

NEURAL FEATURES OF SPEECH-IN-NOISE (SIN) PERCEPTION DEFICITS AFFECTING SOCIAL COOPERATION AMONG COLLEGE STUDENTS: AN FNIRS HYPERSCANNING STUDY

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INTRODUCTION

Noise exposure significantly impacts behavior and health across various populations. Adolescents and children exposed to high noise levels face increased risks such as higher blood pressure and worsened mental health. In adults, noise contributes to stress, reduced willingness to help others, and negative social behaviors.

Some young adults, who have normal hearing, i.e., having less than 20 dB HL based on pure-tone audiometry, complain about having speech-in-noise (SIN) difficulties.^{[3][4]}

- **Research Gap:** Evidence of the self-reported SIN deficits affecting their social interactions among college students is needed. This information will help college students better understand the severity of this issue and encourage them to care more about their auditory well-being.
- **Why fNIRS hyperscanning?:** This neuroimaging technique captures inter-brain coherence during social interactions by monitoring their brain activity simultaneously, offering high temporal resolution and moderate spatial resolution, making it ideal to address questions beyond single-person neuroscience.^{[1][2]}

NOISE EXPOSURE AMONG COLLEGE STUDENTS IN HONG KONG

Prevalence of Self-Reported SIN Difficulties among 39 students:

DIFFICULTY TYPE	PERCENTAGE
NEED FOR REPETITION	29.9%
DIFFICULTY CONVERSING IN NOISY PLACES	22.9%
GREATER DIFFICULTY IN HEARING IN NOISY ENVIRONMENTS	17.4%
FREQUENT TINNITUS	13.5%

High Usage: 85-90% of young adults use personal listening devices regularly.

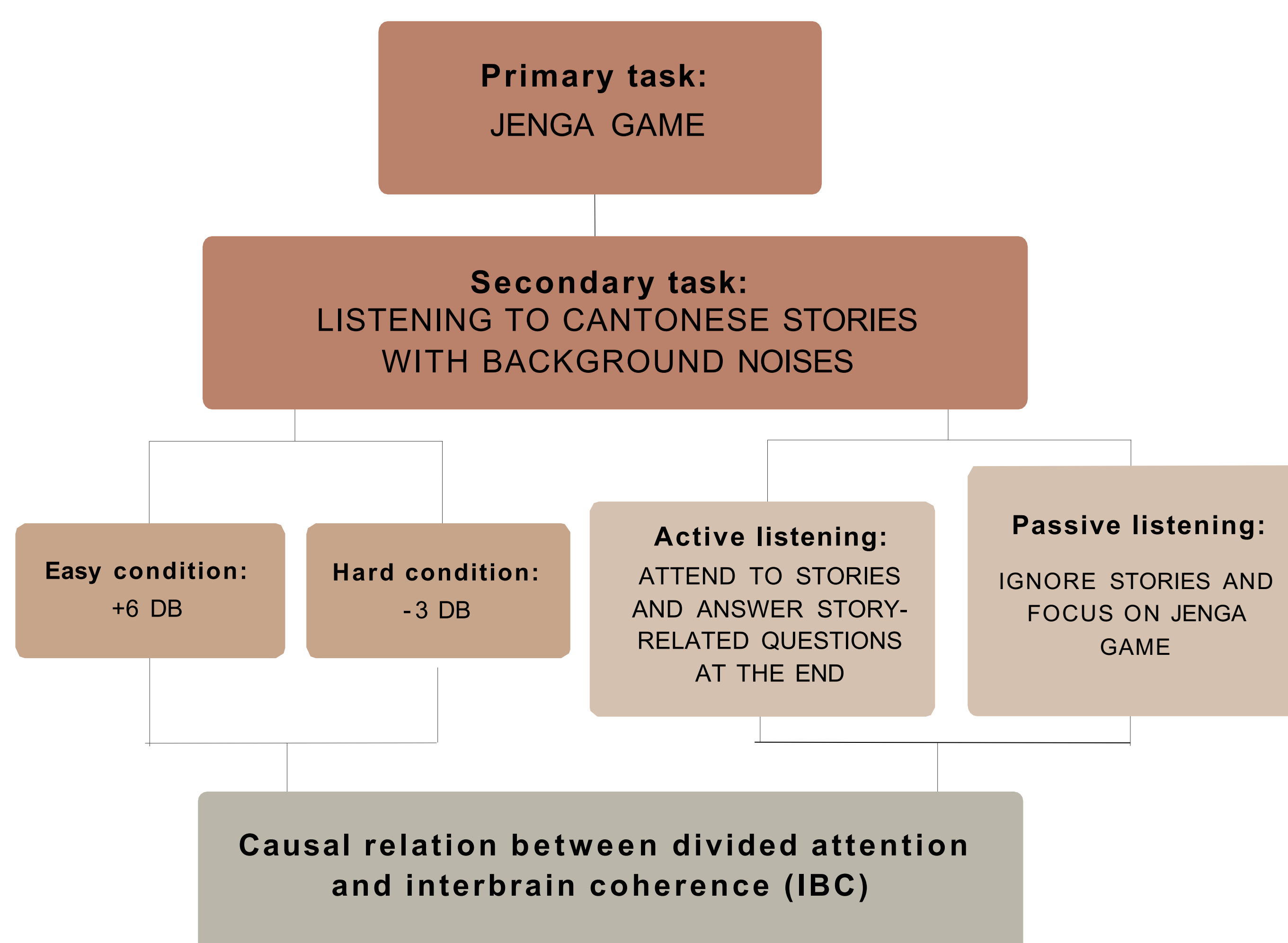
Daily Noise Exposure: Average listening time is 1.61 hours/day.

