

## MEASURING THE DEVELOPMENT OF EXECUTIVE FUNCTIONS IN BILINGUAL HIGH SCHOOL STUDENTS USING EEG

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*Keywords:* EEG; bilingual education; Go/NoGo paradigm

Nowadays many people use more than just one language in their course of daily life. A special group among these individuals are the so-called bilinguals, who acquire and use more than one languages on a native level. Based on recent findings we know that the development of bilingual and monolingual children differ in many aspects of their cognitive areas (e.g. advantages in the use of executive functions in bilinguals), and that these characteristics can be found in late bilinguals and in children participating in bilingual education as well. However, results in this area are inconclusive, and raise many further questions regarding the age of the start of bilingual education, or the intensity of bilingual experience needed to develop more effective executive functions. Based on this the aim of the present research is to investigate if bilingual education has an effect on the development of executive functions of 14- to 18-year-old high school students. To assess this question the method of electroencephalography (EEG) can provide complex electrophysiological and behavioral data. EEG is a non-invasive method to record the electrical activity of the brain along the scalp. In the present study event-related potentials (ERPs) are used, which refer to averaged EEG responses that are time-locked to more complex processing of stimuli. Based on recent results we know that these electrical changes can be detected even in cases when changes cannot be found on a behavioral level. For statistical analysis, point-by-point t-tests were used. In our pilot study 19 healthy, right-handed individuals participated, with the goal to develop and test our version of a Go/NoGo paradigm. The use of a Go/NoGo paradigm is widely acknowledged for the examination of certain executive functions (e.g. inhibition and mental switching), where participants have to give a motor response for go stimuli, and suppress response for nogo stimuli. In the present research individuals participated in two conditions. In the first, images of cars were the go stimuli, and images of birds were the nogo stimuli, while in the other condition it was vice versa. The sequence of the two conditions was counterbalanced in the sample. Statistical analysis revealed significant inhibition effect on four of the frontal electrodes (above the brain region responsible for executive functions), indicating that electrical activation for go and nogo images was different. Our results are in good accordance with literature findings, implying that the tool is ready for use to compare bilingual students and non-bilingual control students at the beginning and at the end of their high school studies. This enables us to investigate the development of executive functions and how they are influenced by bilingual education. These findings can have important implications for both developmental psychology and education, taking a more holistic, complex approach on the effect of different types of education forms.