

An EEG Study of Aphasia Recovery in Bilinguals

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Background

Stroke is the fourth leading cause of death and the leading cause of long-term disability in the United States.

Aphasia is a communication disability that often can occur as the result of a stroke. Aphasia is characterized as the loss of ability to express or understand speech. 25% of stroke survivors experience aphasia (PWA).

Past Research: has shown that healthy bilinguals have increased cerebral connectivity, particularly between the left and right hemispheres, which is thought to be due to the increased executive function of language required to speak multiple languages. In addition, these regions and their connectivity appear to play an important role in recovery of language of language processes lost due to stroke-induced aphasia.

Hypothesis

We expect that PWA will have similar power across hemispheres compared to healthy controls. This effect will be more pronounced for bilingual PWA.

Methods

6 PWA and 6 healthy controls matched for age, gender, language experience and education level. Half of the participants were monolinguals, half has experience with a second language.

Subject	Age	Education	Gender	Language	Aphasia
SCAS014	50	JD	Male	English/Russian	Yes
Control	43	PhD	Male	English/Chinese	No
SCAS017	67	Masters	Male	English	Yes
Control	72	Bachelors	Male	English	No
SCAS015	33	Bachelors	Male	English/Dutch	Yes
Control	35	Bachelors	Male	English/Dutch	No
SCAS019	60	High School	Female	English	Yes
Control	55	High School	Female	English	No
SCAS020	52	Bachelors	Female	English/Tamil	Yes
Control	45	PhD	Female	English/French	No
SCAS007	65	Masters	Female	English	Yes
Control	53	Masters	Female	English	No

Monolingual Case Study

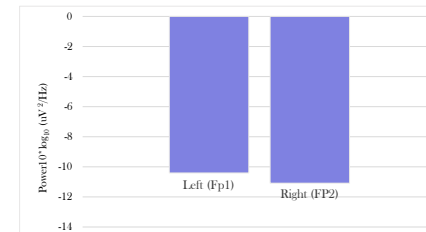
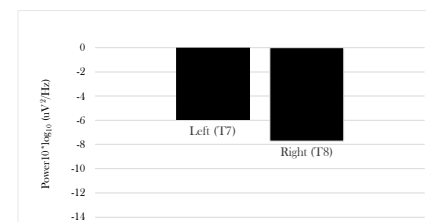
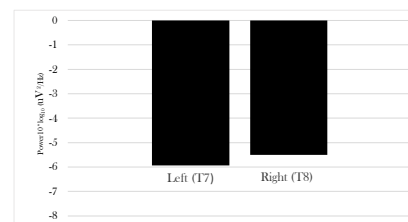
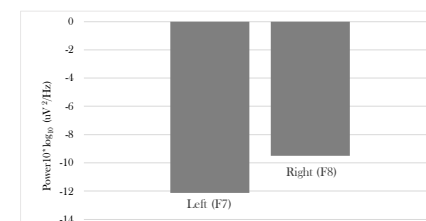
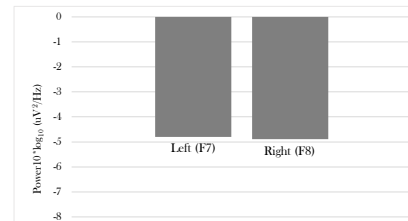
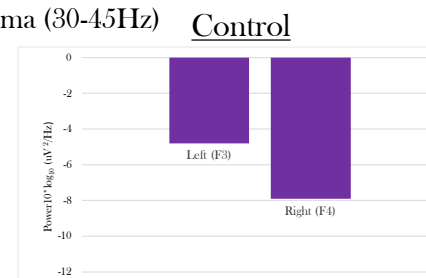
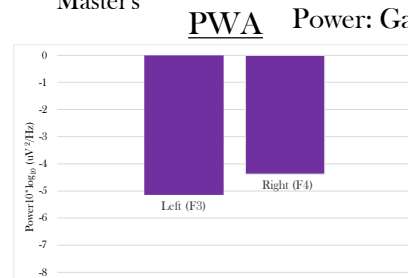
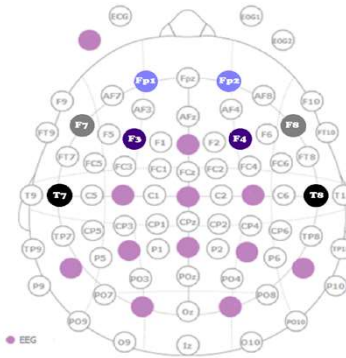
PWA:

- 56 years old
- Broca's Aphasia
- Ischemia Stroke -2 years post stroke
- Monolingual
- Highest Level of Education: Master's

Healthy Control:

- 51 years old
- Monolingual
- Highest Level of Education: Master's

Results



Methods Cont.

Behavioral Testing

- Edinburgh Handedness Inventory, Self Assessment of Language Proficiency, Digit Span Short Term Memory and Bilingual Aphasia Test

Tasks

- Resting Task: (5 runs)
 - 2 minutes of silence with the presence of a white cross
- Passive Task: (4 runs)
 - 3 minutes of 15 words that are in either English or a second language (Spanish, Tamil, or Russian)
 - Words presented for 0.5 seconds with a 1.0 second break successive word
 - English and second language versions of the words had the same number of syllables but were not cognates.

Discussion

In the PWA participant, there gamma power was more similar across hemispheres than for the matched healthy control. Past literature suggests that this may be due to R hemisphere was compensating for the L hemisphere during the resting state. Interestingly, electrodes F7 and F8 - approximately over Broca's area - showed the largest discrepancy for the healthy control compared to the PWA.

We will continue to analyze our data, particularly for the bilingual participants.

Acknowledgements

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