

Innovating Network-Based Individualized Transcranial Alternating Current Stimulation for Speakers with Chronic Post-Stroke Aphasia

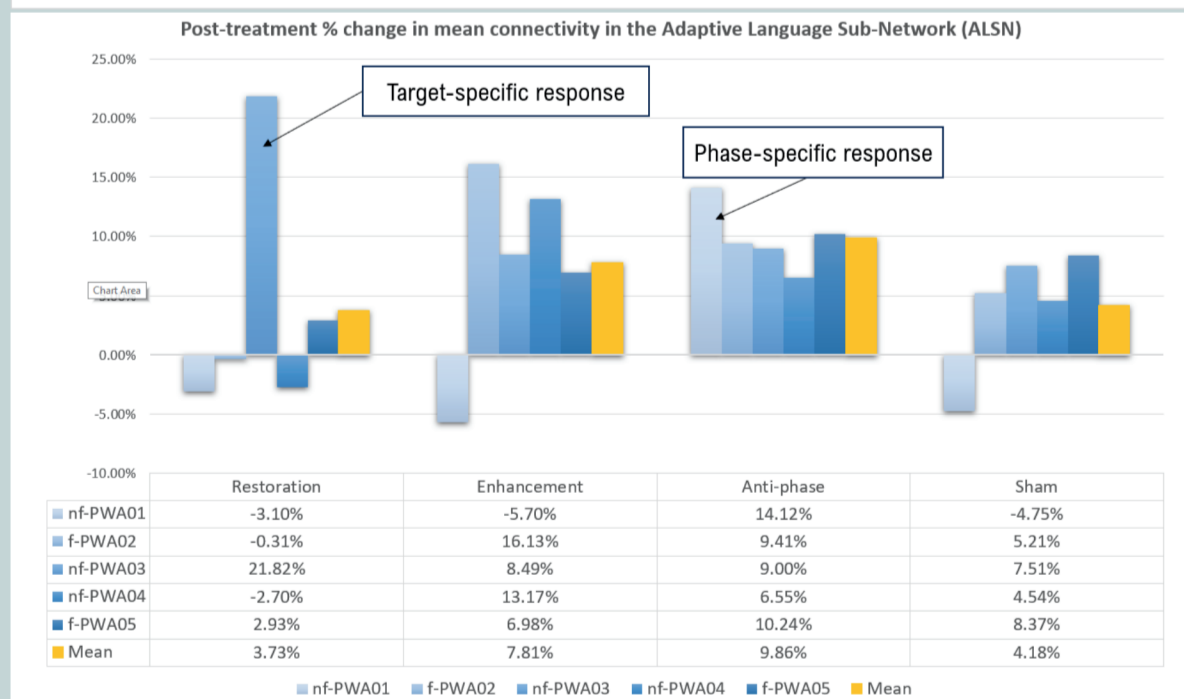
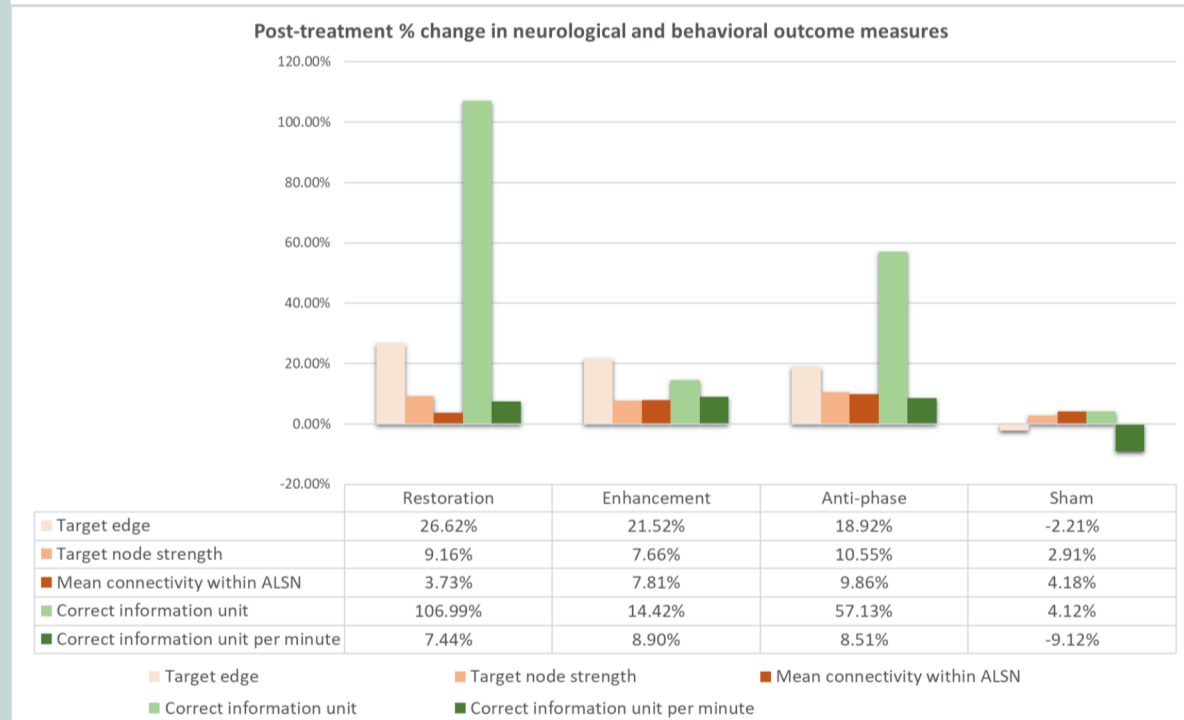
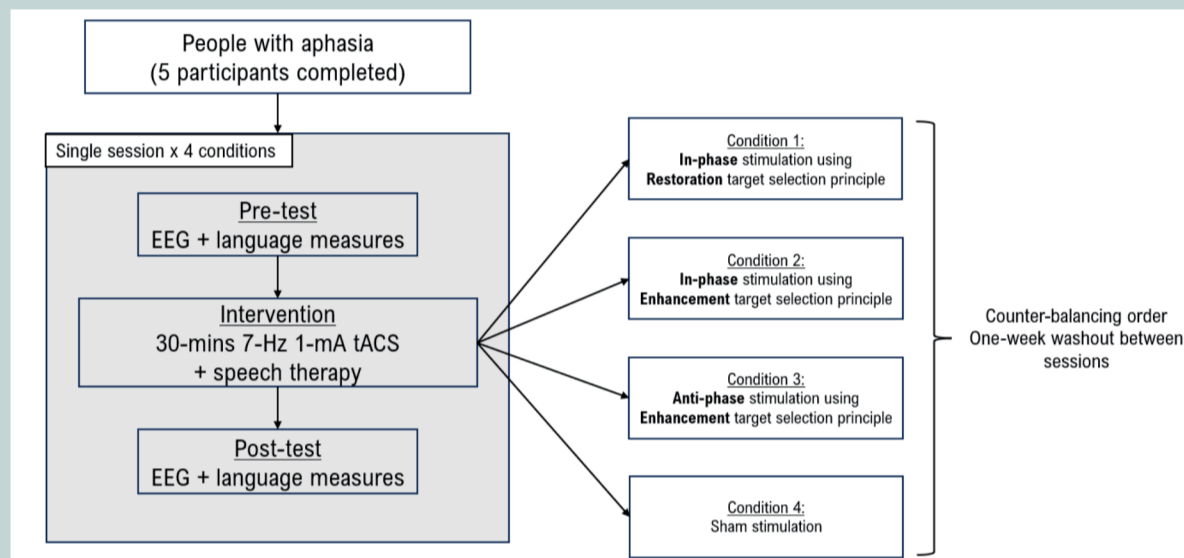
Chester Yee-Nok Cheung^{*^}, Anthony Pak-Hin Kong^{*^}, Mehdi Bakhtiar[^], Guang Ouyang[^]
^{*}The Aphasia Research and Therapy (ART) Laboratory
[^]Unit of Human Communication, Learning, and Development (HCLD), Faculty of Education, The University of Hong Kong

