



Discourse production in people with aphasia: an fNIRS pilot study

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Introduction

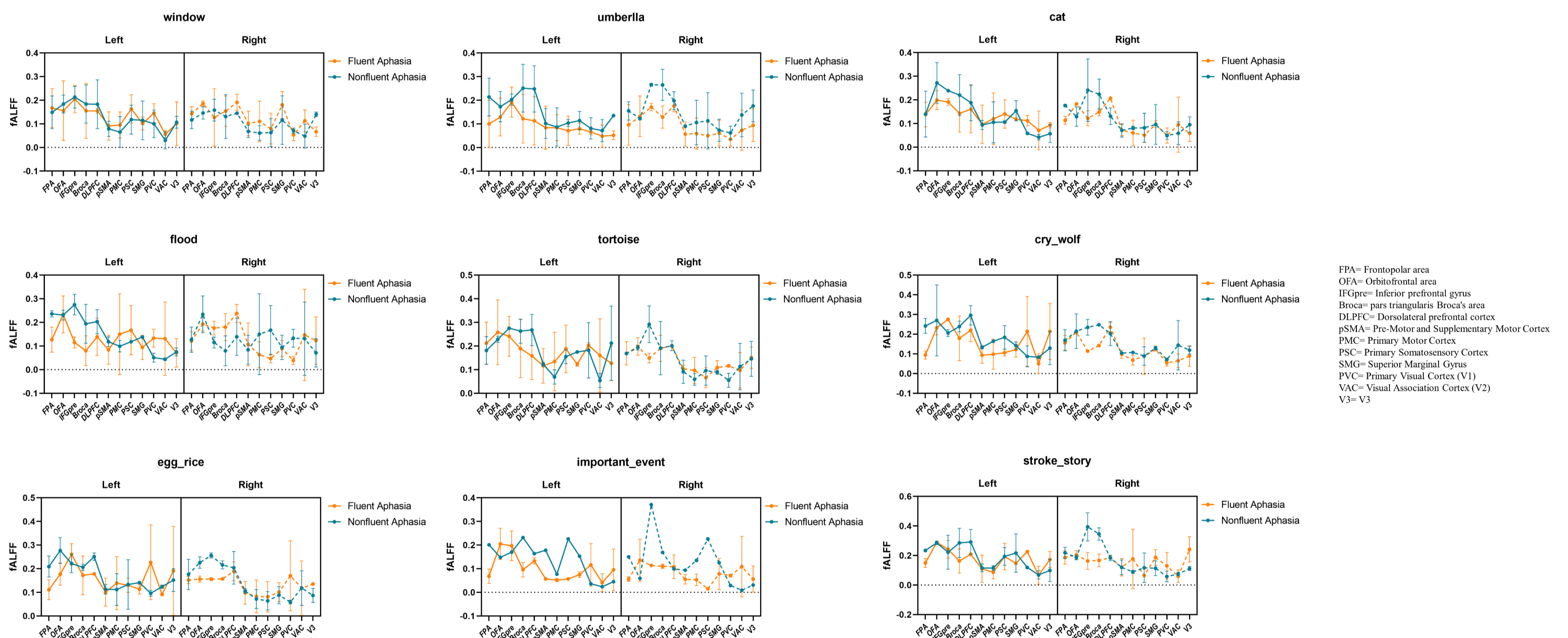
Aphasia is a kind of language disorder, comprehension, and expression impairment due to brain damage, which negatively affects the quality of life of people with aphasia (Sjöqvist Nätterlund, 2010). Discourse assessment can provide more details on the communication quality in people with aphasia (Caselli et al., 2022). However, how the brain works during discourse production in people with post-stroke aphasia is still unclear. Recently, researchers focused on functional near-infrared spectroscopy (fNIRS) in aphasia studies (Klingbeil et al., 2019) (Kim et al., 2022). This pilot study explored the neural mechanism by quantifying the fractional amplitude of low-frequency fluctuations (fALFF) during varied discourse production tasks in people with fluent aphasia (PFA) and people with non-fluent aphasia (PNA).

Methods

We recruited four male people with post-stroke aphasia (two PFA and two PNA) in our study. The age ranged from 32 to 51 years old. The diagnosis of aphasia type was by Western Aphasia Battery- Chinese. A trained speech therapist followed the Mandarin AphasiaBank protocol to collect discourse samples. We applied the fNIRS device to the participant's head during the discourse production session. For each task, we marked the start time when the participants began to talk. And the end time was when he stopped talking. We explored the differences in cortical blood oxygenation using fNIRS in PFA and PNA. During the expression session, we measured each task's fALFF.

Results

The tasks related to fALFF in the PNA differed from those in the PFA. In the PNA group, fALFF increased mainly in the frontal and parietal regions, especially in the left Broca's area and in the right Broca's homologous region. However, the increase in fALFF in the PFA group was primarily in the occipital region and the primary motor cortex. The tasks showed a significant effect on groups based on the multivariate tests. Tasks and groups showed significant interaction effects.



PName	Gender	Age(Y)	Aphasia Type	AQ
Wpp	Male	34	Broca's Aphasia	61.1
Lw	Male	32	Transcortical Motor Aphasia	39.4
CHzh	Male	51	Conductive Aphasia	54.3
SHy	Male	36	Anomic Aphasia	89.4

Conclusions

The current findings indicate the distinct patterns of brain activity between people with non-fluent aphasia and those with fluent aphasia during discourse production. The different fALFF patterns may reveal the neural mechanism underlying language fluency in people with post-stroke aphasia.

Acknowledgments

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Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Keywords: Discourse production Aphasia; functional Near Infrared Spectroscopy(fNIRS); fALFF