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A Novel NRIS Index to Evaluate Brain Activity in Prefrontal Regions While Listening to First and Second Languages for Long Time Periods

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Abstract : Near-infrared spectroscopy (NIRS) has been widely used as a non-invasive method to measure brain activity, but it is corrupted by baseline drift noise. Here we present a method to measure regional cerebral blood flow as a derivative of NIRS output. We investigate whether, when listening to languages, blood flow can reasonably localize and represent regional brain activity or not. The prefrontal blood flow distribution pattern when advanced second-language listeners listened to a second language (L2) was most similar to that when listening to their first language (L1) among the patterns of mean and standard deviation. In experiments with 25 healthy subjects, the maximum blood flow was localized to the left BA46 of advanced listeners. The blood flow presented is robust to baseline drift and stably localizes regional brain activity.

Keywords : NIRS, oxy-hemoglobin, baseline drift, blood flow, working memory, BA46, first language, second language
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