High Noise Activities: 80% engaged in high noise activities at least once in the past year, particularly KTV.

OBJECTIVE

- To identify the neural features of self-reported SIN deficits on social interaction among this population, we used fNIRS hyperscanning. We will examine social interactions between dyads of young adults with and without self-reported difficulty in speech perception in noise.
- We will investigate their inter-brain connections during social interactions using a dual task paradigm that manipulates their attention to social interaction and speech perception.

METHODS



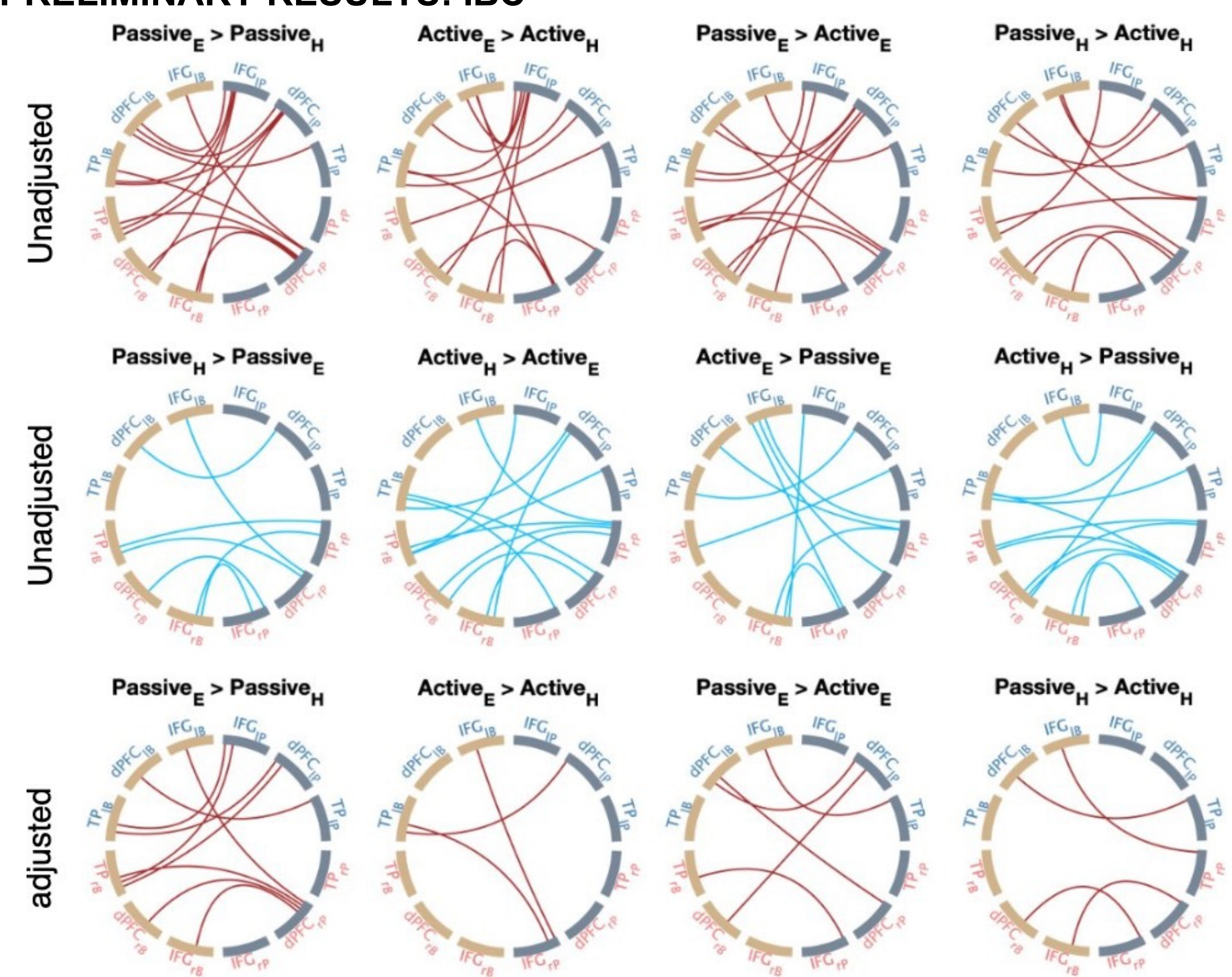
RESULTS

WE HYPOTHESIS THAT...

Differences in task demands (Easy vs. Hard), caused by Signal-to-Noise Ratios, could lead to different impacts on the divided attention to peer interaction in the active listening but not on the passive listening sessions.

Varying levels of noise exposure and more or fewer (self-reported) SIN difficulties of individuals may modulate the IBC during peer interaction and may be predictive of their task performance

PRELIMINARY RESULTS: IBC



CONCLUSION

- ◆ Noise exposure, even for individuals with normal hearing, impacts social interaction and cognitive performance.
- ◆ Preliminary Findings: Indicate potential long-term effects like fatigue and social withdrawal among college students.
- ◆ Future Directions: This research could inform better diagnostic tools and interventions for SIN perception deficits and influence public health strategies and educational practices.

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