

Bilingualism as a Life Experience Induces Dynamic Changes in Resting State EEG Oscillations

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Bilingualism, at least under specific conditions, can result in a more fine-tuned executive control system and in structural and functional brain adaptations (see for a review Pliatsikas, 2019). Resting state EEG (rs-EEG) activity (frequency power) is related to various cognitive functions and can estimate neurological connectivity (mean coherence) between brain regions. As such, it has emerged in the past few years as a complementary neuroimaging methodological option to investigate the effects of languages (e.g., language learning, bilingualism) in the brain (Bice et al., 2020; Prat et al., 2016). Herein, we use rs-EEG to understand how bilingualism may reshape the mind/brain in a diverse pool of bilinguals.

Five minutes eyes-closed task free EEG data from 103 participants (25 were early bilinguals - Italian being the heritage language and German the majority language - and 78 late bilinguals of English in both Germany and Norway) were recorded. All participants completed the Language and Social Background Questionnaire (LSBQ; Anderson et al., 2018), which quantifies language exposure and crucially the division of usage in diverse variety of activities and settings in the participants' two languages over the lifespan. We hypothesized to find positive correlations between linguistic variables (degree of active bilingualism) and frequency bands (especially alpha and beta power), particularly reflected in the posterior brain regions. Furthermore, we expected to observe levels of mean coherence to vary by amount of bilingual language experience.

In terms of power frequency, there was a main effect of Age of L2/L1 onset on *high beta* and *gamma* powers (i.e., earlier acquisition resulted in higher beta and gamma frequencies). Higher exposure/usage scores from the LSBQ of the non-societal language at home modulated mean coherence effects (functional brain connectivity) in *theta*, *alpha* and *gamma* frequencies. Results are in line with claims that bilingualism effects are not monolithic, but are rather modulated by degree of engagement with experiential factors.

References

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