1996).
17. Barry R. J., Johnstone S. J., Clarke A. R. A review of electrophysiology in attention-deficit/hyperactivity disorder: II. Event-related potentials, *Clin. Neurophysiol.*, **114** (2), 184 (2003).
18. Johnstone S. J., Barry R. J., Anderson J. W. Tomographic distribution and developmental time-course of event-related potentials in two subtypes of attention hyperactivity disorder, *Int. J. Psychophysiol.*, **42** (1), 73 (2001).
19. Oades K. D. Frontal, temporal and lateralized brain function in children with attention-deficit hyperactivity disorder: a psychophysiological and neuropsychological viewpoint on development, *Behav. Brain Res.*, **94** (1), 83 (1998).
20. Pavlenko V. B., Lutsyuk N. V., Borisova M. V. Correlation of the characteristics of evoked EEG potentials with individual peculiarities of attention in children, *Neurophysiology*, **36** (4), 276 (2004).
21. Polich J. P300 in clinical applications: meaning, method and measurement, *Am. J. EEG Technol.*, **31** (3), 201 (1991).
22. Kanunikov I. E., Vetosheva V. I. Sovremennye predstavleniia o psikhofiziologicheskoi znachimosti P300, *Fiziologiya cheloveka*, **14** (2), 314 (1988).
23. Suvorov N. F., Tairov O. P. *Psikhofiziologicheskie mehanizmyi izbiratel'nogo vnimaniya*, 287 (L.: Nauka, 1985).
24. Ambrosini A., De Pasqua V., Afra J. Reduced gating of middle-latency auditory evoked potentials (P50) in migraine patients: another indication of abnormal sensory processing?, *Neurosci. Lett.*, **306** (1/2), 132 (2001).
25. Hegerl U., Gallinat J., Mavrogiorgou P. Clinical application of event related potentials in psychopharmacotherapy, *Biol. Psychiatry*, **42** (11), 213 (1997).
26. Hansenne M., Pitchot W., Pinto E. Serotonergic-1a activity and contingent negative variation, *Biol. Psychology*, **52** (3), 259 (2000).
27. Pineda J. A., Swick D., Foote S. L. Noradrenergic and cholinergic influences on the genesis of P3-like potentials, *EEG and Clin. Neurophysiol.*, **42**, 165 (1991).
28. Benes F. M., Taylor J. B., Cunningham M. C. Convergence and plasticity of monoaminergic systems in the medial prefrontal cortex during the postnatal period: implication for development of psychopathology, *Cerebral Cortex*, **10** (10), 1014 (2000).