

Entrainment of neural activity underlying speech perception with amplitude-modulated kilohertz magnetic perturbation (AM-kTMP)

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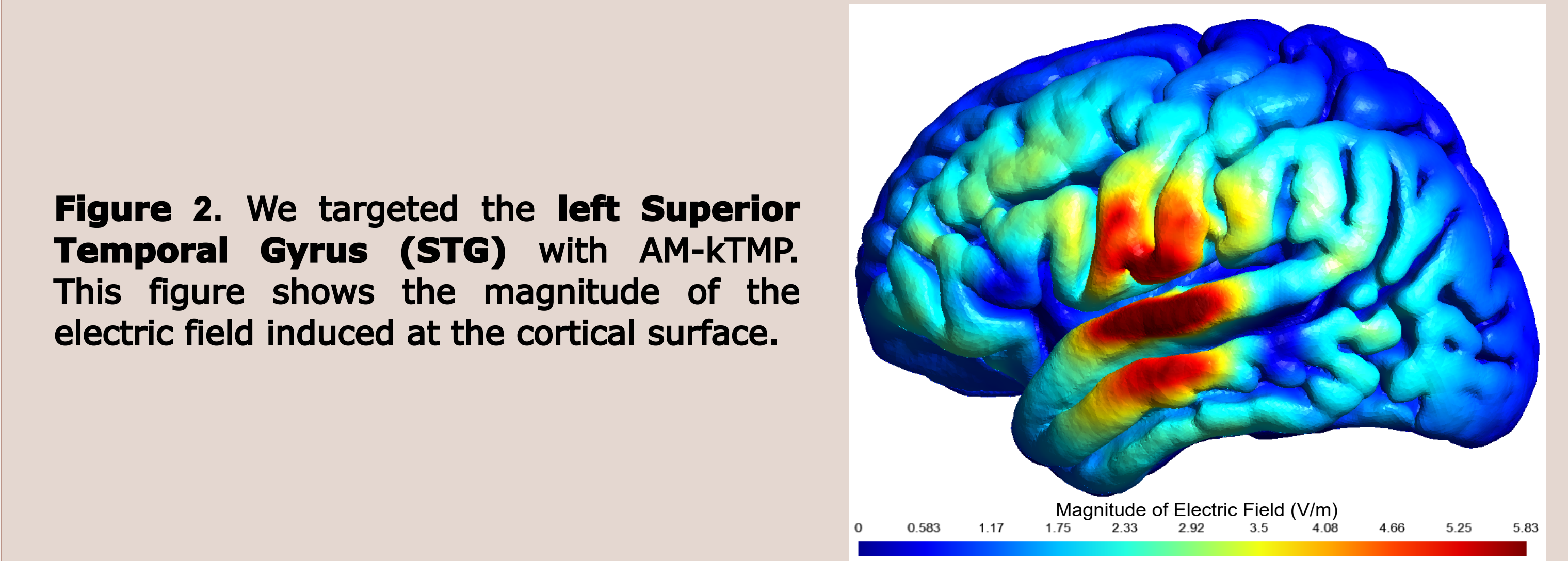
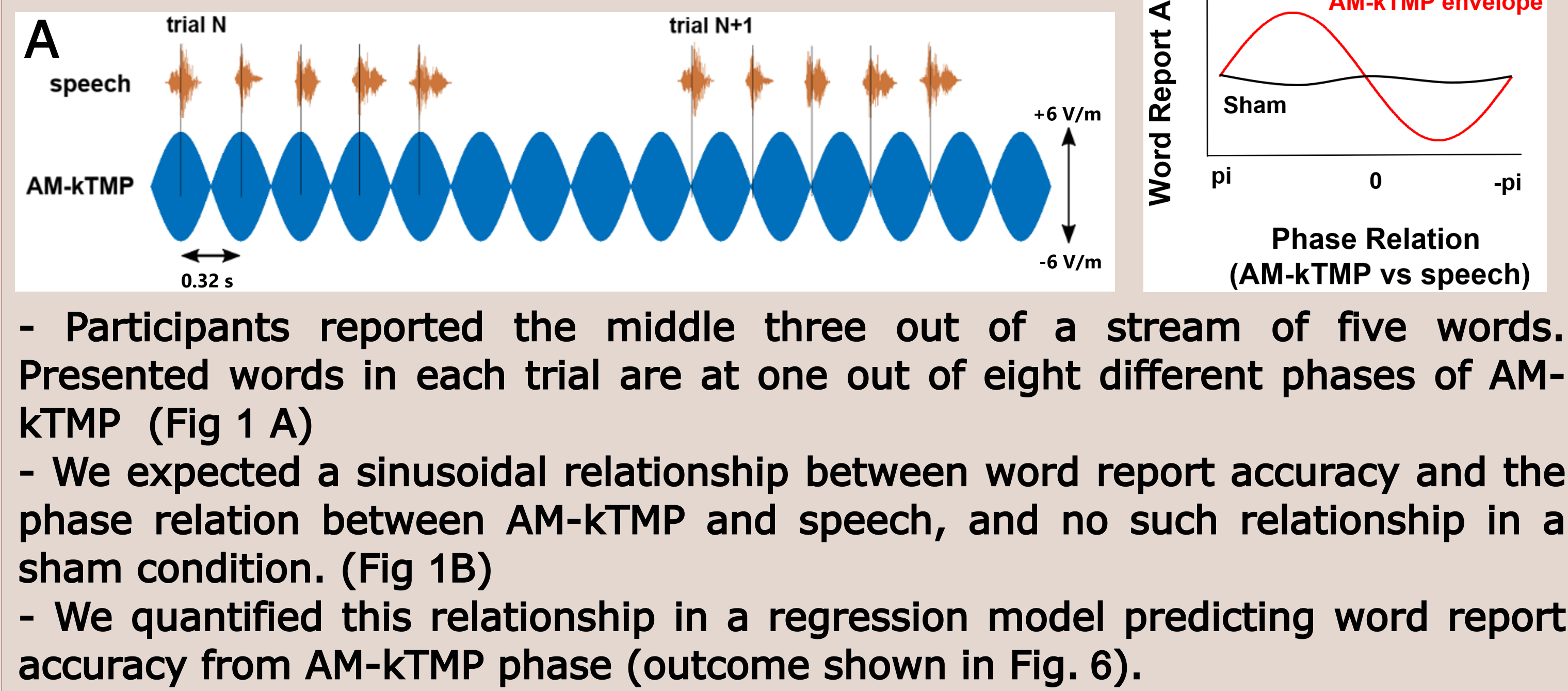
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Background