INTRODUCTION

- **Individualized neuromodulation** in Post-Stroke Aphasia (PSA) is essential but scarce.
- Current neuromodulation research in PSA predominately relies on **one-size-fit-all** stimulation, which yields sub-optimal responsiveness due to **high inter- and intra-personal variability** of the neural network across people with aphasia (PWA).
- We aimed to propose a novel **Network-based individualized target selection method** applying on **phase-synchronizing tACS**, and test its immediate effect after a single-session stimulation.
- Particularly, we tested the difference across 4 stimulation conditions: 1) **Restoration-based in-phase**, 2) **Enhancement-based in-phase**, 3) **Enhancement-based anti-phase**, and 4) **Sham**.

METHOD & RESULTS

- Single-session double-blinded sham-control trial (N = 5, 3 non-fluent, 2 fluent)
- **Dual-site high-definition phase-synchronizing tACS** was used (2 stimulating electrodes on the target sites, 3 returning electrodes surrounded each stimulating electrode)

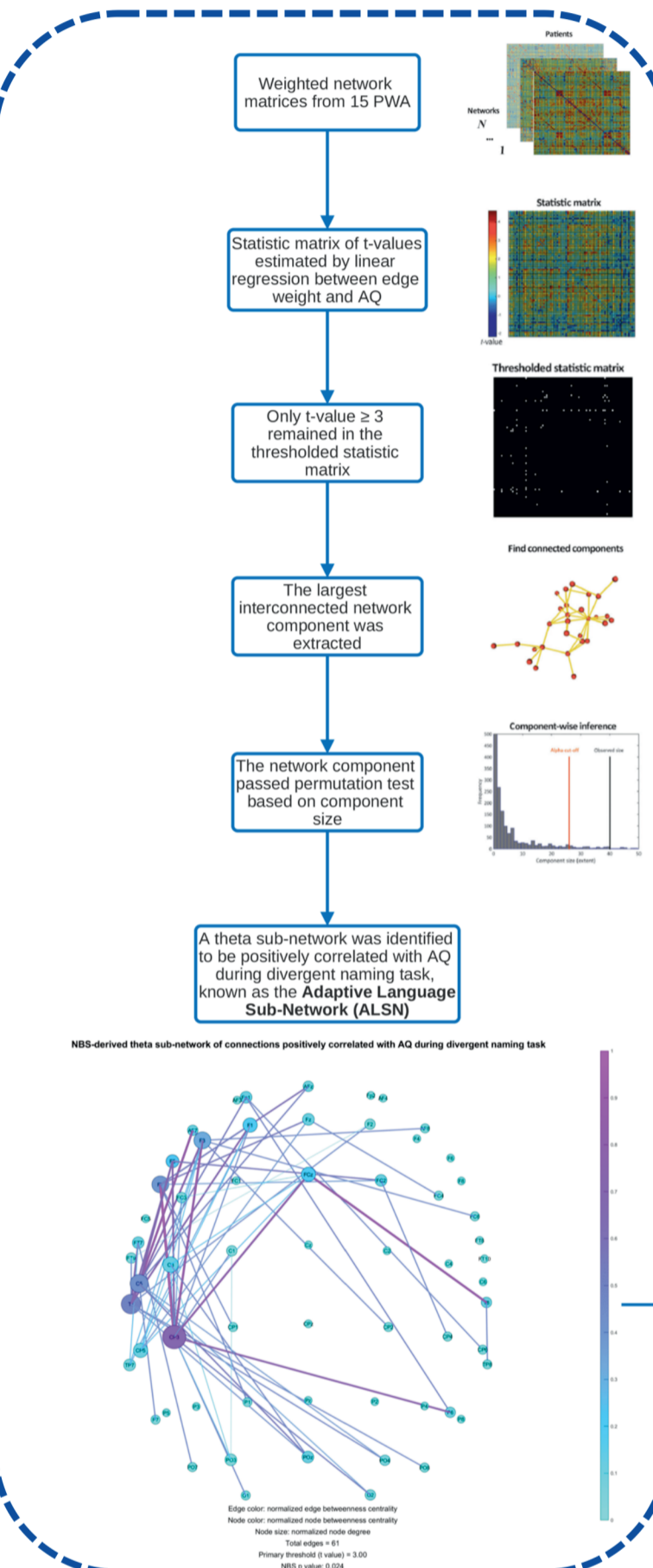


DISCUSSION

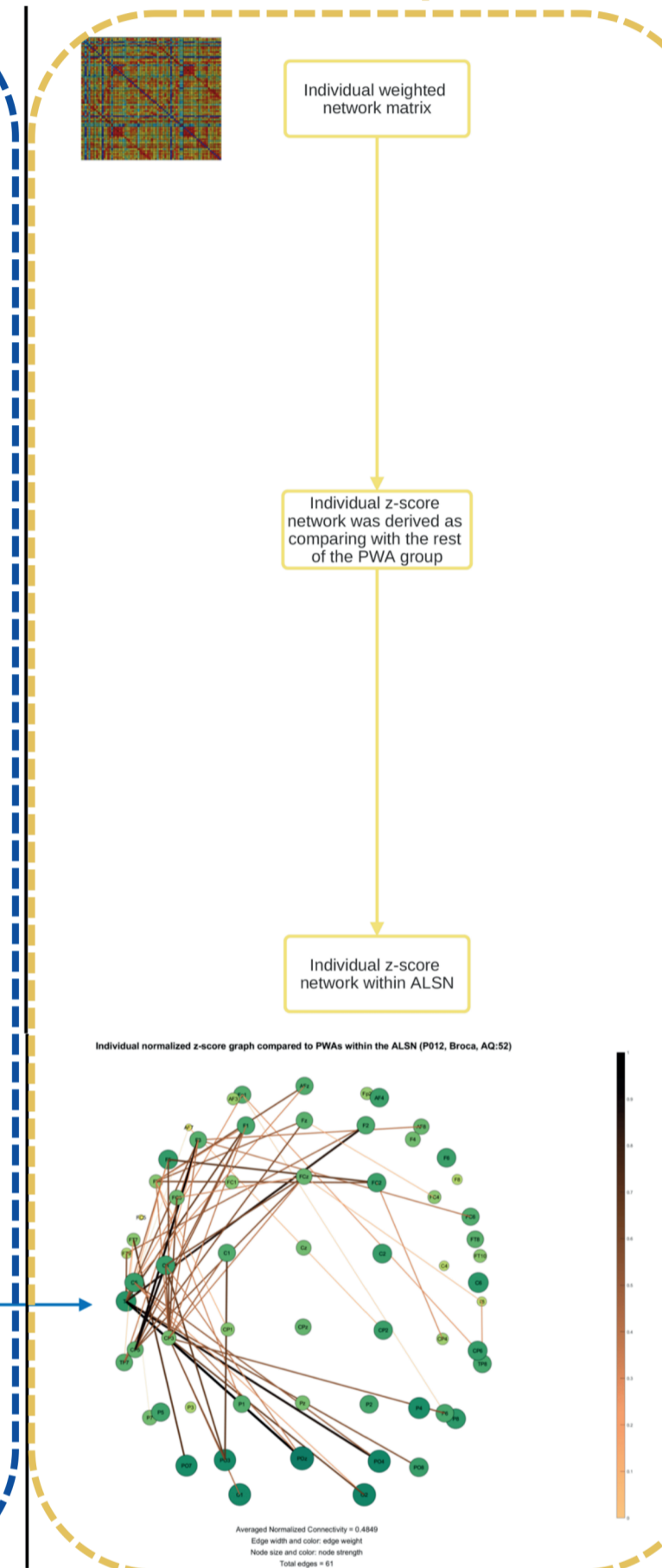
- Both **enhancement-based in-phase** and **enhancement-based anti-phase** conditions successfully induced greater improvement over sham in the target edge, target node strength, mean connectivity of the **Adaptive Language Sub-Network (ALSN)**, and the discourse production performance.
- **Enhancement-based anti-phase** stimulation induced the largest and most consistent network changes over the **ALSN** across participants.
- The optimal stimulation condition was different across participants, suggesting that both **target selection principle** and **stimulation phase** might play a role.
- Future study may focus on deciphering the relationship between certain personal characteristic and specific responsiveness under different target selection principles and stimulation phases, and comparing the effect of this individualization method with one-size-fit-all stimulation.

