

Testing a neurobiological model of inner speech processing

ABSTRACT:

Background

Inner speech (talking or hearing voices in the mind) is a prevalent conscious experience shared by many of us. Research shows that inner speech shares temporal features and neural correlates with overt speech but it remains unclear how inner speech is generated by the brain.

Aims

Because overt speech is perceived optimally when its rhythm is synchronously tracked by oscillatory ‘brain waves’, we ask if inner speech could also be generated or perceived through such brain waves.

Method

We used electroencephalography (EEG) to record neurophysiological signals of inner speech, which was induced by contrasting silent reading of direct speech quotes (e.g., Mary said: “My life is amazing!”) against linguistically-matched indirect speech quotes (e.g., Mary said that her life was amazing.).

Results

In two experiments, we showed that direct (vs. indirect) quote reading was associated with increased phase-locking (i.e. more synchronous brain waves across reading trials) at 3-5Hz frequencies. We did not observe any conditional effects on power (i.e. the amplitude of brain waves). Experimental manipulations on the loudness (loud vs. quiet) or the articulation level (specific or unspecific) of inner speech did not affect the phase (timing) or power (amplitude) of brain waves.

Conclusions

Inner speech in silent reading of speech quotes modulates the phase of the brain’s oscillatory rhythm but does not change the overall level of neural activity. It is likely a perceptual consequence of the brain ‘tuning in’ to frequencies that promote a verbal structure, which arranges phonological representations (i.e. how the words sound) into a melodic whole, giving rise to a sensation of hearing a speech.

Keywords

Direct speech quotes, Electroencephalography, Inner speech; Neural oscillations, Reading

Published Work:

Yao, B., Taylor, J. R., Banks, B., & Kotz, S. A. (2021). Reading direct speech quotes increases theta phase-locking: Evidence for cortical tracking of inner speech? *NeuroImage*, 239, 118313. <https://doi.org/10.1016/j.neuroimage.2021.118313>

Os textos são da exclusiva responsabilidade dos autores
All texts are of the exclusive responsibility of the authors

Researcher's Contacts:

Bo Yao

University of Manchester

Phone: +44(0)161 275 2696

Email: Bo.Yao@manchester.ac.uk