- Previous studies have used transcranial alternating current stimulation (tACS) to modulate neural oscillations entrained to speech rhythms, demonstrating their causal role in speech perception. ¹
- During tACS, most of the current is shunted by the skin, leading to weak neural stimulation. Transcranial magnetic stimulation (TMS) produces stronger effects, but is restricted to a pulse waveform and produces strong auditory and somatosensory co-stimulation. ^{2,3}
- We used an amplitude-modulated (AM) version of kilohertz Transcranial Magnetic Perturbation (kTMP), a novel form of magnetic stimulation with flexible waveforms and reduced somatosensory co-stimulation.
- We tested whether AM-kTMP entrains neural activity by presenting sequences of rhythmic speech at different phase relations to AM-kTMP, applied simultaneously at **3.125 Hz**.

Methods

- Experimental Design



Summary

- The phase relation between AM-kTMP and speech modulated word report accuracy, indicating an entrainment of neural activity underlying speech perception.
- While the effect sizes observed are comparable to tACS, improvements to the experimental protocol (e.g. individualised, longer stimulation) will likely lead to stronger effects.

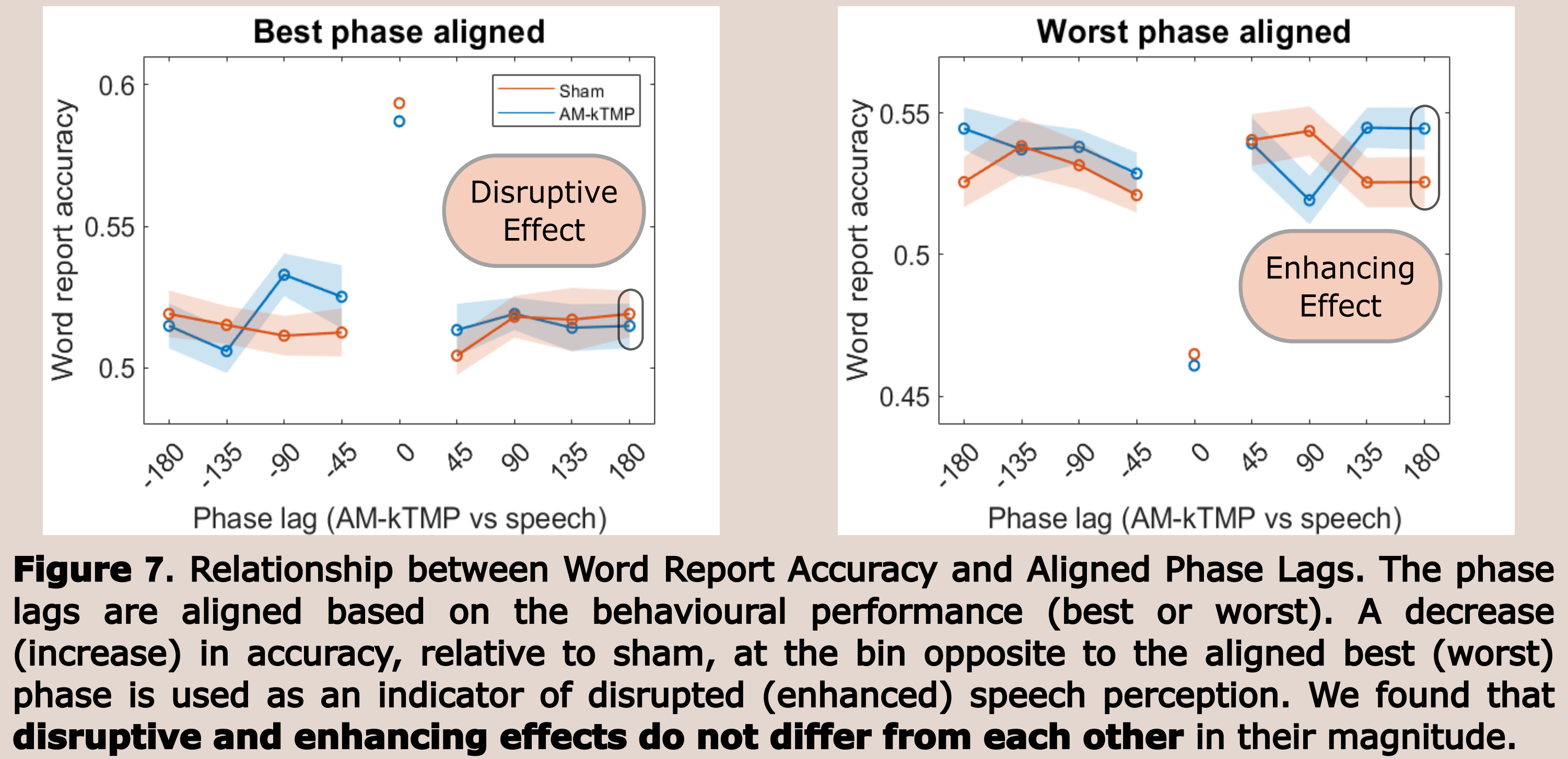
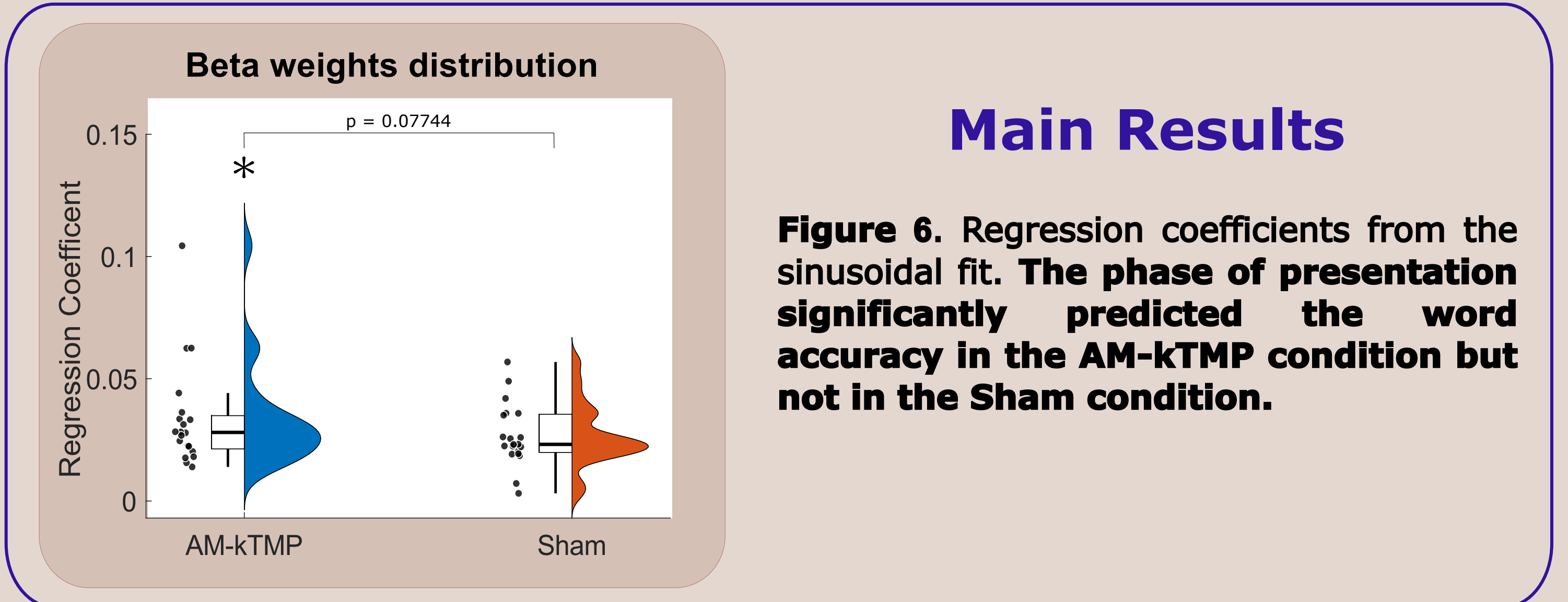
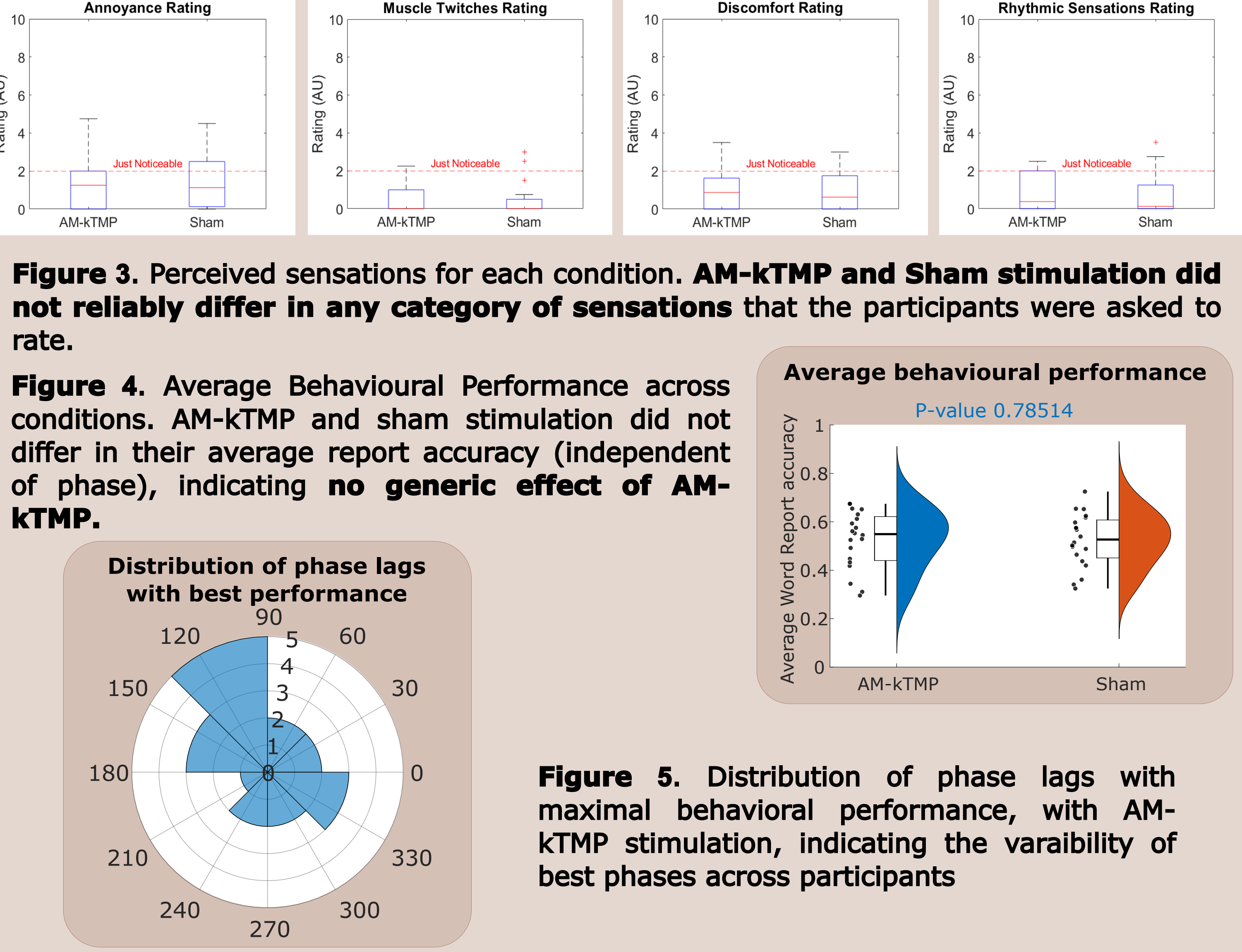
References

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Results



Conflict of Interest

The authors declare the following competing interests: LL, CM, RBI and DS have stock ownership of Magnetic Tides, a non-publicly traded company created to develop new methods of non-invasive brain stimulation. UC Berkeley holds the patent rights related to the kTMP technology and has provided Magnetic Tides with an exclusive licensing agreement.

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