INDIVIDUALIZATION METHOD

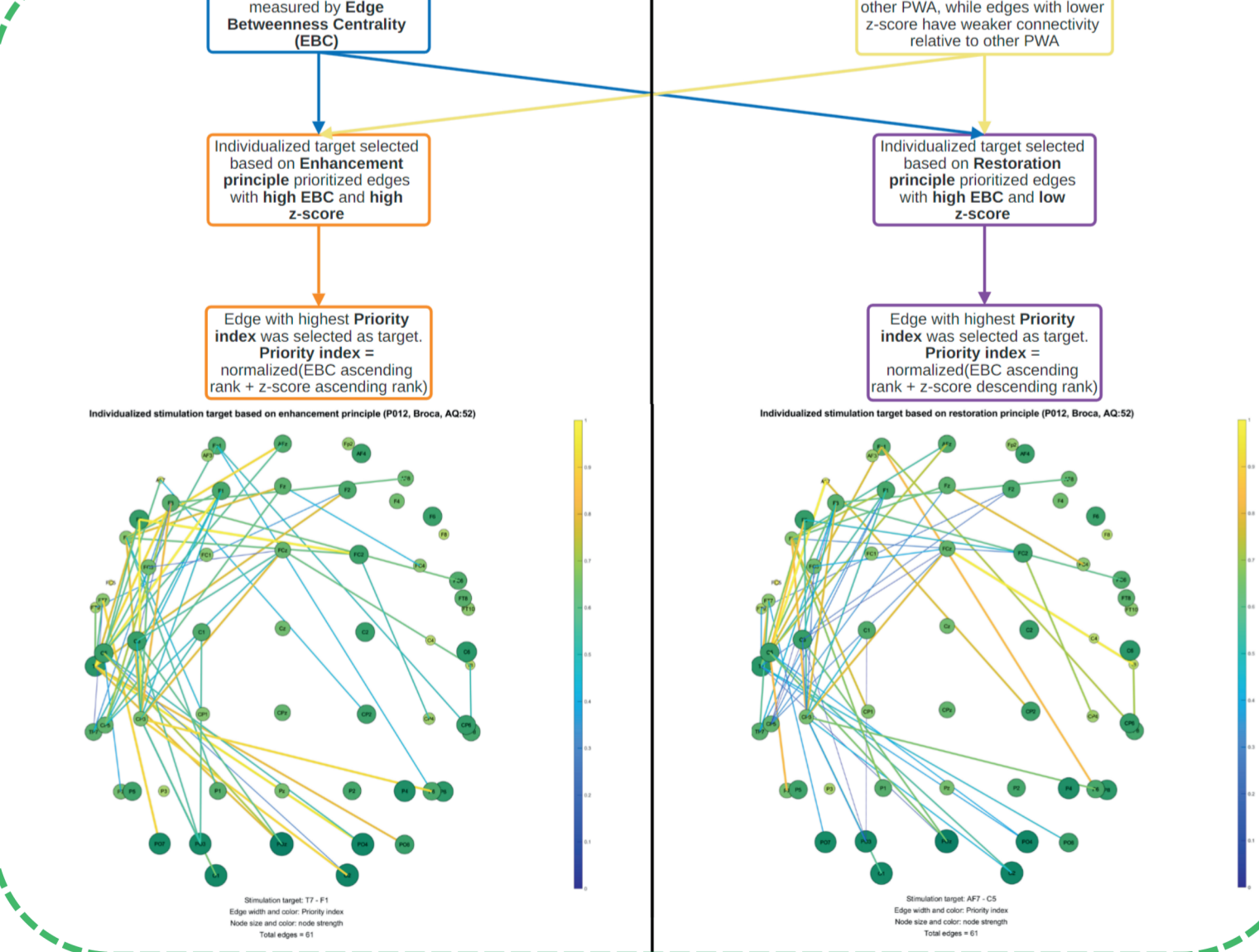
Biomarker identification



Individual profile



Target selection



CONTACT US

Supervisor/Lab director: Prof. Anthony Pak-Hin Kong
Email: akong@hku.hk

Co-supervisor: Prof. Mehdi Bakhtiar
Email: mbakht@hku.hk

Co-author: Prof. Guang Ouyang
Email: ouyangg@hku.hk

The Aphasia Research and Therapy (ART) Laboratory

The University of Hong Kong



ART Lab

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PhD candidate: Mr. Chester Yee-Nok Cheung
Email: chescyn@connect.hku.hk